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Mankato/North Mankato Area Planning Organization

Riverfront Drive Corridor Study

Final Report

June 2017

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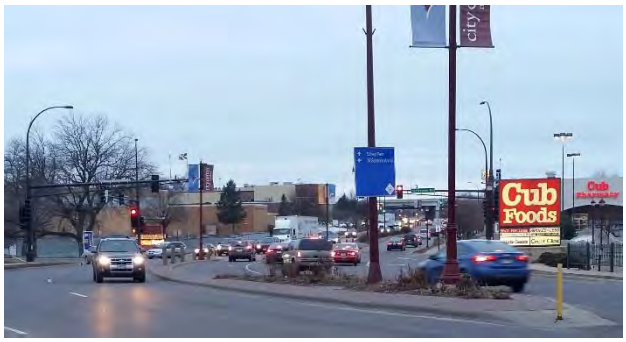
Corridor Context

The Mankato/North Mankato Area Planning Organization (MAPO) and the City of Mankato, in partnership with Blue Earth County and the Minnesota Department of Transportation (MnDOT), completed this study to identify a long-term vision for multimodal improvements on Riverfront Drive in Mankato. The study extent includes Riverfront Drive from Woodland Avenue on the south to Trunk Highway (TH) 14 on the north (**Figure A.1**).

Riverfront Drive serves an important role in providing access and connectivity to downtown Mankato and providing primary connections to other parts of Mankato, North Mankato and the surrounding region, including US Highways 14 and 169. The corridor also serves multiple transportation modes including automobiles, freight, transit, pedestrians and bicyclists. Because of the role Riverfront Drive plays in the local and regional transportation network, it was identified as a priority study corridor in the MAPO 2045 Long Range Transportation Plan. The study was then requested by the City of Mankato and funded through MAPO.



Riverfront Drive looking southwest from Marshall Street during AM peak hour traffic.

Study Partners

The Riverfront Drive Corridor Study was a joint effort between:

- City of Mankato
- MAPO
- MnDOT
- Blue Earth County

Study Objectives

The study partners desired to define a comprehensive vision for Riverfront Drive to continue their momentum in City Center reinvestment while also serving continued growth and local/regional mobility needs over the next 25 years. The study included:

- Defining the issues and potential opportunities along the corridor
- Establishing the corridor vision and goals
- Developing and evaluating potential multimodal infrastructure improvement alternatives
- Developing a short- and long-term implementation plan that identifies potential projects and cost estimates

AM peak hour Traffic backups at the Trunk Highway 14 westbound ramp intersection with Riverfront Drive.

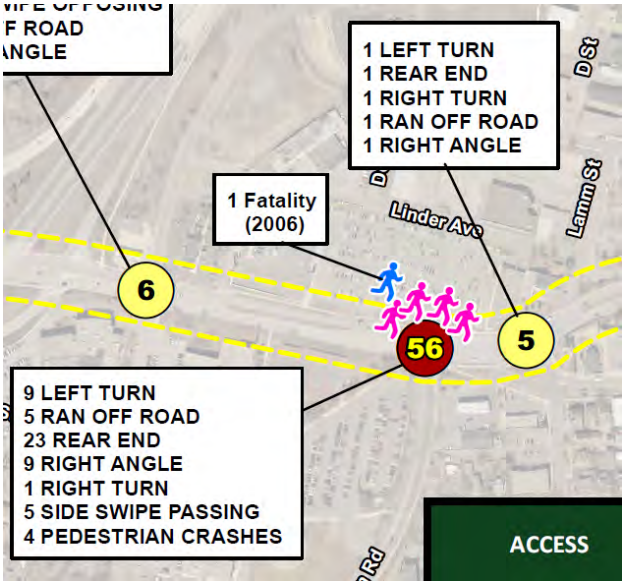
Key Transportation Issues

The corridor study process included a review of existing land use, safety and traffic conditions. Future traffic and redevelopment

opportunities were also considered. This analysis was supported by public, agency and stakeholder input. The following key transportation issues were identified through this process:

- **Mobility and Safety** – Riverfront Drive is an important minor arterial roadway that serves both regional and local traffic. Maintaining mobility on Riverfront Drive while also providing adequate access to businesses, freight users, neighborhoods, pedestrians and bicyclists requires a fine balance. There are a handful of intersections along Riverfront Drive that experience peak hour operational issues today and this is anticipated to worsen as traffic volumes increase.

  Over a five-year period from 2010-2014, there were 244 crashes within the 3.4 miles of the study corridor. Two intersections were identified as having crash rates above the state average.



56 Crashes at the Stoltzman Road/Riverfront Drive intersection from 2010 to 2014 including several pedestrian crashes and one fatality (2006). Source: MNCMAT.

- **Traffic Speeds** – Vehicles traveling above the posted speed are prevalent along the entire corridor study area. Roadway segments exhibiting the highest traffic speeds are between Cherry Street and Plum Street and Adams Street to Good Counsel Drive. Vehicles in these locations were observed travelling greater than 10 mph over the speed limit. The majority of the remainder of the study area observed vehicles traveling between 5-9 mph over the posted speed limit. Speeding traffic is a safety concern and degrades the pedestrian environment.
- **Access -** Overall there are 109 private access locations (32.4/Mile) along the 3.4 mile study corridor. This is especially prevalent in study Segment 4 from Madison Avenue to Good Counsel Drive where there are several a reas of conflicting left turns due to closely spaced access locations. Several of the properties with access to the corridor also have access to a side street. High concentrations of access are typically associated with safety and operational problems.
- **Pedestrian and Bicycle Accommodations -** There is a need to complete gaps in the pedestrian network along Riverfront Drive and an overall desire to make it more comfortable to walk along and across Riverfront Drive. Safer crossings are a priority in the following locations:
  - Mankato West High School to Stoltzman Road (CSAH 16)
  - Throughout the downtown areas from Warren Street to Rock Street
  - To Franklin Elementary School
  - From Good Counsel Drive to the trails on the west side of Riverfront Drive near TH 14

Corridor Goals

Following the identification of issues and needs along Riverfront Drive, study partners developed the following Corridor Study goals:

- Provide efficient vehicle and freight mobility and access
- Safely accommodate all users (vehicles, freight, transit, pedestrians, bicycles)

- Support an inviting and safe pedestrian environment both along and across Riverfront Drive
- Support bicycle connections across Riverfront Drive to designated parallel bike routes and regional trails
- Support future land use and redevelopment plans
- Provide infrastructure improvements compatible with the historic and natural environment
- Enhance community identity

These goals were used to identify and evaluate the trade-offs between improvement options.

Improvement Options and Implementation Plan

Multiple improvement alternatives were identified and evaluated based on the existing conditions analysis and issues and needs identified through public, agency and stakeholder involvement. The improvement options were presented to the public and stakeholders for review and prioritization. Meetings were held with the Mankato City Council, Blue Earth County Board of Commissioners, MnDOT D7 staff and key stakeholders along the corridor including Mankato School District, Mankato YMCA, Cub Foods, Hy-Vee, the Old Town District and Coughlan Quarry representatives. At the final public open house, attendees were asked to help prioritize improvements into implementation timeframes. Attendees were given the opportunity to identify their top three priorities for each of the following implementation timeframes:

- Short-Term (0-5 years) – These improvements are typically smaller, spot improvements that have a lower cost but yet high benefit in terms of addressing existing issues on Riverfront Drive. Because of their smaller size, these improvements could be implemented within the next five years and serve the corridor well for many years into the future.
- Mid-Term (6-15 years) - Projects in this category tend to be larger in size than the short-term projects and may be more feasible to implement in conjunction with a comprehensive infrastructure improvement project such as a street reconstruction project.
- Opportunity/Development/Safety Driven – Projects in this category were identified for the long-term. These are areas that may not have an immediate need for an improvement today but could become problematic over the longer term if 20-year traffic forecasts are realized or safety problems arise. Not all of these improvements are feasible today with the existing land uses along the corridor. They would only be considered if land uses change or opportunities arise that make these options more feasible.

The table on the following page documents the study recommendations into implementation timeframes based on input from study partners, corridor stakeholders, the public and elected officials.

Next Steps

Additional design, studies and public input will be needed for each of the recommended improvement options to move forward. The purpose of the Riverfront Drive Corridor Study was to develop a long-term plan for improvements to Riverfront Drive. The concepts developed as part of this study are high-level and will need additional refinement through preliminary and final design. Environmental review and permitting will also be required with exact requirements based on the scope of the project and the funding source.

The improvement options identified within this study and the projects prioritized as part of the implementation plan will help the City of Mankato continue to maintain a functioning yet safe minor arterial roadway.

Study partners must continue to work together to further plan, obtain funding, design, and

Riverfront Drive Implementation Plan

Priority*	Segment/ Project #	Project Description	Estimated Cost**	Comments
Short-Term 0 to 5 Years	1A OR 1B	Triple Lefts at TH 169 South Ramp, Add Right Turn Lane on Riverfront to YMCA/School, Two-Stage Pedestrian Crossing (School to Cub Foods), Add Right Turn Lane on Stoltzman Double Lefts at TH 169 South Ramp, 3/4 at Poplar Street with Median, Add Right Turn Lane on Stoltzman	$700,000 - $1.0M	Could choose Either 1A OR 1B. Need to further investigate the feasibility of adding a 3rd lane under the TH 169 bridge with Option 1A. Requires coordination with MnDOT and Blue Earth County. MnDOT has a TH 169 bridge rehab project programmed for 2024.
	Cub Foods New Public Street	Establish a public street connection from Riverfront Drive to Linder Ave through the Cub Foods parking lot drive lane	$175,000	Requires close coordination with property owner.
	2	Lane alignment modifications to the Riverfront Drive intersections with Warren Street and Cherry Street	$40,000	Opportunity to study needs at the Warren/Poplar St intersection with Riverfront Drive further during the 2017-2018 Warren Street studies.
	2	Installation of protected lefts on Warren Street/Popular Street and Southbound Riverfront Drive at Cherry Street	$35,500	Opportunity to study needs at the Warren/Poplar St intersection with Riverfront Drive further during the 2017-2018 Warren Street studies.
	2, 3	Test a 3-Lane on Riverfront Drive from Cherry Street to Vine Street Test 2nd Street enhancements (bump-outs, marked crosswalks, etc.) at same time as Riverfront Drive	$55,000 - $65,000	Estimated cost is to test a 3-lane. The lower cost represents using paint and the upper range is for using removable tape striping. Testing 2nd St enhancements would be an additional cost of $900 per bump-out and $900 per crosswalk.
	3	Add wayfinding for public parking locations and public spaces.	$6,000	$500 per sign
	5	Construct roundabout at TH 14 North Ramp	$750,000	Requires coordination with MnDOT and Blue Earth County.
		Subtotal	*$2.0 - $2.5M*	
Mid-term 6 to 15 Years	2-1A OR 2-2	4-Lane narrow median to add sidewalk on east side of Riverfront Drive 3-lanes to add sidewalk on east side of Riverfront Drive.	$1.2M OR $450,000	3-lane in Segment 2 would need to be paired with 3-lane in Segment 3. Both options maintain full access at Civic Center Plaza/back parking lot to Hy-Vee. A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
	All Segment 3 Options	Remove free-right at Plum Street	$60,000	A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
	3-1 OR 3-2, 3-2B, 3-3, 3-4	4-Lane with Pedestrian Flasher (RRFB) at Rock St or Elm St (wherever traffic signal is not present) One of 3-Lane Options (if comfortable after 3-Lane test period)	$300,000 - $800,000	These costs include removing the free right at Plum. Consider an overhead RRFB system if a 4-lane is maintained on Riverfront Drive. A ground mounted RRFB system could be considered with a 3-lane. A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
		Subtotal	*$750,000 - $2.0M*	
Opportunity / Development / Safety Driven	All Segment 1 Options	Extend a public street the proposed Cub Food public street extension at Linder Ave to Sibley Parkway	$300,000	Development driven with former City Public Works site
	All Segment 1 Options	Grade Separated Trail Crossing near Poplar Street	$1- $1.5M	Reevaluate need after short-term improvements to Segment 1 of Riverfront Drive are implemented.
	1-2A	Roundabouts at TH 169 Ramp intersections with Riverfront Drive and Stoltzman Road.	$5M	Will require right-of-way acquisition and coordination with adjacent property owners. A major rehab/reconstruction project on Riverfront Drive in this segment is anticipated in the 2031-2045 timeframe.
	1-2B	Roundabout at TH 169 South Ramp and Stoltzman Road. Six-legged roundabout with 169 North Ramp and Poplar Street.	$6.5M	Not supported by YMCA or School
	1-3A	Diverging Diamond at TH 169; right-in/right-out at Poplar St/YMCA and School access	$4.5M	Not supported by YMCA or School
	1-3B	Add a loop ramp to the TH 169 interchange; raise Riverfront Drive to accommodate.	$4.5M	Will require additional city street network enhancements. A major rehab/reconstruction project on Riverfront Drive in this segment is anticipated in the 2031-2045 timeframe.
	2-1B	4-Lane Shift West	$2.2M	Feasible only if Hy-Vee decides to expand on a new building footprint. Allows wide center median to remain.
	4	Median on Riverfront Drive at Adams Street with trail extension to 3rd Avenue	TBD	Trail extension addresses need identified in Safe Routes to School Plan.
	4	3rd Avenue/Madison - 3rd Avenue Realignment to 4th Leg of Madison Ave/Riverfront Dr intersection	TBD	Development driven in conjunction with Coughlan Mine redevelopment
	4	3rd Avenue/Madison - 3rd Avenue T-intersection at extended Madison Ave	TBD	Development driven in conjunction with Coughlan Mine redevelopment
	4	3rd Avenue/Madison - 3rd Avenue T-intersection to Adams Street extension	TBD	Development driven in conjunction with Coughlan Mine redevelopment. This option not supported by Blue Earth County.
	4	3rd Avenue/Madison - Median at 3rd Avenue	TBD	Development driven in conjunction with Coughlan Mine redevelopment. This option not supported by Blue Earth County.
	4	Madison Ave to Good Counsel Drive: Reevaluate - with of the street, number of lanes, access to Riverfront, and primary intersection locations	TBD	Consider when infrastructure improvements are needed, land use changes or as opportunities arise with individual business/property owners. A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
	5	Construct roundabout at TH 14 South Ramp	$750,000	Consider when operational and/or safety need is present or construct at same time as TH 14 North Ramp roundabout for consistency in driver expectations.

**Timing of all projects dependent upon funding availability.*

*** All estimated costs are for individual improvements only. Costs do not account for any reconstruction needs of Riverfront Drive.*

implement the recommended improvement projects. All partners have an active role in implementing these improvements. All competitive funding sources should be considered. Agencies should also update their comprehensive and transportation plans to include these findings to better leverage funding sources.

II. Introduction

The Mankato/North Mankato Area Planning Organization (MAPO) and the City of Mankato, in partnership with Blue Earth County and the Minnesota Department of Transportation (MnDOT), completed this study to identify a long-term vision for multimodal improvements on Riverfront Drive in Mankato. The study extent includes Riverfront Drive from Woodland Avenue on the south to Trunk Highway (TH) 14 on the north (**Figure A.1**). Unless otherwise present in the study report, figures are included in **Appendix A**.

Riverfront Drive serves an important role in providing access and connectivity to downtown Mankato and providing primary connections to other parts of Mankato, North Mankato and the surrounding region, including US Highways 14 and 169. The corridor also serves multiple transportation modes including automobiles, freight, transit, pedestrians and bicyclists.

Because of the role Riverfront Drive plays in the local and regional transportation network, it was identified as a priority study corridor in the MAPO 2045 Long Range Transportation Plan. The study was then requested by the City of Mankato and funded through MAPO.

The study partners desired to define a comprehensive vision for Riverfront Drive to continue their momentum in City Center reinvestment while also serving continued growth and local/regional mobility needs over the next 25 years. The study included:

- Defining the issues and potential opportunities along the corridor
- Establishing the corridor vision and goals
- Developing and evaluating potential multimodal infrastructure improvement alternatives
- Developing a short- and long-term implementation plan that identifies potential projects and cost estimates

The remainder of the study report is organized into sections to provide context on the study background and purpose, agencies involved, existing and future conditions, improvement options, recommendations and an implementation plan.

Within each of these report sections, you will find references to individual study segments. The Riverfront Drive corridor was separated into five segments in order to best analyze issues within varying contextual differences and to best manage the information with the overall size of the study area. The following segments of Riverfront Drive were analyzed as part of this study:

- Segment 1 - Woodland Avenue to Sibley Parkway
- Segment 2 - Sibley Parkway to the Veteran’s Memorial Bridge
- Segment 3 - Veteran’s Memorial Bridge to Madison Avenue
- Segment 4 - Madison Avenue to Good Counsel Drive
- Segment 5 - Good Counsel Drive to TH 14.

III. Study Partners

The Riverfront Drive Corridor Study was a joint effort between:

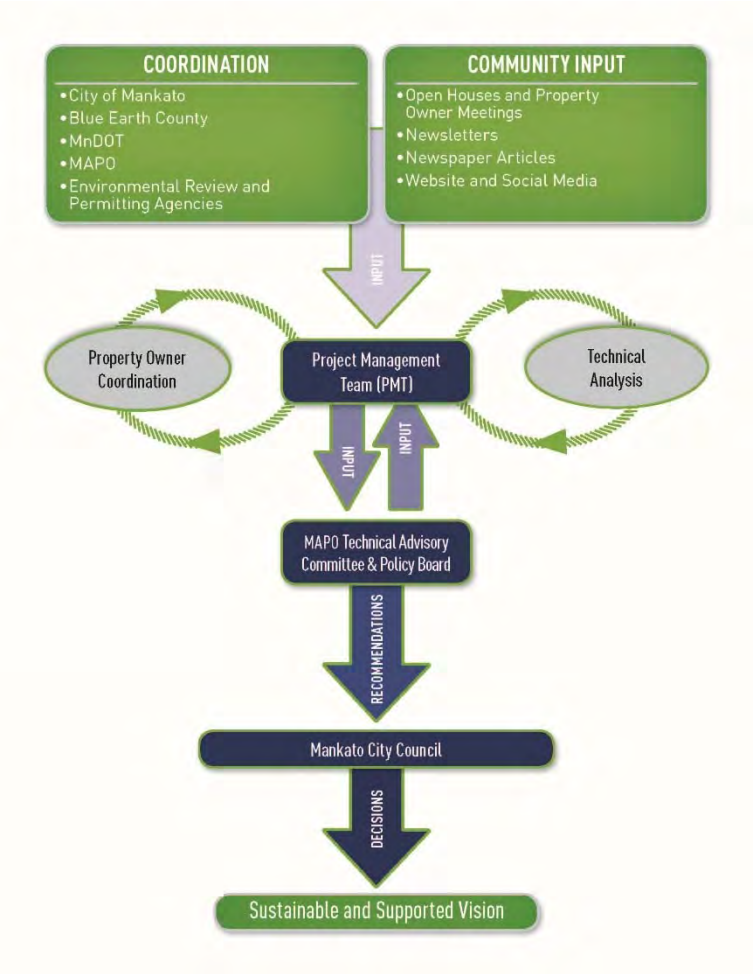
- City of Mankato
- MAPO
- MnDOT
- Blue Earth County

These agencies served as a Project Management Team (PMT) and met monthly throughout the study process to review and discuss study progress and technical deliverables.

IV. Public Involvement

Public involvement was an integral part of the Riverfront Drive Corridor Study. Input from business owners, property owners, interested citizens, elected officials and other corridor users was critical to understanding issues and needs and to vet improvement concepts and priorities. **Figure 1** below outlines the different groups, outreach activities, and their interaction and roles in the overall study's decision-making process.

Figure 1 - Decision-Making Process



The following methods were used to promote public involvement during the study:

1. *Public Informational Meetings* – Two public information meetings were held as a part of this study. The first occurred during the early phases of the study to solicit input on issues, needs and opportunities along the corridor considering existing traffic operations, crash history, existing access, and future land use within the study area. The second occurred in the last phase of the study to gather input on the range of improvement concepts studied, preliminary recommendations, and prioritization for future implementation of projects. Public information meeting summaries are included in **Appendix B.**

2. *Property/Business Owner Meetings* – Project staff met with 16 different property/business owners and representatives throughout the study process. Property/business representatives included members from the Mankato School District, Mankato YMCA, Old Town retail and service businesses and industrial/freight users (CHS, Ardent Mills, Dotson Iron Castings, Crown Cork & Seal), major grocery stores, Coughlan Quarry representatives, and the Tourtellotte Park Neighborhood. Two phases of outreach were conducted with Riverfront

Drive property/business owners. The first phase occurred early in the study process and allowed these stakeholders an opportunity to share their input on issues, needs and concerns with Riverfront Drive and their individual operations. The second phase of outreach occurred with key stakeholders such as the Mankato School District, YMCA, Old Town District and the major grocery stores. Project staff shared the range of improvement concepts under study and gathered input from these stakeholders on likes/dislikes. A full summary of the meetings with the Riverfront Drive business and property owners can be seen in **Appendix C.**

3. *Agency and Elected Official Updates* – Meetings were held with several agencies and elected officials to review the range of alternatives generated from this study. These included work sessions with the Mankato City Council and the Blue Earth County Board, and meetings with MnDOT District 7 planning and engineering staff. The final report was presented to the Mankato Planning Commission on June 28, 2017 and the Mankato City Council on August 14, 2017.

4. *MAPO Updates* – Study updates were provided to the MAPO Technical Advisory Committee (TAC) in July and January. Similar updates were provided to the MAPO Policy Board in February and May 2017.

5. *Study Communications* – Bolton & Menk, Inc. hosted a project website for the Riverfront Drive Corridor Study throughout the entire process at https://www.bolton-menk.com/clients/mapo/riverfront/ . Study documents, concept alternatives and public involvement notices were posted on the website at key study milestones. Newsletters were also prepared for each public information meeting and sent to stakeholders along Riverfront Drive and a press release was included in the Mankato Free Press Newspaper as notice to the community.

V. Existing Conditions

Existing conditions were documented on Riverfront Drive with a focus on previous studies, land use, traffic operations, safety, access, pedestrian/bicycle accommodations and environmental resources. This information served as the framework for developing improvement goals for Riverfront Drive into the future.

Previous Studies Overview

Several short- and long-range documents have been completed which provide planning direction for future transportation system needs within and near the Riverfront Drive corridor. The key points in each study relevant to Riverfront Drive are summarized below by plan title.

MAPO 2045 Long Range Transportation Plan (2015)

- Riverfront Drive is a minor arterial roadway.
- Identifies the following congested roadway segments by 2045:
    - Cherry Street: Riverfront Drive to 5th Street – Level of Service (LOS) E and volume-to-capacity (V/C) ratio of .98.
    - S. Riverfront Drive: Highway 169 to Lamm Street – LOS E with V/C ratio of .89.
    - Interchange deficiencies at Riverfront Drive and TH 14 related to intersection geometry and traffic control. Notes previous studies recommend multi-lane roundabouts or traffic signals as solutions.
    - Gap in paved trail system between the western terminus of the Sakatah Signing Hills State Trail at the TH 14 interchange and Dukes Street.

Old Town Master Plan (2016)

- A master plan for the Old Town area that serves as an update to the City Center Renaissance Plan's implementation tactics in light of several identified changes and challenges within the area.
- Provides Implementation Tactics for developing a plan to reuse the Coughlan Quarry area for future development. Redevelopment of this area will create a trip generator for vehicular and pedestrian traffic alike with a variety of potential uses. Future study recommended to determine use.
- Need to facilitate connections and linkages by examining Riverfront Drive and Second Street to reduce traffic speeds and address pedestrian safety concerns. The following suggestions were noted to accomplish this:
    - Convert Riverfront Drive to a three-lane section with a center turn lane
    - Install additional pedestrian crossing control signals
    - Facilitate truck turning movements
    - Accommodate bicycle lanes on Second Street
    - Develop additional on-street parking options with adjusted lanes
- Encourage a walkable environment on Riverfront Drive and Second Street by providing safe pedestrian connections between neighborhoods. Suggestions to accomplish this included:
    - Streetscaping that creates friction to slow traffic such as implementation of sidewalk bumpouts that reduce the street width and provide space for benches, art, landscaping, and lighting
    - Accentuated crosswalks to focus attention on pedestrian connections
    - Bike lanes along Second Street to assist with traffic calming and connectivity
    - Wider sidewalks (12ft min.) to encourage pedestrian movement and sidewalk cafes

- Incorporation of art and other streetscaping to enhance character
- Pedestrian scaled period lighting for safety and character
- Improvements to pedestrian crossings, particularly at the Riverfront Drive/Rock Street gateway to Riverfront Park
- Mid-block pedestrian crossings with center refuge and signals with accentuated patterns, materials, and colors to bring attention to pedestrians
- Enhanced connections to Washington Park from Riverfront Drive including bumpouts, patterned crosswalks and pedestrian signals
- Enhancements to the crossing elements at the intersections of Plum Street, Mulberry Street (at Second Street), and Main Street
- Integration of a multi-modal transportation network as redevelopment occurs
- Public transportation alternatives for connectivity and accessibility
- Other items such as permeable pavement, accentuated alley surfaces, and buried powerlines to improve the pedestrian environment

Preliminary ICE Traffic Analysis Report: TH 14 at Riverfront Drive (2015)

- Recommended single-lane roundabouts at both ramp intersections to alleviate delays caused by limited gaps in traffic during peak hours.

Preliminary ICE Traffic Analysis Report: TH 169/60/60 at Riverfront Drive (2015)

- Recommended change in signal timing as a short-term solution to alleviate backups on the TH 169/60/60 SB ramp intersection with S. Riverfront Drive.
- Recommended development of alternative intersection designs to meet future demands including the addition of turn lanes at Poplar Street, a potential multi-lane roundabout at the Riverfront Drive/Stoltzman Road (CSAH 16) intersection, modifications to the TH 169/60 entrance ramp, increases to turn lane lengths at several locations, and other modifications.

Front Street Connectivity Plan (2014)

- Plan's focus is on improving accessibility of Front Street from Main Street to Liberty Street.
- Recommended maximizing or maintain parking levels in study area.
- Recommended improving pedestrian connectivity to entertainment, retail, lodging and recreational areas – wayfinding signage at E. Cherry Street and S. Riverfront Drive and Main Street and S. Riverfront Drive.

Wayfinding Signage Plan (2015)

- Recommends addition of wayfinding signage to announce arrival to and assist with navigation through the City Center. Signage may include informational kiosks, pedestrian signage on sidewalks, and vehicular signage directing to public parking and other points of interest.
- Signage staged in two phases. Phase 1 (2015) included the intersections of Riverfront Drive and Sibley Parkway, Warren Street, Main Street, and Rock Street. Phase 2 (2016) includes the intersections of Riverfront Drive and Cherry Street, Plum Street, Spring Street, and Civic Center Plaza

Complete Streets Plan (2015)

- Outlines the Broad Street Project which is a 3-mile bicycle link from the north side of the City, through the City Center and eventually Stoltzman Road (CSAH 16).
- Outlines the West Pleasant Street Project that will utilize West Pleasant Street to connect the Broad Street Project to the Red Jacket Trail.
- There is one bicycle facility planned along Riverfront Drive completing the connection of the Sakatah Singing Hills State Trail under the TH 14 overpass and across Riverfront Drive to

Good Counsel Drive. For the rest of the corridor, emphasis is on Broad Street to accommodate bicycles with lane construction projects slated for 2016, 2017 and 2018 along this parallel route.

- Identifies a future bicycle route (year unidentified) will cross Riverfront Drive at Elm Street for access to Riverfront Park.
- Identifies a future bicycle route along Woodland Avenue accessing Sibley Park.

Mankato Area Public School's Safe Routes to School Plan (2013)

- Franklin Elementary School recommendations include converting N. Riverfront Drive from a four-lane road to a three-lane road from Madison Avenue to TH 14 to calm traffic and promote multi-modal use.
- Roosevelt Elementary School recommendations include the installation of pedestrian crossing signs at the intersection of Sibley Street and S. Riverfront Drive and at the crosswalk of the Minneopa Bike Trail and S. Riverfront Drive to encourage pedestrian awareness.
- Roosevelt Elementary School recommendations also include Sibley Street (CSAH 8) and S. Riverfront Drive improvement with pedestrian bump-outs, pedestrian refuge medians and lane configuration changes such as a four-lane to three-lane section. (See also project listed below)

Safe Routes to School Project (2017)

- Utilizes a $229,000 Safe Routes to School Grant for traffic calming and crosswalk improvements at the intersection of Riverfront Drive and Sibley Street. Project proposes to reduce Riverfront Drive to one lane in each direction and southbound left-turn lane at Sibley Street with a rectangular rapid flash beacon at the crosswalk.

Railroad Corridor Mitigation Plan (2009)

- Calls for pedestrian railroad underpass to be located on Sibley Street to provide connections to school sidewalks. The pedestrian underpass would also serve as access for emergency vehicles.
- Proposes to close rail crossings at Hubbell Avenue and Owatonna Street.
- Proposes addition of a vehicle turn around on Owatonna Street north of the tracks.
- Proposes a pedestrian plaza at the Minnesota River's edge that would be elevated over railroad tracks adjacent to the intersection of Riverfront Drive and Hickory Street. A skyway connection would extend to the City's second level skyway system, the downtown mall, the parking garages, and the Verizon Wireless Center.

Calls for Main Street at-grade crossing of the tracks to be closed and a security gate installed at the flood wall. This would prevent pedestrians/bicyclists from accessing the N. Minnesota River Trail at this location along Riverfront Drive.

Demographics and Trends

Located in south central Minnesota, the Mankato/North Mankato metropolitan planning area is 75 miles south of Minneapolis-St. Paul at the junction of TH 14 and TH 169/60. The area has experienced widespread growth across the metropolitan area and serves southern Minnesota as a hub for health care, education, retail, agriculture, and industry. The area is comprised of Mankato, North Mankato, Eagle Lake and Skyline; Blue Earth and Nicollet counties; and Belgrade, Lime, South Bend, LeRay and Mankato townships.

Population

The Mankato/North Mankato area has seen rapid growth. In 2010, the Metropolitan Statistical Area (MSA) population was 96,740 with an urbanized population of 58,265. The 2010 population estimate represents a 12.9% change from the year 2000 for the MSA. Table 1 illustrates historic

population figures referenced from the Mankato/North Mankato Metropolitan Planning Organization's (MAPO) 2045 Long Range Transportation Plan.

A large portion of the rapid growth occurred in Mankato alone, exhibiting 21.2% change within the decade. Much of the growth probably occurred in the first half of the decade as indicators show decline after 2007. More recent estimates indicate that growth has slowed to a more moderate rate. Trends implied the MAPO area added 450 to 535 people annually at the time the 2045 plan was developed.

	1980 CENSUS	1990 CENSUS	2000 CENSUS	% CHANGE 2000-2010	2010 CENSUS	% CHANGE 2000-2010	2015 ESTIMATE
Mankato	28,651	31,477	32,427	3.0%	39,309	21.2%	41,044
MSA	79,243	82,120	85,712	4.4%	96,740	12.9%	99,134

Table 1 - 1980 – 2010 Historic Population
(Source: US Census Bureau; Minnesota State Demographer (Mankato Area Housing Study Update, 2013; MAPO 2045 Long Range Transportation Plan.)

Age

The population's age distribution is important as it effects transportation usage. Within the period from 2000 to 2010, 18-34 year olds as well as those of retirement age saw the highest increases in populations indicating increased commuters and dial-a-ride transit users. Retirees exhibited the greatest increase in population while 18-20 year olds represented the largest demographic group. With a large 18-20 year old group, the area may see a higher demand for pedestrian and bicycle amenities.

Employment

Most household trips include travel to and from places of employment. Mankato and North Mankato are the major employment centers for the region with a labor shed spanning 16 counties. There is a net inflow of primary jobs in the MAPO market area meaning there are more jobs in the market than people living in the market area. Almost 72 percent of labor force living in the market area also work there.

	MSA		
AGE	2000	2010	CHANGE
0-9	9,869	11,466	1,597
10-17	9,447	8,298	(1,149)
18-20	17,249	19,606	2,357
25-34	10,460	13,342	2,882
35-44	11,879	10,009	(1,870)
45-54	10,640	12,129	1,489
55-64	6,161	10,411	4,250
65-74	4,785	5,627	842
75-84	3,649	3,867	218
85+	1,573	1,985	412
Total	**85,712**	**96,740**	**11,028**

Table 2 - Population by Age
(Source: US Census Bureau; MAPO 2045 Long Range Transportation Plan).

Transportation System Characteristics

The transportation network characteristics identify major qualities of the physical roadway system of Riverfront Drive and its connections. The following section provides details on existing roadway conditions including descriptions of functional classification and connections, speed limits, number of lanes and parking accommodations.

Functional Classification

The functional classification system is used to create a roadway network that efficiently collects and distributes traffic from neighborhoods to the state highway system. A successful system coordinates and manages mobility, roadway design, and route alignment as well as seeks to match current and future access and land use with the adjacent roadway's purpose, speeds, and spacing. The functional classification system is comprised of principal arterials, minor arterials, major and minor collectors, and local roadways.

Riverfront Drive serves as a minor arterial roadway running the entire length of Mankato. It serves a diverse mix of personal vehicle, freight, transit, bicycle, and pedestrian traffic. From a regional perspective, mobility on Riverfront Drive is important, with vital interchange connections to

Highways 14 and 169/60, the two principal arterial highways running through Mankato. Riverfront Drive provides connections to the following minor arterial roadways: Sibley Street (MN Highway 66), Stoltzman Road (CSAH 16), Warren Street, Cherry Street, Main Street, Veteran's Memorial Bridge, Madison Avenue, 3rd Avenue (CSAH 5) and North Riverfront Drive (CSAH 57). Riverfront Drive also provides a cross community function for local and regional trips. All of this creates a challenge in balancing mobility and access along the roadway. See MAPO's Functional Classification Map in **Appendix D**.

Existing Traffic Speeds

The posted speed limit is 30 miles per hour (mph) from Woodland Avenue to Ann Street. Traffic speeds transition from 30 to 35 mph north of Ann Street and from 35 to 40 mph at Dukes Street/Good Counsel Drive. From this point, speeds increase to 45 mph north of the TH 14 interchange.

The following existing traffic speeds were collected during the May 2016 traffic data collection counts:

- Woodland Avenue to Sibley Parkway: Traffic has been documented as traveling five to nine MPH above the posted speed limit north of the TH 169/60 interchange. South of the interchange, southbound traffic continues with this trend while northbound traffic exhibits speeds of one to four MPH above the limit.
- Sibley Parkway to Veteran's Memorial Bridge: The majority of north and southbound movements exhibit vehicles traveling five to nine mph above the speed limit while the section of roadway between Cherry Street/Minnesota Streets and Plum Street exhibits vehicles traveling at 10+ mph above the posted speed limit.
- Veteran's Memorial Bridge to Madison Avenue: Most of this segment exhibited traffic traveling at five to nine mph above the posted speed limit. Traffic between the bridge and Plum Street traveling southbound is documented as traveling 10+ MPH over the posted limit.
- Madison Avenue to TH 14: Traffic from Madison Avenue to Adams Street was observed traveling five to nine mph above the posted speed limit of 30 mph. Traffic traveling northbound between Adams Street and Good Counsel Drive exhibit speeds in excess of 10 mph over the posted speed limit of 30/35 mph. The same situation is exhibited in the southbound lanes between May Street and Adams Street.

Existing Number of Lanes and Parking Accommodations

Riverfront Drive is a two-lane undivided roadway between Woodland Avenue and Sibley Street. On-street parking is permitted on the west side of the corridor in this segment. From Sibley Street to TH 169/60 southbound ramp/Owatonna Street, Riverfront Drive is a four-lane undivided roadway and north of this area it transitions to a four-lane divided roadway. The intersections of TH 169/60 southbound ramps/Owatonna Street, Poplar Street/Mankato West High School, Stoltzman Road (CSAH 16) and Marshall Street are signalized with dedicated left turn lanes along Riverfront Drive. There are also dedicated right turn lanes on Riverfront Drive at Marshall Street and Stoltzman Road (CSAH 16).

Riverfront Drive is a four lane divided roadway from Sibley Parkway to the Veteran's Memorial Bridge. All intersections with Riverfront Drive in this segment are signalized with dedicated left turn lanes along the corridor. Dedicated right turn lanes exist for northbound traffic at Main Street, southbound traffic at Minnesota Street/Cherry Street, and southbound traffic at Sibley Parkway.

Between Madison Avenue and Plum Street, Riverfront Drive is a four lane undivided roadway. Traffic signals exist at Plum Street, Elm Street, and Madison Avenue. The lack of turn lanes in this segment are a concern from both a traffic operations and safety perspective. Observed traffic behaviors in this segment include weaving to avoid turning traffic and/or parallel parking traffic (on northbound side of Riverfront Drive between Washington Street and Vine Street).

Riverfront Drive is a four lane undivided roadway from Madison Avenue to Good Counsel Drive and four lane divided from Good Counsel Drive to TH 14. There is a two way left turn lane along Riverfront Drive from Lafayette Street to Ruth Street. All intersections in this area are side-street stop controlled with Riverfront Drive having the right of way.

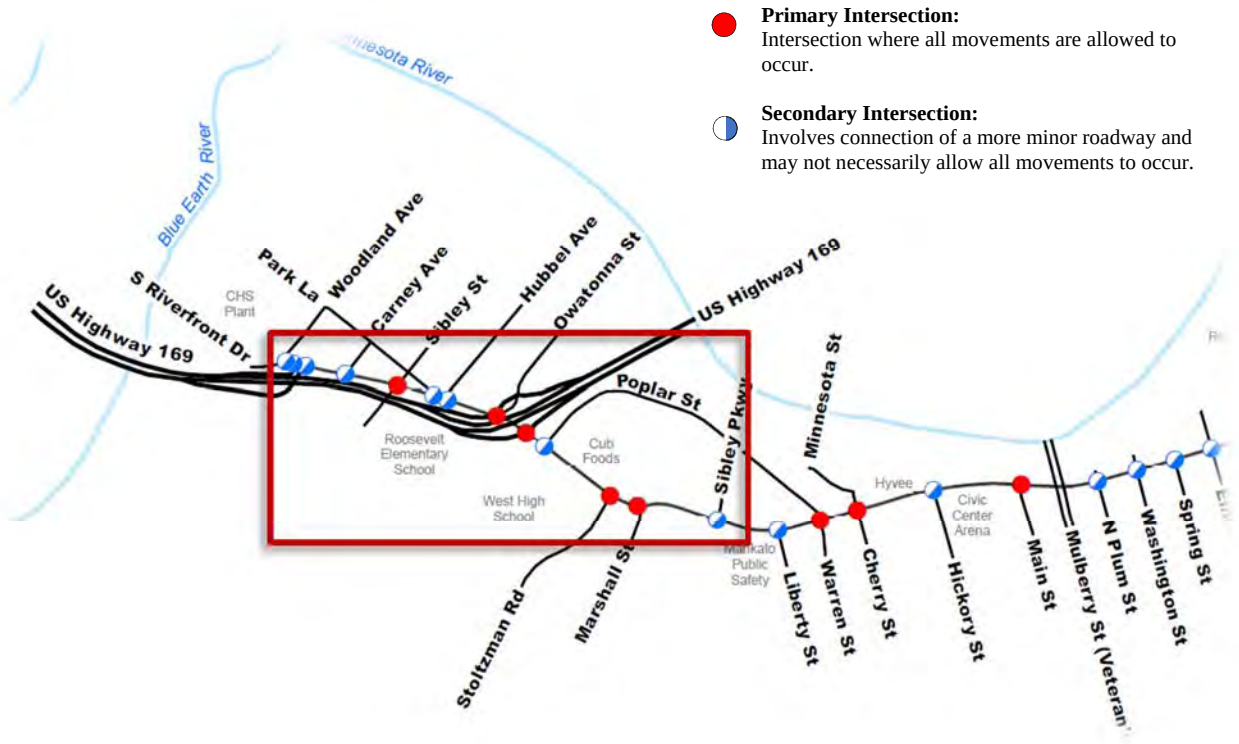
Study Area Characteristics

The following sections document land use, traffic operations, crash history, roadway access, pedestrian and bicycle connections, and known social, economic, and environmental (SEE) resources within the study area. Several Figures are included in Appendix A relating to the existing characteristics described within each segment of the study area in the text below.

- Figure A.2 - Existing Land Use
- Figure A.3 - Existing Traffic Operations
- Figure A.4 - Crash History (2010-2014)
- Figure A.5 - Existing Traffic Speeds
- Figure A.6 - Access Inventory
- Figure A.7 - Pedestrian and Bicycle Connections

A detailed Existing Traffic Conditions Technical Memorandum is attached in **Appendix E** which documents the traffic data collection, methodology and additional details on existing conditions analysis summarized in the sections below.

Segment 1 – Woodland Avenue to Sibley Parkway



Land Use and Major Traffic Generators

Land uses adjacent to this segment consist of mostly commercial with some institutional mixed in. Industrial uses are located on the west side, south of Woodland Avenue and north of the TH 169/60 interchange. Residential neighborhoods are located on both sides of Riverfront Drive between

Woodland Avenue and the interchange. Major traffic generators in this segment include CHS Oilseed Processing, Roosevelt Elementary School, the YMCA, Mankato West High School, and the Cub Food retail complex.

Traffic Operations

This segment carries 8,300 vehicles per day south of the TH 169/60 interchange, 20,700 vehicles per day between the interchange and Stoltzman Road (CSAH 16), and 15,500 vehicles per day from Stoltzman Road (CSAH 16) to Sibley Parkway.

The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. Intersections and each intersection approach are given a ranking from Level of Service (LOS) A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS A through D is generally perceived to be acceptable to drivers. LOS E indicates that an intersection is operating at, or very near, its capacity and that drivers experience considerable delays. LOS F indicates an intersection where demand exceeds capacity and drivers experience substantial delays.

Almost all intersections in this segment are operating at generally acceptable levels of service, however, the Poplar Street/Riverfront Drive intersection operates at a LOS D in the AM peak hours which is approaching an unacceptable LOS. Traffic backups were identified for northbound and southbound movements on Riverfront Drive for both AM and PM peak hour periods as well as the westbound leg entering from Mankato West High School in the AM peak hour period.

All other intersections within this segment operate acceptably under existing conditions. Although the overall intersection operations are acceptable, there are a few areas where traffic back-ups are common during the peak periods, indicating a potential problem. These areas include the following signalized intersections:

- North and southbound TH 169/60 ramps for traffic entering Riverfront Drive
- All four legs of the Stoltzman Road (CSAH 16)/Riverfront Drive intersection experience backups during peak hours
- North and southbound Riverfront Drive movements at the Marshall Street intersection

Crash History (2010 – 2014)

A crash review was completed using the Minnesota Crash Mapping Analysis Tool (MnCMAT) which identified 90 crashes in this segment within a five-year period from 2010 to 2014. MnDOT uses a comparison of the crash rate and the critical rate when determining whether or not safety issues exist at an intersection. The crash rate is the number of crashes per million entering vehicles (MEV). The critical rate is a statistical comparison based on similar intersections statewide. An observed crash rate greater than the critical rate indicates that the intersection operates outside of the expected, normal range. The critical index reports the magnitude of this difference and a critical index of less than one shows that the intersection is operating within the normal range.

Most intersections in this segment exhibit crash counts within a normal range during the five-year period. However, the Stoltzman Road (CSAH 16)/Riverfront Drive intersection exhibited 56 crashes (Critical Index: 1.14) which is outside of the normal range. These crashes included nine left turn crashes, nine right angle crashes, and 23 rear end crashes. There were four pedestrian/bicycle crashes at this intersection within the five-year period and one in 2006 which resulted in a fatality. An Intersection Control Evaluation Study was completed that considered lane configurations and traffic controls at this intersection suggesting that the left and shared through-left turn lanes at the northbound approach may be causing driver confusion leading to increased crashes as the signal currently operates with protected and permissive left turn phases. The study recommended changing the northbound and southbound traffic to split phase operations could potentially reduce the number of crashes observed at this intersection. Another intersection of note is the Sibley Street/Riverfront Drive intersection where all six crashes were right angle.

Access

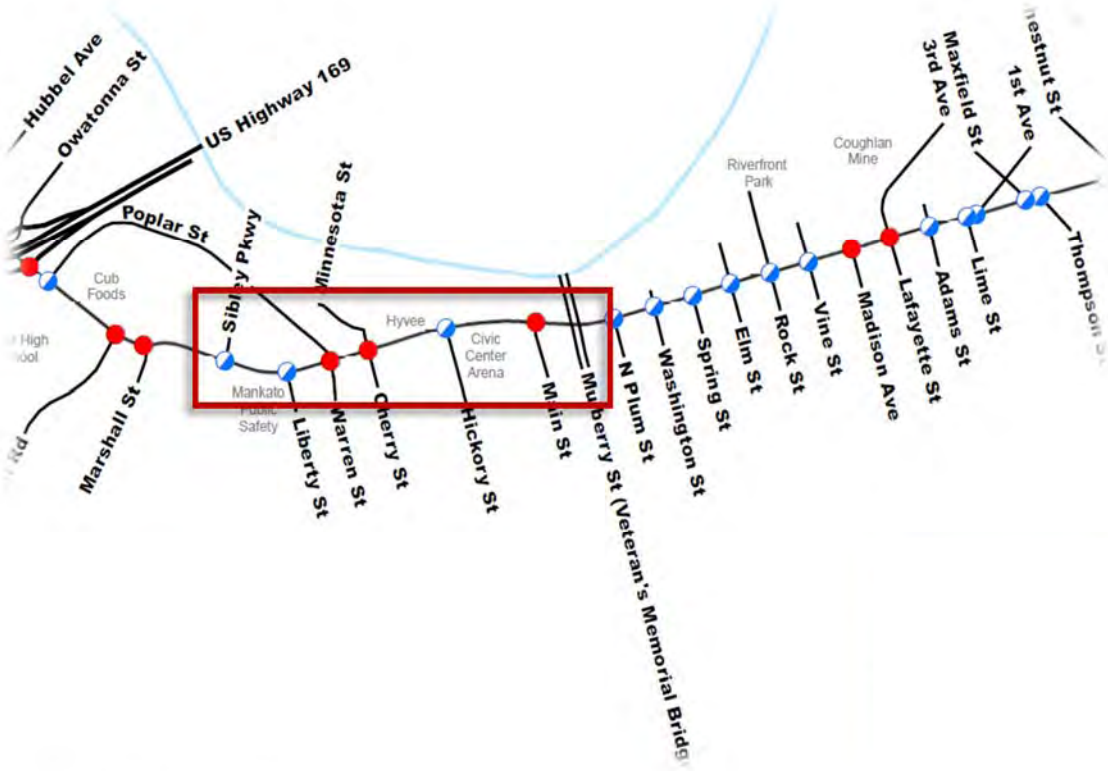
There are 28 access points in this segment including five primary accesses (5 per mile), eight secondary accesses (9 per mile), and 15 private accesses (16 per mile). Both primary and secondary access counts fall within or below MAPO's recommendations for 9 to 19 accesses per mile along minor arterial roadways. However, the spacing of signalized intersections within this segment is problematic as shown by the traffic back-ups occurring at multiple intersections in this segment today.

Pedestrian and Bicycle Connections

Sidewalks are present along both sides of the corridor within most of the southern area and north of the TH 169/60 interchange. There is no sidewalk on the east side of the corridor between Sibley Street and Woodland Avenue. There are no bicycle facilities along Riverfront Drive in this segment of roadway, however, two trails intersect Riverfront Drive including the West Mankato trail, located at Poplar Street, as well as the Minneopa Trail which begins across Riverfront Drive from Woodland Avenue and continues west along TH 169/60, outside of the study area.

There are a few high demand pedestrian crossing locations along this segment of Riverfront Drive. The Sibley Street intersection accommodates children accessing Roosevelt Elementary School to the east. Improvements to this intersection were included in the Mankato Safe Routes to School Plan described in the previous plans section of this document. The crossing located at Poplar Street carries bicycles and pedestrians as the West Mankato Trail intersects Riverfront Drive at this location. Students also use this crossing to access Burger King and the Cub Foods retail complex during lunch hours. The Cub Foods retail complex also generates pedestrian trips from the Marshall Street and Stoltzman Road (CSAH 16) intersections with Riverfront Drive. A signaled crossing location exists on Stoltzman Road (CSAH 16) just north of the Mankato West High School's main parking lot access for those accessing the school from east of Stoltzman Road (CSAH 16).

Segment 2 – Sibley Parkway to Veteran's Memorial Bridge



Land Use and Major Traffic Generators

This segment is surrounded by commercial and industrial land uses and traverses alongside an area designated as Central Business District (CBD) that includes the Front Street Connectivity District on the east side of the roadway. Reconciliation Park is located adjacent to the Veteran's Memorial Bridge on Riverfront Drive. The Riverfront Court Apartments are located near the intersection of Riverfront Drive/Main Street between the City Center Hotel and the Verizon Wireless Center and represents the only residential use within this segment. Major traffic generators within this segment include: new office complex and parking ramp at the Warren Street/Riverfront Drive intersection, Hy-Vee, Verizon Wireless Center, hotels, Mankato Intergovernmental Center and parking ramp, and Blue Earth County Library.

Traffic Operations

Riverfront Drive carries 16,400 vehicles per day in this segment. All intersections in this segment are identified as operating at acceptable LOS grades. Traffic backups have been identified at the southbound approach to the Minnesota Street/Cherry Street and Warren Street intersections during PM peak hour traffic. Northbound backups have been identified at Minnesota Street/Cherry Street and Main Street for AM/PM and PM peak hours respectively.

Crash History (2010 – 2014)

While elevated crash counts exist at the signalized intersections of Warren Street (35 crashes) and Minnesota Street/Cherry Street (22 crashes), neither of the intersections exhibit crashes outside of the normal range. However, Warren Street does exhibit higher occurrences of rear end crashes with 16 occurring in the five-year period. There was one pedestrian crash at Warren Street and two at Cherry Street within the five-year period as well.

Access

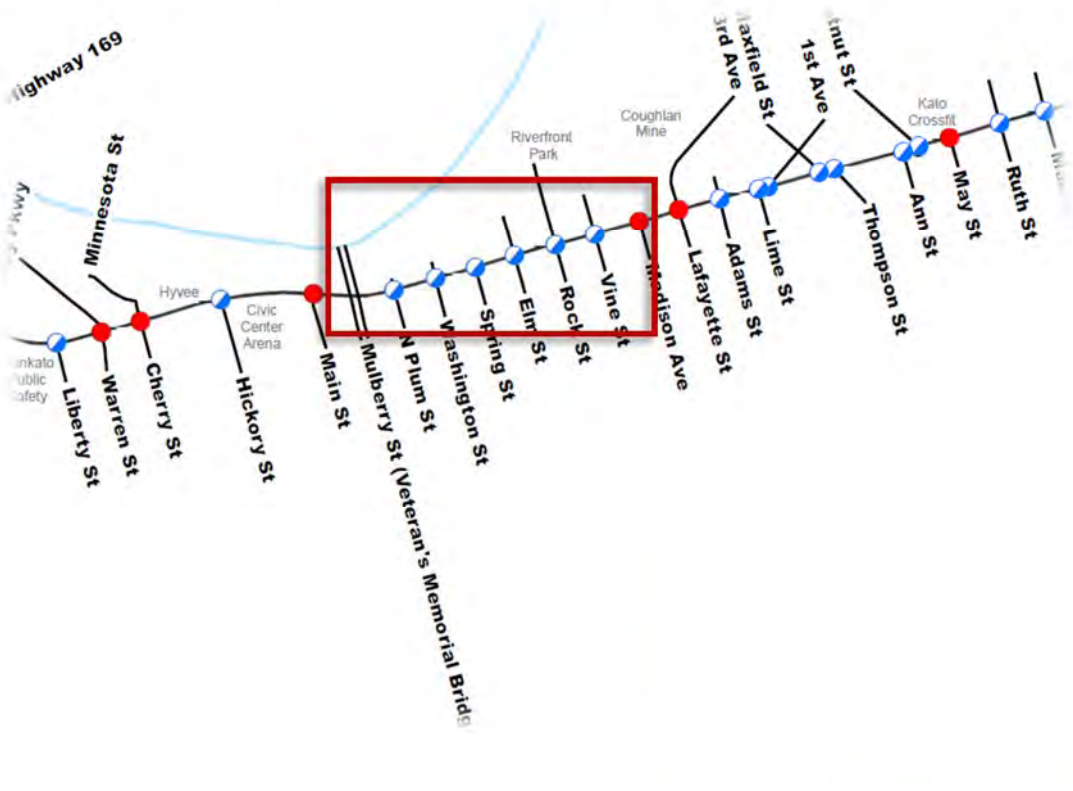
There are a total of 19 accesses within this segment including 3 primary accesses (4 per mile), 3 secondary accesses (4 per mile), and 13 private accesses (18.9 per mile). Both primary and secondary access counts fall below MAPO's recommendations for 9 to 19 accesses per mile along minor arterial roadways.

Pedestrian and Bicycle Connections

Sidewalks are present along both sides of the corridor between Sibley Parkway and Cherry Street. A gap exists on the eastern side of the roadway from Cherry Street to Hickory Street. There are no bicycle facilities along Riverfront Drive in this segment of roadway, however, a dedicated on-street bike lane exists on Cherry Street extending across Riverfront Drive to Minnesota Street. In addition, a parallel on-street bicycle route exists on Broad Street.

High demand pedestrian crossings exist along this segment at various locations. The intersections of Liberty Street and Poplar Street/Warren Street is frequented by those accessing dining retail options on the west side of Riverfront Drive. The Hy-Vee grocery store draws pedestrians to cross at the Cherry Street-Minnesota Street intersection. Pedestrians accessing the Minnesota River Trail and the historic Depot parking lot use the Main Street intersection. The Verizon Wireless Center draws foot traffic crossing Riverfront Drive during events.

Segment 3 – Veteran's Memorial Bridge to Madison Avenue



Land Use and Major Traffic Generators

This segment of Riverfront Drive primarily serves a mix of commercial and industrial/freight uses while traversing a segment of CBD existing between the Veteran's Memorial Bridge and Spring Street. This segment passes through the Old Town Master Plan planning area bound by Main Street, North Second Street, Madison Avenue, and the riverfront. This planning effort outlines strategies for area improvements and potential redevelopment that will influence roadway infrastructure as well as vehicular and pedestrian/bicycle movements. This segment provides access to Riverfront Park which is a major draw for vehicles and pedestrians accessing events. Planned developments in the area including the Coughlan Quarry and the Bridge Plaza redevelopments, will create increased vehicle and pedestrian traffic in this segment in the future. There is also access to heavy industrial uses that draw heavy truck traffic and rail for distribution. Major traffic generators within this segment include:

1. Retail within the Old Town Historic District
2. Many industrial entities such as Dotson Iron Castings, Mankato Iron & Metal, and Ardent Mills among others.
3. The Coughlan Quarry Redevelopment Area
4. The Bridge Plaza Redevelopment Area
5. Super America Gas Station
6. Gerring's Mankato Car Wash
7. Riverfront Park

Traffic Operations

Between Madison Avenue and Plum Street, Riverfront Drive carries approximately 17,400 vehicles per day. All intersections within this segment operate at acceptable LOS grades. The northbound approach to Madison Avenue intersection exhibits backups in the AM and PM peak traffic hours.

Crash History (2010 – 2014)

All intersections exhibit crash counts within the normal range, however, Madison Avenue had an elevated count of 33 crashes over the five-year period. There were 22 left turning crashes among which 20 were caused by traffic along Riverfront Drive.

Access

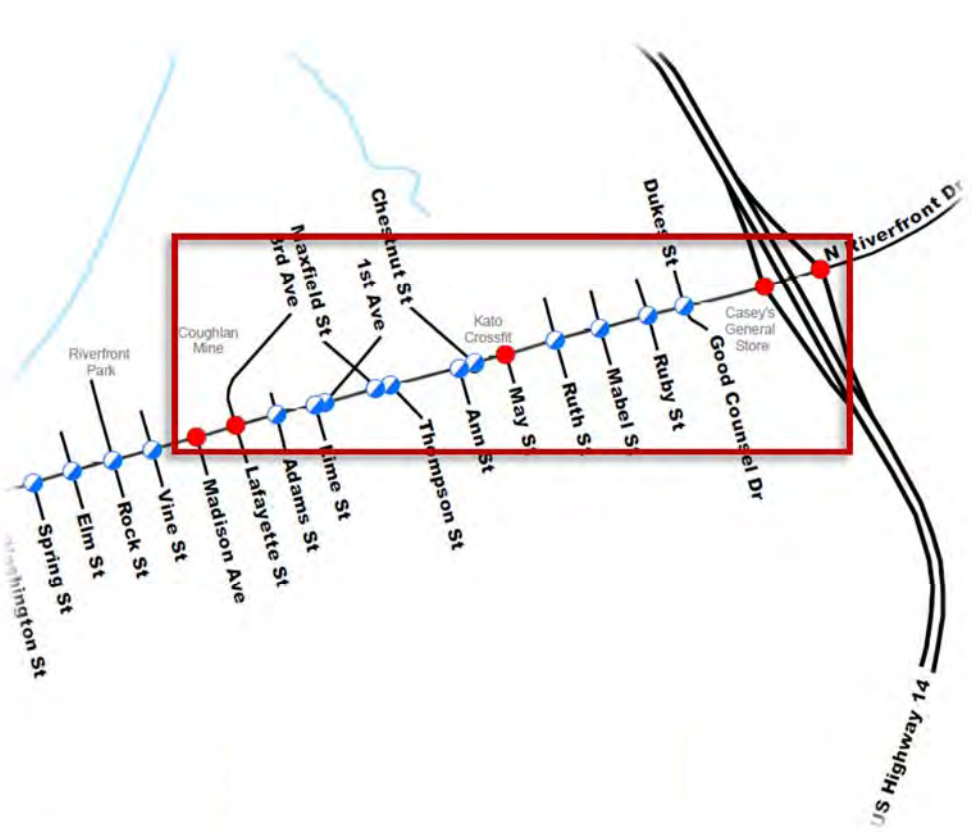
There are a total of 34 access locations within this segment including 1 primary access (1.8 per mile), 6 secondary accesses (10.9 per mile), and 27 private accesses (49.3 per mile). Primary access counts fall below, and secondary access counts fall within, MAPO's recommendations for 9 to 19 accesses per mile along minor arterial roadways. However, there are multiple access locations within this segment that are closely spaced and exhibit conflicting left-turn movements which is a safety concern.

Pedestrian and Bicycle Connections

Sidewalks are present along both sides of the corridor the entire length of this segment. There are no bicycle facilities along Riverfront Drive in this segment, however, a dedicated on-street bike lane exists on Broad Street running parallel to the corridor two blocks to the east. No trails currently intersect Riverfront Drive within this segment.

Pedestrian traffic is high in this area and will only increase with more frequent events at Riverfront Park and redevelopments at Coughlan Quarry and the Bridge Plaza redevelopment areas. A future trail connection is proposed at the signalized intersection at Elm Street that will enhance access to Riverfront Park and the Minnesota River Trail. The area is also in high demand for pedestrian crossings due to public parking lots and the Old Town District. Signals are located at Plum Street, Elm Street, and Madison Avenue. There is a three block separation between each signal creating an environment where existing signals do not align with all pedestrian crossing demand locations. For example, Rock Street provides a gateway to Riverfront Park and serves heavy traffic during events. Pedestrian crossing at this location during events is heavily controlled by law enforcement which shows the demand for enhanced intersection controls.

Segment 4 – Madison Avenue to the TH 14 Interchange



Land Use and Major Traffic Generators

Uses along this segment include commercial and light industrial with some residential, institutional, and park uses easily accessed. Lime Street, Adams Street, and Lafayette Street provide access to Franklin Elementary School on the east and Chestnut Street and Maxfield Street provide access to light industrial uses such as Crown Cork & Seal Co. to the west.

Two schools serve as major traffic generators for parents and school buses access during peak traffic hours in this segment. These include Franklin Elementary School at Lafayette Street and Adams Street as well as Loyola School via Good Counsel Drive. There is a large presence of warehouse and distribution uses along this segment including businesses like Ferguson Plumbing Supplies, SPS Plumbing Supply, Graybar, and Rooms and Rest Distribution Center among others. This area also provides access to the industrial uses along 3rd Avenue (CSAH 5) as well as major rail connections for distribution services. A key traffic generator in this segment is the TH 14 interchange which filters regional traffic through the area creating access opportunities to the previously mentioned uses.

Traffic Operations

This segment carries approximately 13,500 vehicles per day and provides access to the TH 14 interchange.

All intersections operate at an acceptable LOS grade. However, traffic backups have been observed traveling southbound at the Madison Avenue traffic signal for AM and PM peak hour traffic. Traffic backups have also been observed on the TH 14 southbound ramp for traffic entering Riverfront Drive in the PM peak hours. These back-ups occasionally extend to the TH 14 mainline which is a safety concern. Drivers have also been observed making illegal U-turns around the median to the north of the ramp intersection on Riverfront Drive to avoid the westbound ramp to

southbound Riverfront Drive delays.

Crash History (2010 – 2014)

There were 31 crashes within this segment not including those 33 that occurred at the Madison Avenue intersection (noted in Segment 3). There were 15 crashes at Lafayette Street/3rd Avenue giving this intersection a critical index of 1.04 and showing that this intersection is experiencing a higher than usual number of crashes compared to similar intersections statewide. Crashes include 5 right angle, 4 ran off road, and 4 rear end crashes among other types. Sight distance and proximity to the Madison Avenue signalized intersection have been noted as potential issues at this intersection. There was one pedestrian/bicycle crash at Lime Street in 2008 which resulted in a fatality. Other intersections exhibit crash counts with the normal range.

Access

There are currently 70 access locations along this segment of the corridor including five primary accesses (4.1 per mile), 11 secondary accesses (9.1 per mile), and 54 private accesses (44.6 per mile). Primary access counts fall below, and secondary access counts fall within, MAPO's recommendations for 9 to 19 accesses per mile along minor arterial roadways. There are over 20 locations identified within this segment where accesses are closely spaced resulting in overlapping turning movements which is a safety concern. There were several properties along this segment that have side street access and may be candidates for access closure along Riverfront Drive.

Pedestrian and Bicycle Connections

Sidewalks are present along both sides of the entire extent of this segment. There are no bicycle facilities or trails traversing the segment or intersecting the segment. However, the Minnesota River Trail and the Sakatah Singing Hills Trail can be accessed north of the TH 14 interchange. A parallel, dedicated on-street bicycle lane exists on Broad St, two blocks to the east of Riverfront Drive between Madison Avenue and Thompson Street.

A trail addition is proposed to close a gap existing near the TH 14 interchange. The trail will travel south along the west side of Riverfront Drive crossing at Good Counsel Drive and continuing into the residential neighborhoods to the east of the corridor, eventually connecting to dedicated on-street bike lanes on Broad Street. This will enhance bicycle traffic along that short segment of Riverfront Drive.

All Segments – Environmental Considerations

A high-level environmental screening using publicly available GIS datasets was conducted to identify any potential environmental resources within the study area as future roadway improvements were considered. No fatal flaws to roadway improvements were identified within the study area as part of this preliminary screening. Additional formal environmental documentation may be necessary as individual roadway improvement projects are pursued in the future. The environmental screening conducted as part of this study is included in **Appendix F**.

VI. Key Transportation Issues

An important element of the study was the identification of key transportation issues. The following information and **Figure A.8** provide a summary of issues identified by existing conditions analysis and public input.

Mobility and Safety

Mobility on Riverfront Drive is important from a regional standpoint due to the cross community function it plays for both local and regional trips with interchange connections to the two major highways running through Mankato. It also serves an important role for regional goods movement between the industrial, distribution, and railyard operations it connects to the state highway systems. Conversely, the corridor also serves significant foot traffic as a result of large community events at Riverfront Park, the Verizon Wireless Center, the Old Town Business District, and schools nearby. This results in a paradox that creates a challenge in balancing mobility and accessibility needs.

Peak hour mobility concerns exist at a few locations along the corridor. These include the TH 169 Interchange, Poplar Street, Stoltzman Road (CSAH 16), Warren Street, Cherry Street, Main Street, Madison Avenue, and the TH 14 Interchange.

Over a five-year period from 2010-2014, there were 244 crashes within the 3.4 miles of the study corridor. Two intersections were identified as having crash rates above the state average including the intersections of Riverfront Drive with Stoltzman Road (CSAH 16) and Lafayette Street/3rd Avenue (CSAH 5). Along with a high crash count, the Riverfront Drive/Stoltzman Road (CSAH 16) intersection experienced five pedestrian and bicycle crashes from 2006 to 2014 with one fatality in 2006.

Traffic Speeds

High traffic speeds were observed throughout the study area. Roadway segments exhibiting the highest traffic speeds are Segment 3 (between Plum Street and Cherry Street) as well as Segment 4 (from Adams Street to Good Counsel Drive) where vehicles are travelling greater than 10 mph over the speed limit. In most areas along the corridor from the TH 14 Interchange south to the TH 169 Interchange, vehicles are traveling five to nine mph over the speed limit. Speeding traffic is a safety concern and degrades the pedestrian environment.

Access

Overall there are 109 private access locations (32.4/Mile) along the 3.4 mile study corridor. This is especially prevalent in study Segment 4 from Madison Avenue to Good Counsel Drive where there are several areas of conflicting left turns due to closely spaced access locations. Several of the properties with access to the corridor also have access to a side street. High concentrations of access are typically associated with safety and operational problems.

Pedestrian and Bicycle Accommodations

Sidewalks are present on both sides of the corridor for most of the study area. There are a few exceptions including the east side of the corridor in Segment 2 between Cherry Street and Civic Center Plaza as well as the east side of the corridor from Good Counsel Drive to the TH 14 Interchange. Bicycles are accommodated on-street along the parallel route of Broad Street.

There is a need to complete the identified gaps in the pedestrian network and an overall desire to make it more comfortable to walk along and across Riverfront Drive. Safer crossings are a priority in the following locations:

1. Mankato West High School to Stoltzman Road (CSAH 16)
2. Throughout the downtown areas from Liberty Street to Rock Street
3. To Franklin Elementary School

4. From Good Counsel Drive to the trails on the west side of Riverfront Drive near TH 14

VII. Future Traffic

Future traffic volumes for 2041 (25-yr forecast) were developed using a combination of historical data, the Mankato/North Mankato Area Planning Organization (MAPO) 2045 Long Range Transportation Plan, and factoring in population growth trends in the area. The historical growth rates (1997-2013) along Riverfront Drive were all calculated to be between 0.2 and 0.9 percent. The MAPO 2045 Long Range Transportation Plan indicated future growth rates to be between 0.9 and 1.65 percent. Population growth trends have been between 0.5 percent per year and 1.5 percent per year on average depending on which time period is analyzed.

Riverfront Drive is a developed corridor that has experienced little change in traffic volumes over the past two decades. The supporting local roadway network is also well established and not anticipated to see much change in terms of traffic feeding into Riverfront Drive. In order to be conservative, traffic forecasts developed for this study assumed some growth. This allowed the study team to test various improvements at higher traffic volumes to ensure they would still operate adequately if these higher volumes were realized. However, it is anticipated that Riverfront Drive will continue to serve traffic volumes very close to today's volumes for the foreseeable future.

Traffic growth was compared using trend lines from various data sources and a 1% straight line growth value. These graphics are included in the Future Conditions Traffic Analysis Memorandum in **Appendix G.** In general, the 1% line falls within a similar range of the 2045 Long Range Transportation Plan and the full-history trend and would appear to provide a reasonable growth rate for the corridor. Study partners agreed the 1% straight line trend was an adequate assumption for 2041 traffic forecasts for this study. This assumption is meant to be all encompassing of background growth as well as spot redevelopment in areas nearby. The 2041 forecasted traffic volumes for the Riverfront Drive corridor can be seen in **Figure A.9.**

Future Operations Analysis

A LOS analysis of the peak hours was completed using forecasted turning movement counts for a no-build condition. **Tables 3 through 6** show the results of the 2041 no-build traffic analysis for Segments 1 through 4/5, respectively.

Segment 1: Woodland Avenue to Sibley Parkway

Table 3 - 2041 Existing Geometry (No Build) Traffic Operations Analysis

Intersection	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Riverfront Dr & Woodland Ave	AM	2	A	7	A	NBT	NBL/T/R	25	100
Stop Controlled	PM	3	A	7	A	SBT	SBL/T/R	50	50
Riverfront Dr & Sibley St	AM	6	A	41	E	NBT	WBL/T	75	200
Stop Controlled	PM	7	A	32	D	NBL	WBL/T	75	175
SB TH 169 Ramp/Owatonna St & Riverfront Dr	AM	49	D	75	E	SBL	SBL/T	575	950
Signalized Intersection	PM	32	C	56	E	SBT	SBL/T	275	650
NB TH 169 Ramp & Riverfront Dr	AM	62	F	1949	F	NBL	NBR	725	1275
Stop Controlled	PM	24	C	127	F	NBR	NBR	375	1000
Mankato West HS/Poplar St & Riverfront Dr	AM	79	E	351	F	WBR	WBT/R	600	800
Signalized Intersection	PM	50	D	162	F	NBT	WBT/R	575	800
Riverfront Dr & Stoltzman Rd	AM	89	F	320	F	NBL	NBL	800	1300
Signalized Intersection	PM	44	D	156	F	NBT	NBL/T	425	500
Riverfront Dr & Marshall St	AM	75	E	182	F	WBT	WBT	300	775
Signalized Intersection	PM	15	B	41	D	NBL	WBT	125	400

*Delay in seconds per vehicle

**Maximum delay and LOS on any approach and/or movement

***Limiting Movement is the highest delay movement.

AM Peak Hour

- Intersection delay has failing LOS at the intersections of Riverfront Drive with the NB TH 169 Ramp and Stoltzman Road (CSAH 16).
- The limiting movement operates with LOS F at the following intersections:
    - TH 169 North Ramp at Riverfront Drive
    - Poplar Street-West Mankato High School at Riverfront Drive
    - Stoltzman Road (CSAH 16) at Riverfront Drive
    - Marshall Street at Riverfront Drive

PM Peak Hour

- Intersection delay is acceptable with LOS D or better at all of the intersections.
- The limiting movement operates with LOS F at the following intersections:
    - TH 169 North Ramp at Riverfront Drive
    - Poplar Street-West Mankato High School at Riverfront Drive
    - Stoltzman Road (CSAH 16) at Riverfront Drive

Tables B1 and B2 in Appendix B of the Future Traffic Conditions Memorandum show the delay and queue lengths for each movement at all of the intersections in Segment 1.

Segment 2: Sibley Parkway to Veteran's Memorial Bridge

Table 4 - 2041 Existing Geometry (No Build) Traffic Operations Analysis

Intersection	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Riverfront Dr & Sibley Pkwy	AM	38	D	84	F	WBR	WBT	175	825
Signalized Intersection	PM	5	A	41	D	EBL	WBT	50	150
Riverfront Dr & Poplar St/Warren St	AM	14	B	32	C	WBL	NBT/R	100	275
Signalized Intersection	PM	18	B	31	C	EBL	SBT/R	150	350
Riverfront Dr & Minnesota St/Cherry St	AM	11	B	32	C	WBT	SBT	75	325
Signalized Intersection	PM	19	B	56	E	SBL	WBL/T	175	350
Riverfront Dr & Main St	AM	8	A	26	C	WBL	NBT	50	150
Signalized Intersection	PM	13	B	31	C	EBL	NBT	100	250

*Delay in seconds per vehicle

**Maximum delay and LOS on any approach and/or movement

***Limiting Movement is the highest delay movement.

AM Peak Hour

- Intersection delay is acceptable with LOS D or better at all of the intersections.
- The limiting movement operates with LOS F at the intersection of Sibley Parkway and Riverfront Drive.

PM Peak Hour

- Intersection delay is acceptable with LOS A or B at all of the intersections.
- The limiting movement operates with LOS E at the intersections of Minnesota Street-Cherry Street and Riverfront Drive

Tables B3 and B4 in Appendix B of the Future Traffic Conditions Memorandum show the delay and queue lengths for each movement at all of the intersections in Segment 2.

Segment 3: Veteran's Memorial Bridge to Madison Avenue

Table 5 - 2041 Existing Geometry (No Build) Traffic Operations Analysis

Intersection	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Riverfront Dr & Plum St	AM	4	A	23	C	WBL	NBT	50	175
Signalized Intersection	PM	5	A	28	C	WBL	NBT	50	175
Riverfront Dr & Elm St	AM	4	A	11	B	WBL	NBL/T	50	125
Signalized Intersection	PM	6	A	22	C	EBL	SBL/T	75	225
Riverfront Dr & Madison Ave	AM	12	B	24	C	WBL	NBT/R	125	300
Signalized Intersection	PM	17	B	49	D	WBT	NBT/R	200	425

*Delay in seconds per vehicle

**Maximum delay and LOS on any approach and/or movement

***Limiting Movement is the highest delay movement.

AM Peak Hour

- Intersection delay is acceptable with LOS A or B at all of the intersections.
- The limiting movement is acceptable with LOS C or better at all of the intersections.

PM Peak Hour

- Intersection delay is acceptable with LOS A or B at all of the intersections.
- The limiting movement is acceptable with LOS D or better at all of the intersections.

Tables B5 and B6 in Appendix B of the Future Traffic Conditions Memorandum show the delay and queue lengths for each movement at all of the intersections in Segment 3.

Segment 4/5: Madison Avenue to TH 14

Note: Study Segment 5 (the TH 14 interchange area) was included with Segment 4 for this analysis.

Table 6 - 2041 Existing Geometry (No Build) Traffic Operations Analysis

Intersection	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Riverfront Dr & 3rd Ave/Lafayette St	AM	5	A	57	F	EBL	EBR	75	225
Stop Controlled	PM	6	A	48	E	EBT	EBR	100	275
Riverfront Dr & May St	AM	1	A	16	C	WBL	WBL/R	25	75
Stop Controlled	PM	3	A	23	C	WBL	WBL/R	50	100
Riverfront Dr & TH 14 EB Ramp	AM	5	A	22	C	EBL	EBR	100	250
Stop Controlled	PM	6	A	39	E	EBL	EBL	125	325
Riverfront Dr & TH 14 WB Ramp	AM	28	D	197	F	WBL	WBL/T	325	1025
Stop Controlled	PM	56	F	374	F	WBL	WBL/T	650	1725

*Delay in seconds per vehicle

**Maximum delay and LOS on any approach and/or movement

***Limiting Movement is the highest delay movement.

AM Peak Hour

- Intersection delay is acceptable with LOS D or better at all of the intersections.
- The limiting movement operates with LOS F at the following intersections:
    - 3rd Avenue/Lafayette Street at Riverfront Drive
    - TH 14 Westbound Ramp at Riverfront Drive

PM Peak Hour

Intersection delay and the limiting movement have failing LOS at the intersection of the TH 14 Westbound Ramp and Riverfront Drive.

The intersection delay is LOS A for all other intersections.

- The limiting movement is LOS E at 3rd Avenue/Lafayette Street and the TH 14 Eastbound Ramp.
- The limiting movement is LOS C at May Street.

Tables B7 and B8 in Appendix B of the Future Traffic Conditions Memorandum show the delay and queue lengths for each movement at all of the intersections in Segment 4.

VIII. Study Goals and Objectives

Following the identification of issues and needs along Riverfront Drive, study partners developed the following Corridor Study goals:

- Provide efficient vehicle and freight mobility and access
- Safely accommodate all users (vehicles, freight, transit, pedestrians, bicycles)
- Support an inviting and safe pedestrian environment both along and across Riverfront Drive
- Support bicycle connections across Riverfront Drive to designated parallel bike routes and regional trails
- Support future land use and redevelopment plans
- Provide infrastructure improvements compatible with the historic and natural environment
- Enhance community identity

These goals were used to identify and evaluate the trade-offs between improvement options.

IX. Identification and Evaluation of Alternatives

Multiple improvement alternatives were identified and evaluated based on the existing conditions analysis and issues and needs identified through public, agency and stakeholder involvement. The following describes alternatives studied for each segment of Riverfront Drive. Full copies of the alternative drawings discussed here can be seen on the MAPO website (www.mnmapo.org). Also, a discussion of alternatives can be seen in the Future Conditions Traffic Analysis Memorandum in **Appendix G.** An evaluation matrix was used to compare the benefits and trade-offs between alternatives as compared to the study's goals. This evaluation matrix can be seen in **Appendix H**.

Segment 1: Woodland Avenue to Sibley Parkway

Issues in this segment include:

- Closely spaced intersections – There are four closely spaced intersections from the TH 169 interchange ramps to Stoltzman Road (CSAH 16). The closest is the northbound TH 169 ramp to Poplar Street which is spaced approximately 170' apart. The number of intersections in a short distance becomes problematic in peak hours when traffic volumes are highest and vehicle queues from one intersection make it difficult to progress through the next intersection. This is especially evident with the southbound TH 169 movement to eastbound Riverfront Drive. Over 670 vehicles make this left-turn today in the AM peak hour and this number is anticipated to rise to 860 by 2041. This heavy movement is not able to be adequately accommodated with the existing roadway geometry. The majority of these left-turns have a destination to either the Mankato West High School, YMCA or Stoltzman Road (CSAH 16).

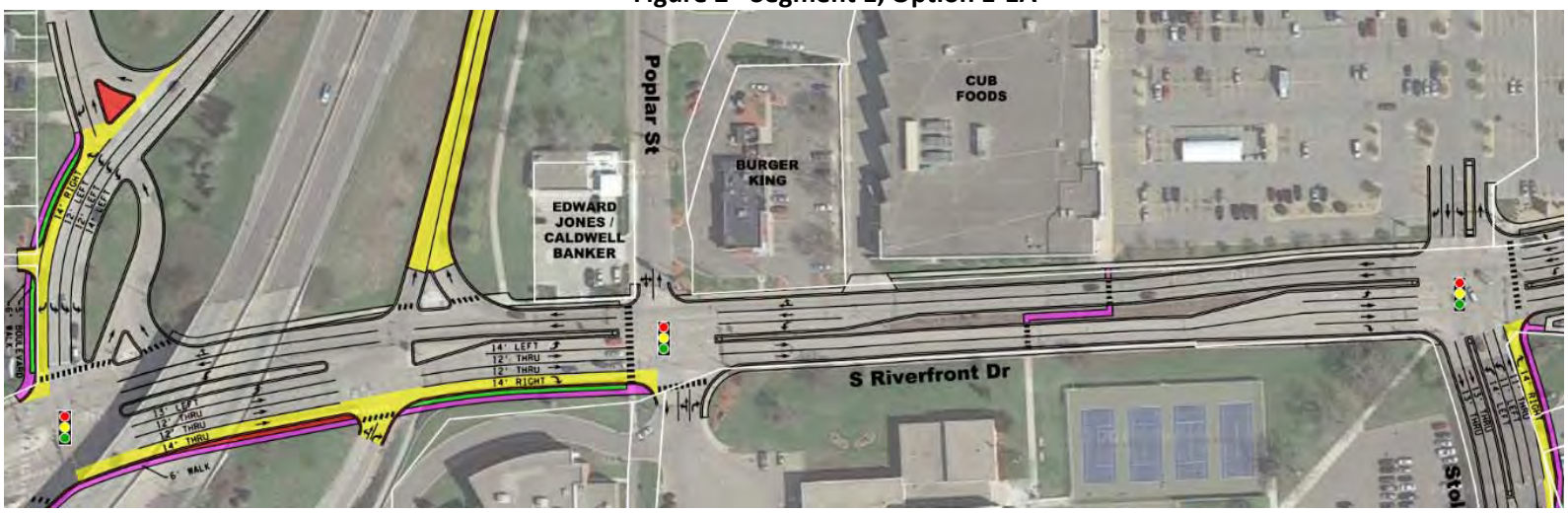
- Peak hour delays at major intersections – As noted earlier in the report, the intersection of Poplar Street/Riverfront Drive operates at LOS D during the AM peak hour today. Without any improvements by 2041, the intersections of Riverfront Drive with Poplar Street, Stoltzman Road (CSAH 16) and Marshall Street are all anticipated to operate at LOS D and the interchange ramps and the YMCA/school access are anticipated to operate at LOS F.
- Elevated crashes at the Riverfront Drive/Stoltzman Road (CSAH 16) intersection – This intersection had a critical crash rate of 1.14 which indicates the crashes that have occurred are outside of the expected, normal range. A previous study identified the lane configuration and traffic control at this intersection may be leading to driver confusion.
- High demand for pedestrian crossings between West High School and the Cub Foods property - Student pedestrians crossing Riverfront Drive from West High School to Cub Foods has been an issue over many years. Different treatments have been implemented to improve the safety of this crossing and encourage pedestrians to cross at the signalized intersections at Poplar Street and Stoltzman Road (CSAH 16). Students are still being observed crossing mid-block haphazardly. This is most common before and after school.

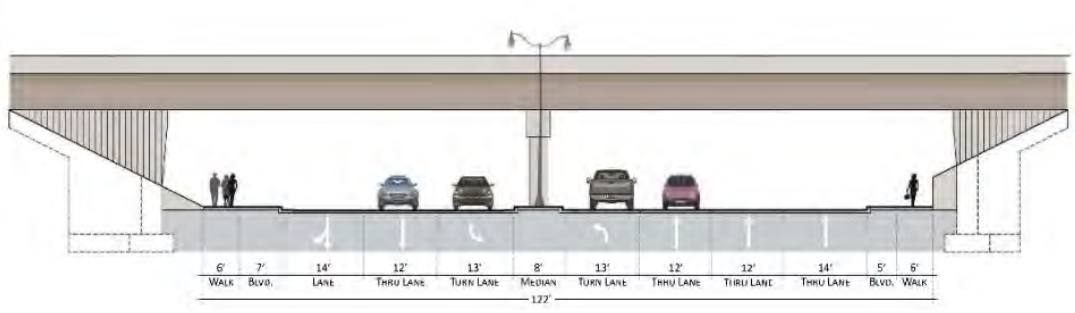
Three different approaches were used to identify and evaluate alternatives in segment one. The first approach was to maintain Riverfront Drive as a traditional signalized corridor. Two improvements were identified to address spot operations and safety issues. The second approach was a roundabout corridor approach. Two alternatives were developed that replaced existing traffic signals with roundabouts in various locations. The third and final approach focused on improvements that could be made to the Highway 169/Riverfront Drive interchange to improve operations and flow on Riverfront Drive. Two interchange modification alternatives were considered. All of the approaches and options are described in additional detail below.

Traditional Signalized Corridor Approach:

- **Option 1-1A:** Triple left turn from southbound TH 169; additional on-ramp lane for northbound TH 169; Poplar Street remains signalized; turn lane addition and signal phasing improvement at Stoltzman Road (CSAH 16). Pedestrians are accommodated through signalized crossings at Stoltzman Road (CSAH 16) and Poplar Street and a mid-block crossing between the Mankato West High School and Cub Foods.

Figure 2 - Segment 1, Option 1-1A





Typical Section of Option 1-1A (under the TH 169 bridge)

Option 1-1A addresses the lane utilization imbalance on the southbound TH 169 ramp for left turners by adding a third left turn lane and another receiving lane for eastbound Riverfront Drive traffic which turns into a dedicated right-turn lane to the YMCA and West High School access. These lane additions paired with clear directional signage on the southbound TH 169 ramp will allow users to choose the proper left-turn lane based on their destination. YMCA/school users will use the westernmost left-turn lane, Stoltzman Road (CSAH 16) users will choose the middle left-turn lane and Cub Foods area users will choose the inside left-turn lane. This should work well for local travelers as they become accustomed to which lane they should be in. The risk in this option is that those unfamiliar do not use the proper lane and end up weaving and slowing down the flow. Another risk with this option is the potential for a property acquisition to fit the third lane in on the existing ramp and the addition of a third lane under the TH 169 Bridge. For this planning study, a full bridge evaluation was not completed. It appears a third lane could fit under the bridge but may require some bridge abutment work to accommodate. The feasibility of modifying the bridge abutment is unknown at this time and will require further study. To avoid bridge abutment work, the third lane could be added by removing the existing sidewalk on the south side of Riverfront Drive.

All Segment 1 options include the following improvements (illustrated on each of the drawings):

- Additional lane on northbound TH 169 ramp - This improves the operation at the ramp intersection by providing more room for both directions of Riverfront Drive traffic to merge on the ramp.
- Mid-block pedestrian crossing –Since the demand exists mid-block, all options for Segment 1 have included a two-staged pedestrian crossing to provide a safe option where the demand exists. The design allows pedestrians to cross the eastbound lanes of Riverfront Drive from the West High School sidewalk that terminates at Riverfront Drive to the wide median, travel east within the median for a short distance before turning to cross the westbound lanes of Riverfront Drive to the front of the Cub Foods building. Crossing one direction of traffic at a time with the ability to wait comfortably and safely in the median until the next phase of crossing is completed is a safety improvement at this location. The graphic below illustrates an example of this type of crossing.

Source: Imagery@2017 Google, Map Data @2017 Google

Source: Imagery@2017 Google, Map Data @2017 Google

Another option for consideration is to have the school move the sidewalk that connects the front of the Mankato West High School to Riverfront Drive to align better with a desired future pedestrian refuge on Riverfront Drive.

- Addition of a right-turn lane on Stoltzman Road (CSAH 16) –The addition of a dedicated right-turn lane on Stoltzman Road (CSAH 16) to eastbound Riverfront Drive allows for a clearer lane delineation at this intersection by providing dual left-turn lanes and a separate through lane and right-turn lane. This is expected to improve the intersection operations and address the crash issues.

The Option 1-1A improvement is anticipated to address the traffic operations and safety issues in Segment 1 for many years into the future. If the forecasted 2041 traffic volumes are realized, the delays on side streets such as the interchange ramps, Poplar Street and Stoltzman Road (CSAH 16) are anticipated to approach LOS D. At that time, the City and its partners may need to consider a more comprehensive corridor improvement such as a roundabout corridor or interchange

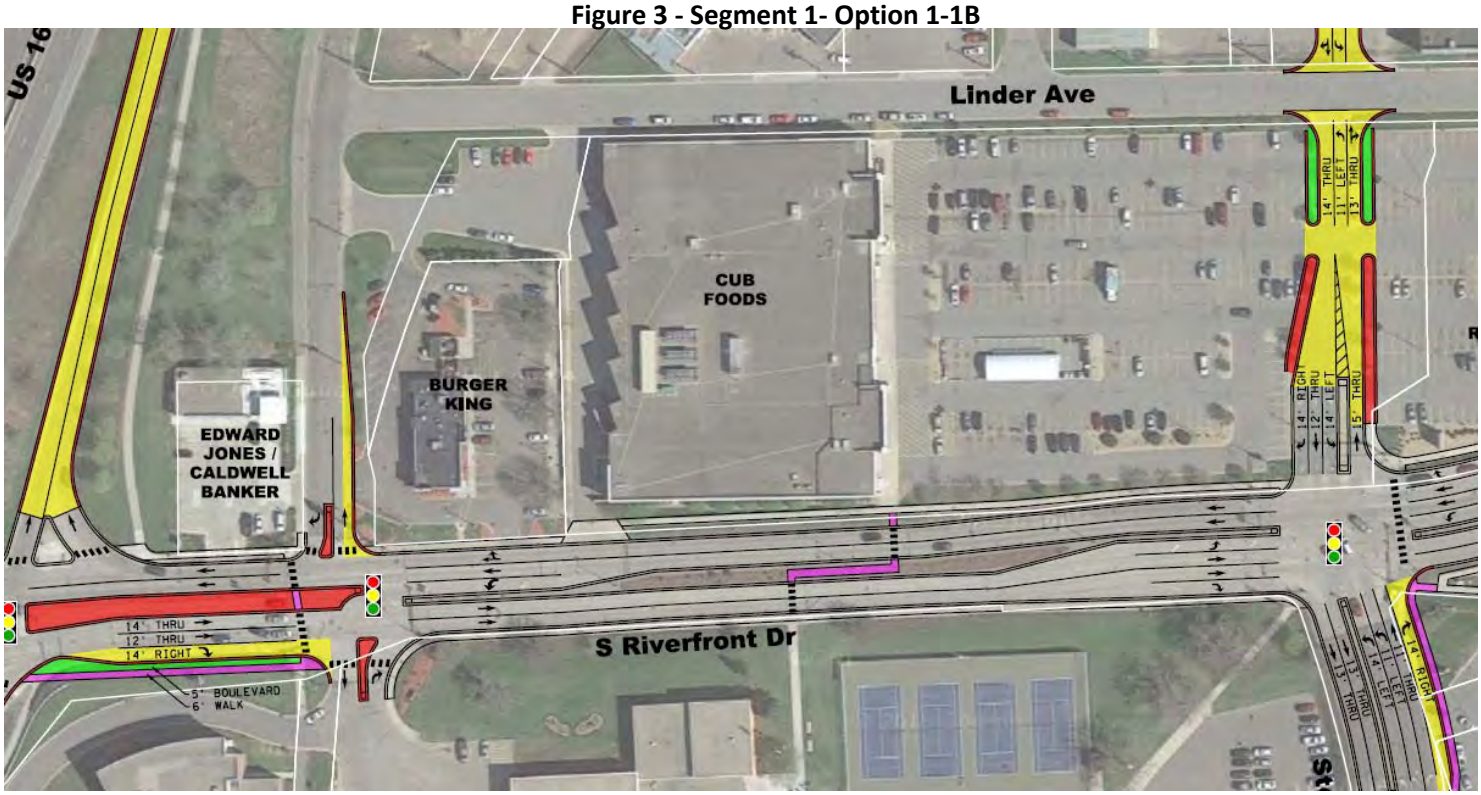
modifications.

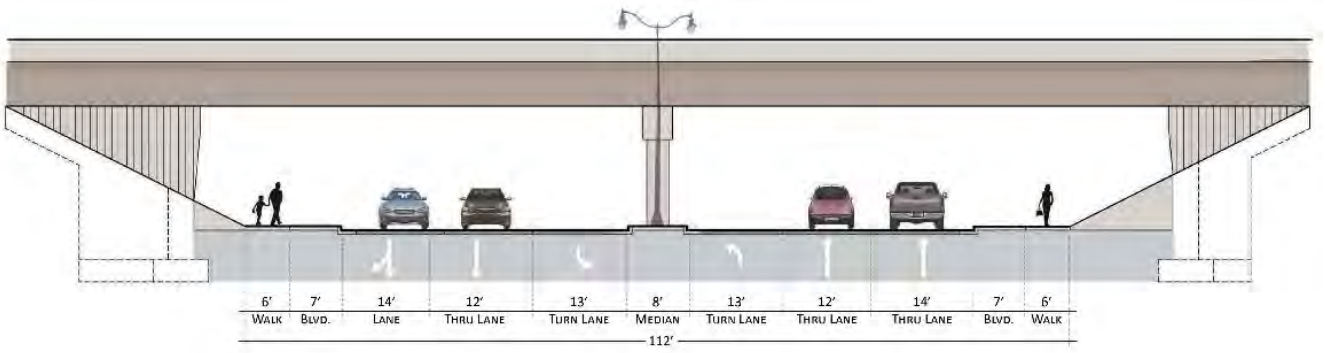
The advantages of this option is that full access is maintained at all of the intersections between the TH 169 ramps and Stoltzman Road (CSAH 16), adequate traffic operations and safety are provided, and pedestrians are accommodated mid-block. The disadvantage is the risks identified above with fitting a third lane on the TH 169 ramp and on Riverfront Drive under the bridge, and drivers actually using all three turn-lanes on the southbound TH 169 ramp as intended. The school and YMCA were supportive of this option.

Right-of-way would be required with this option to accommodate the third left-turn lane on the southbound TH 169 ramp and the right-turn lane on Stoltzman Road (CSAH 16). It is not anticipated that any full property acquisitions would be required; however, further analysis is needed to determine this fully for the lane addition on the TH 169 southbound ramp. The estimated cost of this alternative is $700,000.

- **Option 1-1B:** No changes to the southbound TH 169 ramp; additional on-ramp lane for northbound TH 169; partial signalization at Poplar Street with all left turns removed except the westbound left into Mankato West High School; turn lane addition and signal phasing improvement at Stoltzman Road (CSAH 16); roadway expansion at Stoltzman Road (CSAH 16) through Cub Foods parking lot form Riverfront Drive to Sibley Parkway; and signalized pedestrian crossings at Stoltzman Road (CSAH 16) and Poplar Street.

Figure 3 - Segment 1- Option 1-1B





Typical Section of Option 1-1B (under the TH 169 bridge)

This option achieves improved traffic operations on Riverfront Drive by creating a ¾ access at Poplar Street. Left-turns at Poplar Street would be restricted with the exception of a left-turn into the YMCA/West High School access. This would require all left-turns from the YMCA/School to take a right on Riverfront Drive and either make a U-turn at the Stoltzman Road (CSAH 16) intersection or use the new public street through the Cub Foods area to travel back to Poplar Street and then make another right to go west on Riverfront Drive and/or access the TH 169 northbound ramp.

Option 1-1B is also anticipated to address the traffic and safety issues in this segment for many years into the future. Similar to Option 1-1A, if the forecasted 2041 traffic volumes are realized, the delays on side streets such as the interchange ramps, Poplar Street and Stoltzman Road (CSAH 16) are anticipated to approach LOS D. At that time, the City and its partners may need to consider a more comprehensive corridor improvement such as a roundabout corridor or interchange modifications.

The advantages of this option are adequate traffic operations and safety are provided and pedestrian accommodations are enhanced through a mid-block crossing between the school and Cub Foods and a wide median at Poplar Street for the West Mankato Trail crossing.

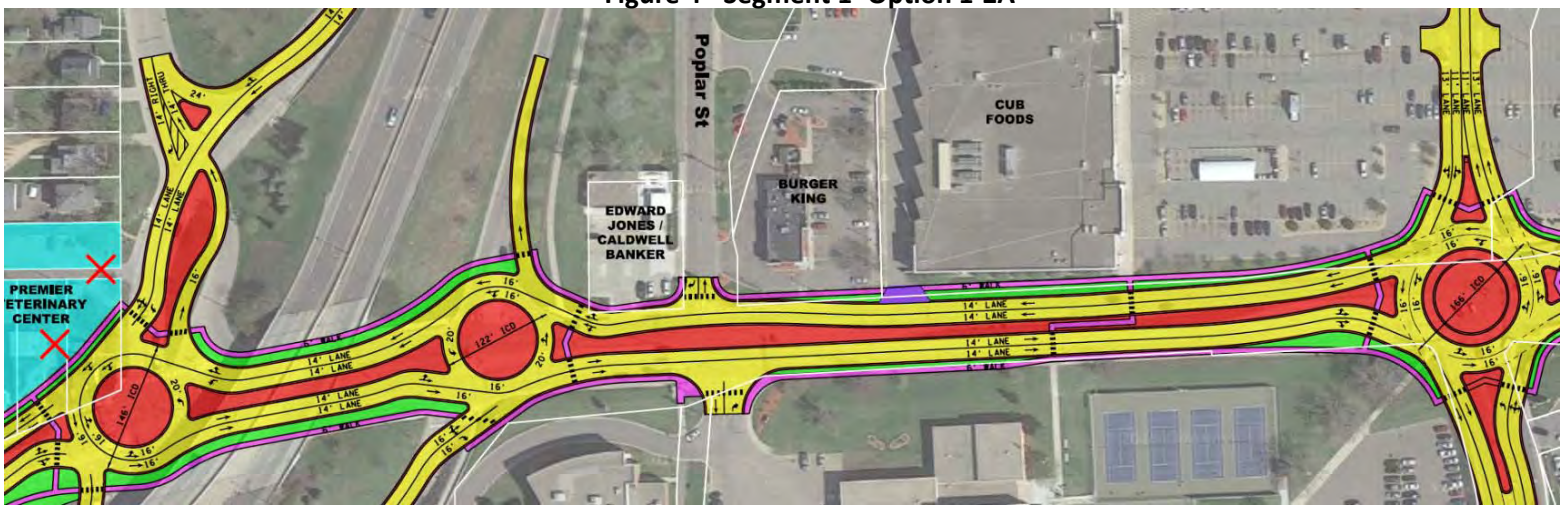
The disadvantages are additional circuity for vehicles leaving the YMCA/school area heading west and Poplar Street vehicles heading east. The school and YMCA expressed some concern with this additional circuity but were open to continue discussing this alternative in the future as a potential option. Cub Foods was open to the idea of a public street through from Stoltzman Road (CSAH 16) to Linder Avenue. Additional coordination will be required with the owner of this property.

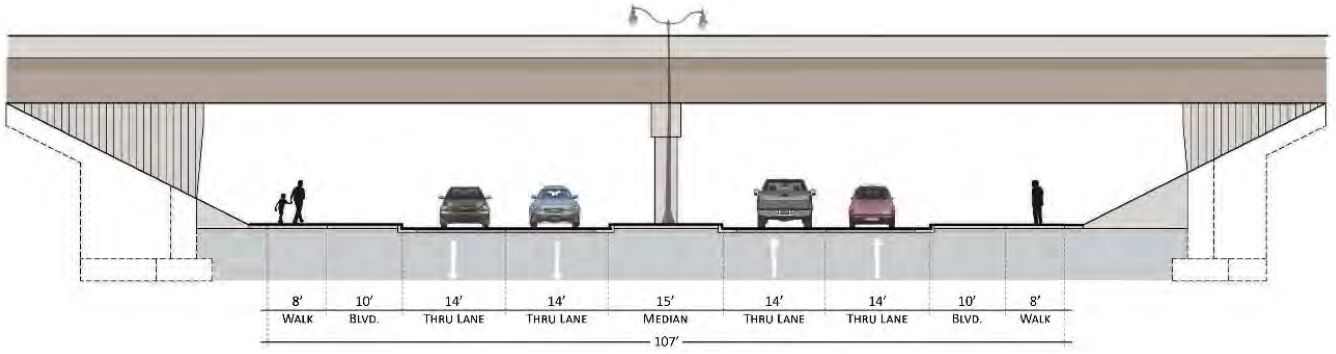
This improvement would require some right-of-way acquisition for the addition of a right-turn lane on Stoltzman Road (CSAH 16) and the public street extension through the Cub Foods area. The estimated cost of this improvement, including the street extension through the Cub Foods area, is approximately $1,000,000.

Roundabout Corridor Approach:

- **Option 1-2A:** Roundabouts at TH 169 ramps and Stoltzman Road (CSAH 16); right-in/right-out at Poplar Street; and roadway expansion at Stoltzman Road (CSAH 16) through Cub Foods parking lot from Riverfront Drive to Sibley Parkway. Pedestrians accommodated at all of the roundabouts and mid-block from Mankato West High School to Cub Foods.

Figure 4 - Segment 1- Option 1-2A





Typical Section of Option 2-1A (under the TH 169 bridge)

Option 1-2A provides improved traffic operations at all of the intersections and along Riverfront Drive when compared to the traditional signalized options (1-1A and 1-1B). The one exception is the side street delay at the YMCA/school driveway and the Cub Foods entrance. If 2041 forecasted volumes are experienced, these locations are anticipated to operate at a LOS F. This is due to the lack of available gaps that are anticipated to be available for these movements with the roundabouts on Riverfront Drive. This option would require U-turns at the roundabouts for the Poplar Street/YMCA/School accesses. This was not seen as a fatal flaw to the school and YMCA representatives as the roundabouts can adequately facilitate U-turns.

The study compared the long-term functionality of a roundabout at the Stoltzman Road (CSAH 16) intersection versus a traffic signal. The results indicated a traffic signal functions better into the future than a roundabout. This is due to the high volumes in the projected 2041 PM peak hour. A signal is able to give more time to the heavier movements so that they can get through the signal with minimal delay. A roundabout provides better operations for the lower volume southbound movements but the heavier movements suffer as they are not able to traverse the roundabout with acceptable delay.

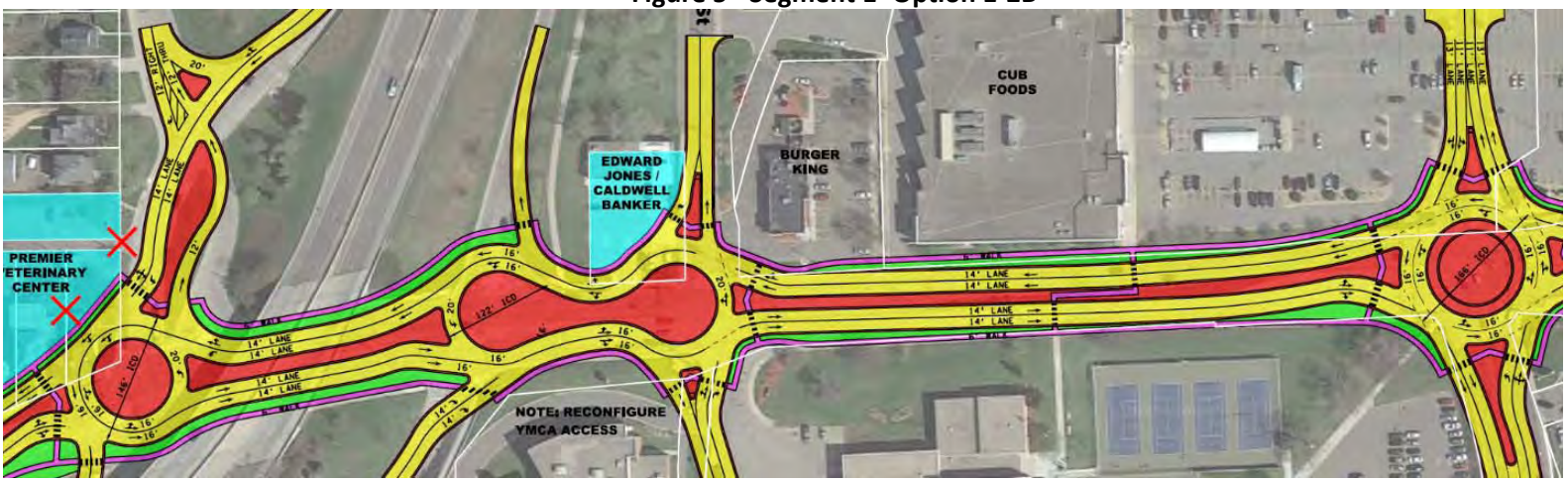
The advantages of this option include adequate traffic operations on Riverfront Drive and at the interchange ramps and Stoltzman Road (CSAH 16) out to 2041. Pedestrian accommodations would be enhanced with additional space under the TH 169 Bridge providing more separation of pedestrians from vehicles. The wide medians provide opportunities for pedestrian crossings at the

roundabouts and the mid-block crossing.

A disadvantage of this option is the side street delay for the YMCA/School driveway and the Cub Foods entrance. The cost and right-of-way required to build this solution is a substantial element. It would require four full property acquisitions with one being potential historic property. The estimated cost of this improvement is $5,000,000.

- **Option 1-2B:** Roundabouts at the southbound TH 169 ramp and Stoltzman Road (CSAH 16); combined tear drop roundabout at the northbound TH 169 ramp and Poplar Street; and roadway expansion at Stoltzman Road (CSAH 16) through Cub Foods parking lot from Riverfront Drive to Sibley Parkway. Pedestrians accommodated at all of the roundabouts and mid-block from Mankato West High School to Cub Foods. The typical section for Option 1-2B is the same as Option 1-2A above.

Figure 5 - Segment 1- Option 1-2B



Option 1-2B provides improved traffic operations at all of the intersections and along Riverfront Drive when compared to the traditional signalized options (1-1A and 1-1B) and Roundabout Option 1-2A.

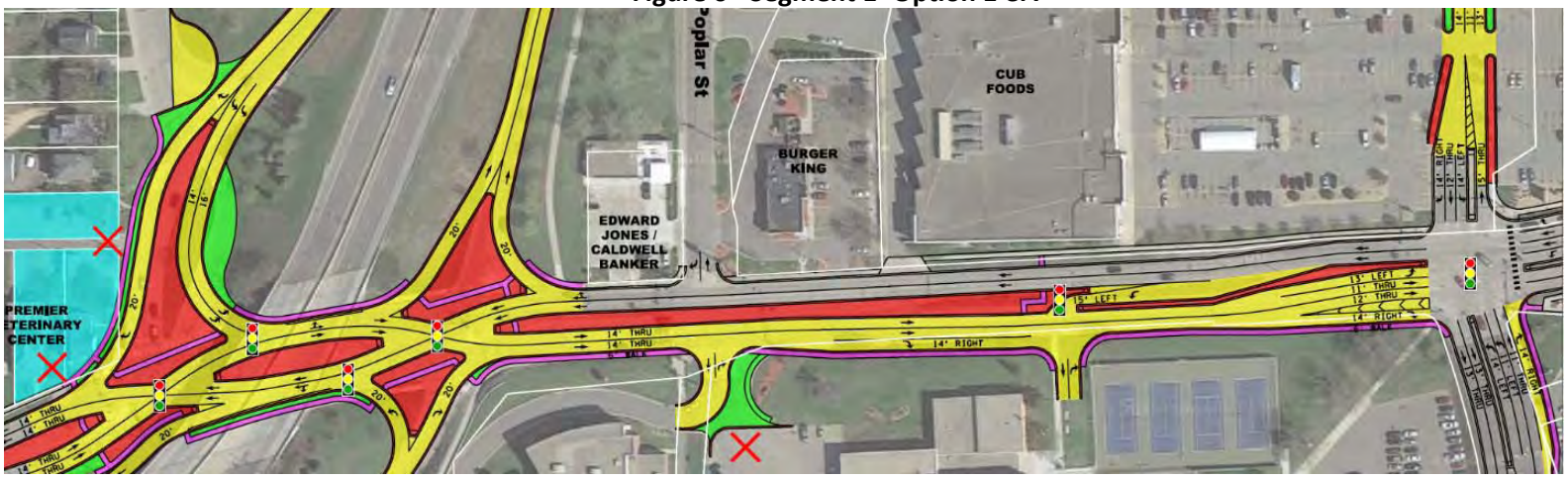
The advantages of this option include adequate traffic operations on Riverfront Drive and side streets out to 2041. The option provides more direct access for Poplar Street and the YMCA/school entrance than Option 1-2A. Pedestrian accommodations are enhanced with additional space under the TH 169 Bridge providing more separation of pedestrians from vehicles. The wide medians provide opportunities for pedestrian crossings at the roundabouts and the mid-block crossing.

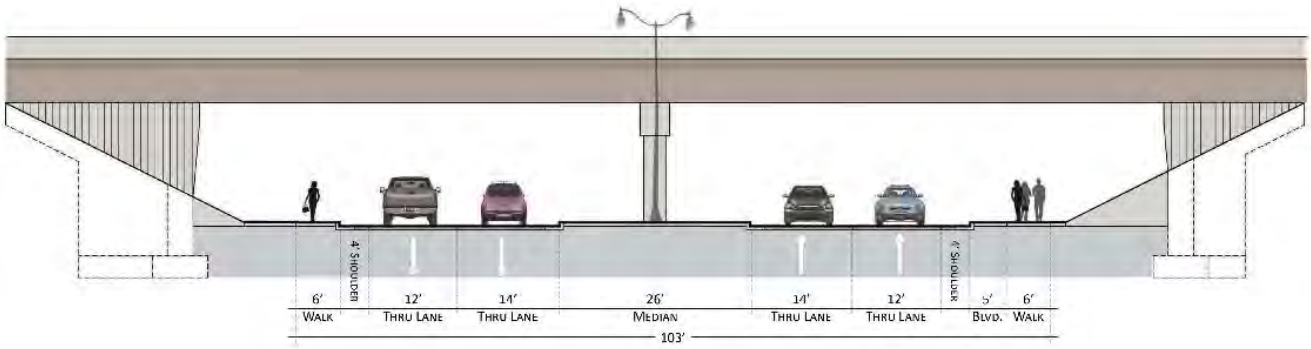
A disadvantage of this option is the cost and right-of-way required to build this solution is a substantial. It would require five full property acquisitions with one being potential historic property. The estimated cost of this improvement is $6,500,000.

Interchange Modifications Approach:

- **Option 1-3A:** Diverging diamond at TH 169 ramps; right-in/right-out at Poplar Street; additional on-ramp lane for northbound TH 169; Mankato West High School entrance road shifted east and partially signalized; roadway extension of Stoltzman Road (CSAH 16) through Cub Foods parking lot from Riverfront Drive to Sibley Parkway; and turn lane addition and signal phasing improvement at Stoltzman Road (CSAH 16). Pedestrians are accommodated at the TH 169 ramp intersections, Stoltzman Road (CSAH 16) and mid-block from Mankato West High School to Cub Foods.

Figure 6 - Segment 1- Option 1-3A





Typical Section of Option 3-1A (under the TH 169 bridge)

This option was derived from a goal to maximize traffic operations through Segment 1. The heavy southbound TH 169 to eastbound Riverfront Drive movement works well with a diverging diamond operation. A diverging diamond configuration increases the capacity of left-turns without needing additional lanes. A diverging diamond is a type of diamond interchange in which the two directions of traffic, in this case on Riverfront Drive, cross to the opposite side on both sides of the bridge. This operation allows for more efficient signal operations and improves the flow on the entire corridor through the interchange area. There is also a safety benefit as fewer conflict points exist with this design. This option provides the best traffic operations and safety benefit of all of the Segment 1 options studied.

In order to provide adequate spacing between the interchange ramp terminals, the location of the Mankato West school access was moved to the east with this option. This would require a major shift in the configuration of the school site with the back parking lot no longer having access to Riverfront Drive and the main entrance being relocated near the front of the school. Due to these substantial changes in the school site, this option was not supported by the school district at this time.

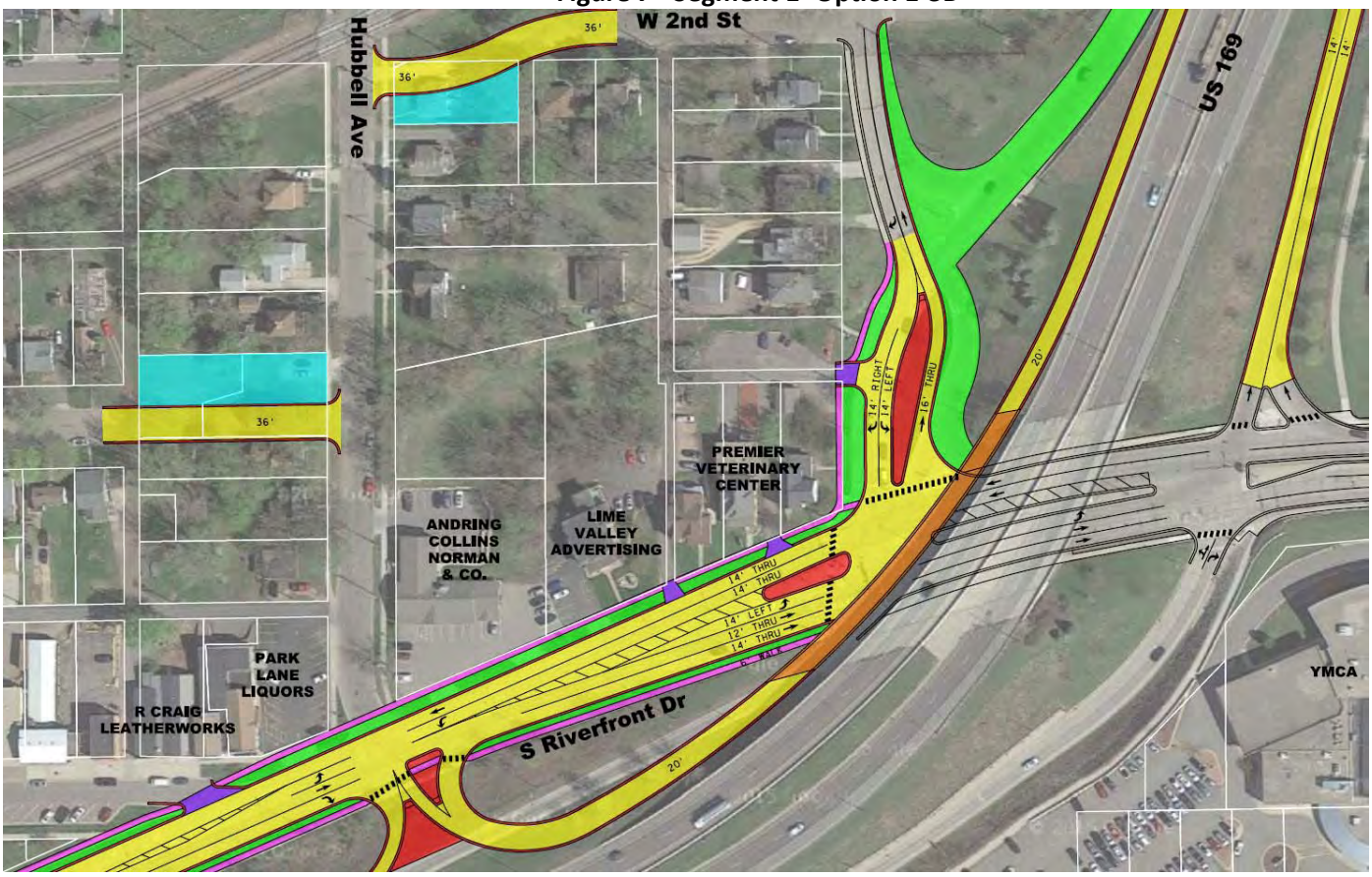
This option would also require a major change for the YMCA access as this would become a right-in/right-out to Riverfront Drive. Westbound traffic leaving the YMCA would need to make a U-turn at Stoltzman Road (CSAH 16) or use a new public street connection through Cub Foods to access Poplar Street. The design of the YMCA driveway and the additional circuity this option causes for their members led to this option not being supported by the YMCA at this time.

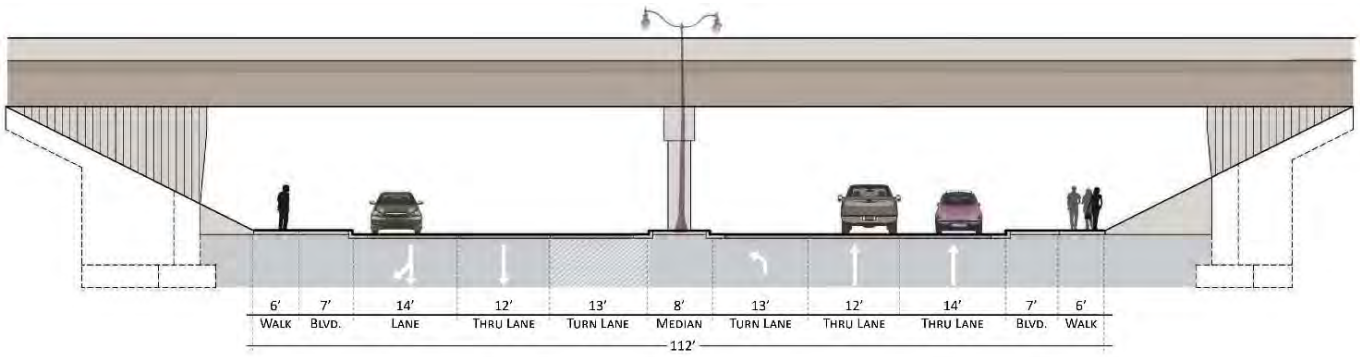
The advantages of this option are the improved traffic operations, safety and enhanced pedestrian environment with wide medians for crossings. The disadvantages are the lack of current property owner support and the cost and right-of-way acquisition required. The study partners also expressed

concern with a lack of community familiarity with this type of design and the number of signals being added to the corridor which is a long-term maintenance consideration. The City of Mankato expressed concern with the loss of access to Hubbell Avenue which provides connections from Riverfront Drive across the railroad tracks into the Sibley area neighborhood. It is anticipated at least three properties would need to be acquired to build this solution. The estimated cost is approximately $4,500,000.

- **Option 1-3B:** Loop ramp from southbound TH 169 eliminating access of Hubbell Avenue onto Riverfront Drive; roadway extension of 2nd Street from Owatonna Street to Hubbell Avenue and 3rd Street between Sibley Street and Hubbell Avenue; additional on-ramp for northbound TH 169; and turn lane addition and signal phasing improvement at Stoltzman Road (CSAH 16). Pedestrians are accommodated at the signalized crossings of Poplar Street and Stoltzman Road (CSAH 16) and mid-block between Mankato West High School and Cub Foods.

Figure 7 - Segment 1- Option 1-3B





Typical Section of Option 3-1B (under the TH 169 bridge)

This option was derived with a goal to consider other opportunities to serve the heavy southbound TH 169 to eastbound Riverfront Drive movement. This option turns those left-turns into right-turns by adding a loop ramp onto the TH 169 interchange. The challenge with this option is the short distance to bring the loop ramp down to Riverfront Drive. In order to make that work, Riverfront Drive would need to be elevated from its current location to meet the loop ramp at a new intersection. Elevating Riverfront Drive then changes how the existing properties and local street connections tie into Riverfront Drive. Hubbell Avenue would no longer be able to connect to Riverfront Drive and additional local street connections between Hubbell Avenue and 2nd and 3rd Streets would be needed for circulation.

It is anticipated this option would adequately serve the 2041 traffic volumes. The advantages of this option are the access points east of the TH 169 interchange could remain in place as is. The disadvantages include the cost and local street reconfigurations required west of the interchange to make this work. The estimated cost of this improvement is approximately $4,500,000.

Grade Separated Trail Crossing

The feasibility of a grade separated trail crossing was studied at a high-level. The conclusion is a grade-separation, whether underpass or overpass, is a feasible improvement option to connect the West Mankato Trail across Riverfront Drive near Poplar Street. This grade separation could be made to work with any of the Segment 1 roadway improvement options described above. Illustrations of the options studied are included in **Appendix I**. Estimated costs for the trail grade separation are approximately $1,000,000 to $1,500,000. Study partners felt a grade separation is a good option to consider for future implementation but is not likely needed in the shorter term.

Segment 2: Sibley Parkway to Veteran's Memorial Bridge

Issues in this segment include:

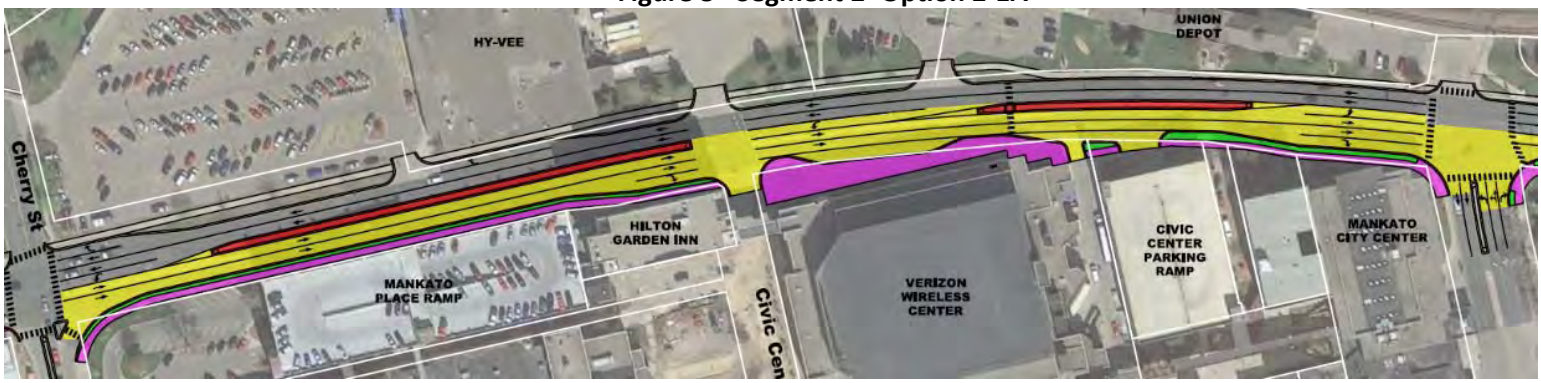
- Lack of sidewalk on east side of Riverfront Drive between Cherry Street and Civic Center Plaza – A gap in the sidewalk system exists in this location. Pedestrians are routinely observed walking haphazardly in this area either where no sidewalk exists along a narrow shoulder area on the east side of Riverfront Drive or within the landscaped median on Riverfront Drive. Both of these conditions are a safety concern. The grocery store is a primary destination for pedestrians also trying to cross Riverfront Drive in this area.
- Pedestrian crossing safety at Liberty Street – There is a pedestrian crossing demand at the Liberty Street/Riverfront Drive intersection. This intersection is not signalized which increases the difficulty for pedestrians to find an adequate gap in traffic to cross and for vehicles to recognize a pedestrian is present.
- Cherry Street and Warren Street signal operations and lane alignments – Both the Warren Street and Cherry Street traffic signals do not currently provide protected lefts. It is difficult to find a gap in northbound Riverfront Drive traffic to make the southbound to eastbound left turn at these locations. In addition, the lane alignment for eastbound thru movement from

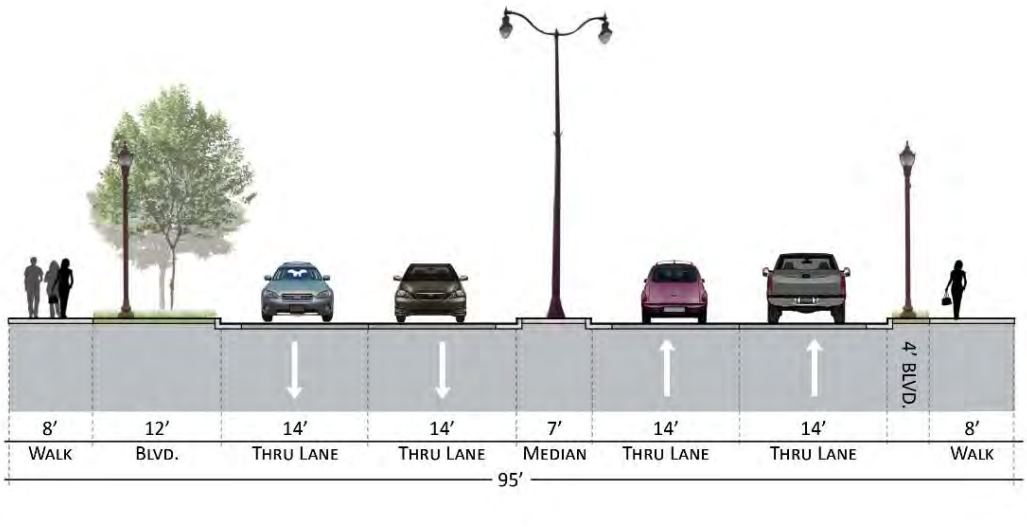
Minnesota Street to Cherry Street is offset by four feet. The westbound movement from Warren Street to Poplar Street is offset by six feet. Both of these may cause driver confusion.

The following improvement options were identified for this segment:

- **Option 2-1A:** The median is narrowed by eight feet to allow for a sidewalk on the east side of Riverfront Drive while maintaining 4-lanes of traffic on Riverfront Drive. The west curb line remains in place. The existing rectangular rapid flashing beacon north of Civic Center Plaza would need to be shifted north or moved to the south side of the Civic Center Plaza intersection to utilize the proposed medians.

Figure 8 - Segment 2- Option 2-1A





Typical Section of Option 2-1A

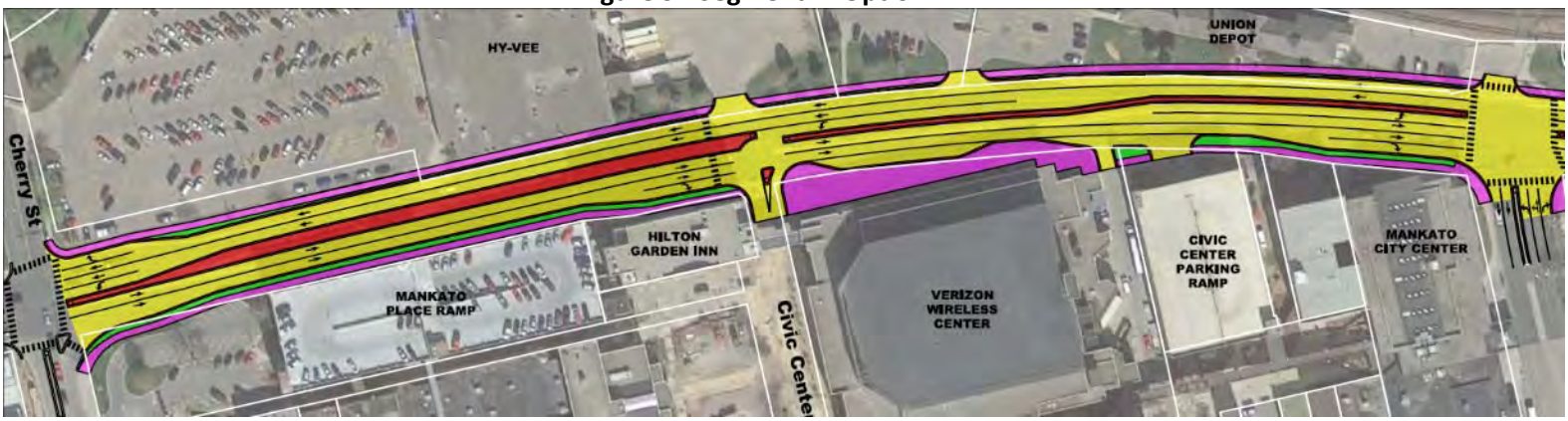
The 2041 traffic operations analysis shows the operations are acceptable and the same as the no-build for Option 2-1A since no geometric changes were made at the intersections. Hy-Vee was supportive of this option as no changes are proposed to their driveways along Riverfront Drive.

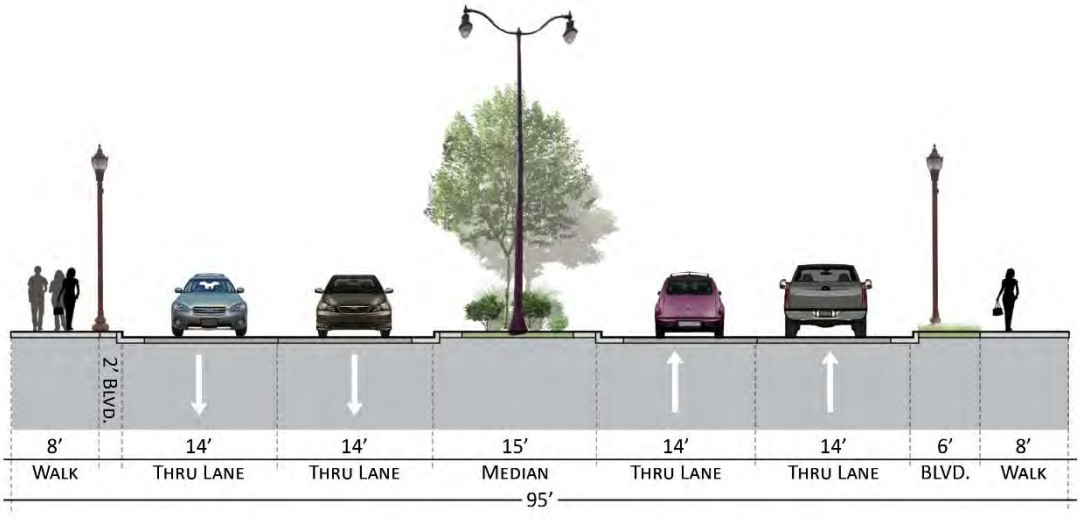
The advantages of this option are the addition of the sidewalk without major impacts to adjacent properties. The proposed improvements are anticipated to fit within the existing right-of-way available. One disadvantage is the existing rectangular rapid flashing beacon would need to be shifted either slightly north or to the south side of the Civic Center Plaza intersection on Riverfront Drive to make use of the proposed medians. The estimated cost of this option is approximately $1,200,000.

- **Option 2-1B:** This option shifts the west curb line between Cherry Street and Plum Street to the west to provide a sidewalk on the east side of Riverfront Drive while still maintaining 4-lanes of traffic. The existing rectangular rapid flashing beacon east of Civic Center Plaza would

likely need to be shifted to the south side of the Civic Center Plaza intersection to utilize the proposed median.

Figure 9 - Segment 2- Option 2-1B





Typical Section of Option 2-1B

The 2041 traffic operations analysis shows the operations are acceptable and the same as the no-build for Option 2-1B since no geometric changes were made at Cherry Street, Warren Street, or Main Street. This option included a ¾ access at the Civic Center Plaza/Hy-Vee back parking lot intersection. The purpose of Option 2-1B was to consider an option that maintained the existing roadway footprint today yet also added a sidewalk. Study partners realized this option would only work if Hy-Vee were looking to expand on a different footprint than their building today. However, city and consultant staff met with Hy-Vee during the study process and found they do not currently have plans for an expansion project that could accommodate this option. Therefore, they do not support this as a viable option due the proximity of Riverfront Drive to their current building, the loss of a driveway on Riverfront Drive, and the loss of full access to their back parking lot.

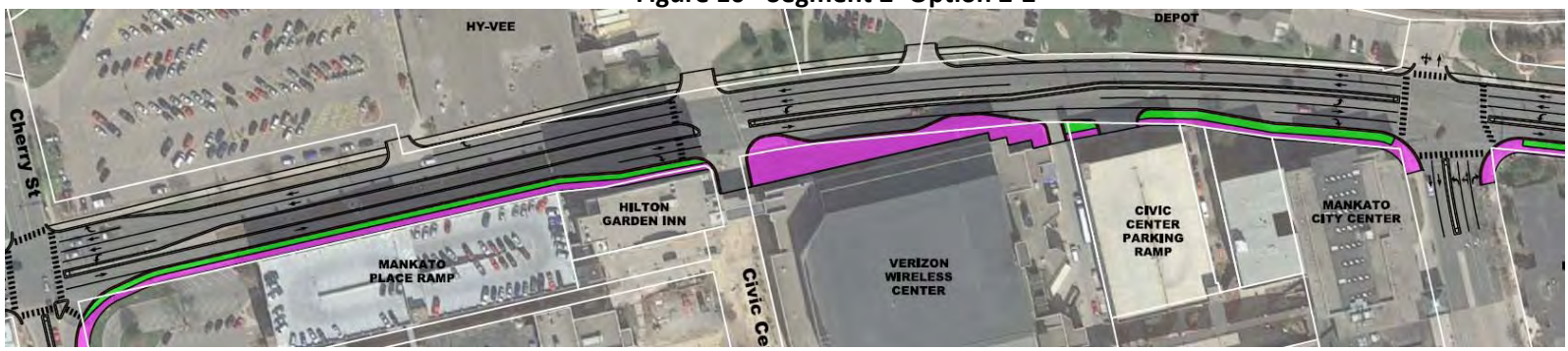
The advantages of this option are the addition of the sidewalk while at the same time maintaining the wide center median which is a benefit from a pedestrian crossing standpoint. The disadvantage is it does not work for Hy-Vee's current operations.

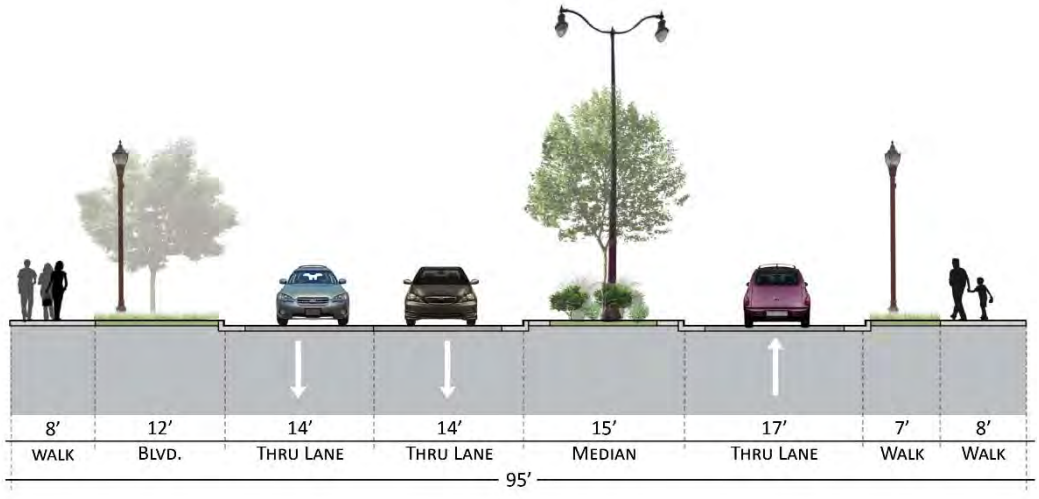
The estimated cost of this option is approximately $2,200,000.

- **Option 2:** This option provides a 3-lane on Riverfront Drive. The 3-lane configuration includes two lanes southbound and one lane northbound on Riverfront Drive. One northbound through lane is removed starting 50' north of Cherry Street to provide a sidewalk on the east side. The

existing rectangular rapid flashing beacon north of Civic Center Plaza would need to be shifted to the south side of the Civic Center Plaza intersection to utilize the proposed median. The median north of Civic Center Plaza is not wide enough to support a pedestrian refuge.

Figure 10 - Segment 2- Option 2-2





Typical Section of Option 2-2

Option 2 was studied in combination with the desire to test a 3-lane in Segment 3 (Old Town). The traffic operations analysis found that in order to make the 3-lane in Segment 3 work acceptably, the 3-lane would need to start at Cherry Street. Overall vehicle delay is anticipated to increase with this option yet still operate within an acceptable range at a LOS B on Riverfront Drive and LOS C on the side streets with 2041 traffic volumes. It is anticipated that northbound queuing will increase substantially if 2041 traffic volumes are realized. The northbound queuing will be most affected at the Warren Street/Poplar Street intersection as driver anticipate the lane drop at Cherry Street. The queues at Warren Street/Poplar Street are anticipated to more than double; however, most vehicles are anticipated to flush through the traffic signal in this location in one cycle.

The advantages of this option are the ability to accommodate the sidewalk addition within the existing right-of-way, expanding the 3-lane outside of Old Town to all serve this portion of the downtown area with improved pedestrian facilities and crossings. This option is supported by Hy-Vee as it does not change their site access or circulation patterns.

The primary disadvantage of this option is the change in northbound queuing that is anticipated as traffic approaches the 2041 traffic levels. Although still acceptable from a traffic engineering standpoint, the queues projected during the peak hours will be different than today. There is a concern that the community does not have a tolerance for the anticipated queues. The other

disadvantage is a change in the existing rectangular rapid flashing beacon location to use the proposed median south of Civic Center Plaza.

The estimated cost for Option 2-2 is approximately $450,000.

Segment 3: Veteran's Memorial Bridge to Madison Avenue

Issues in this segment include a lack of pedestrian crossings at major intersections, perceptions of a lack of parking, and a general desire to enhance the streetscape and widen sidewalks to improve the pedestrian environment along Riverfront Drive and the look and feel of Old Town.

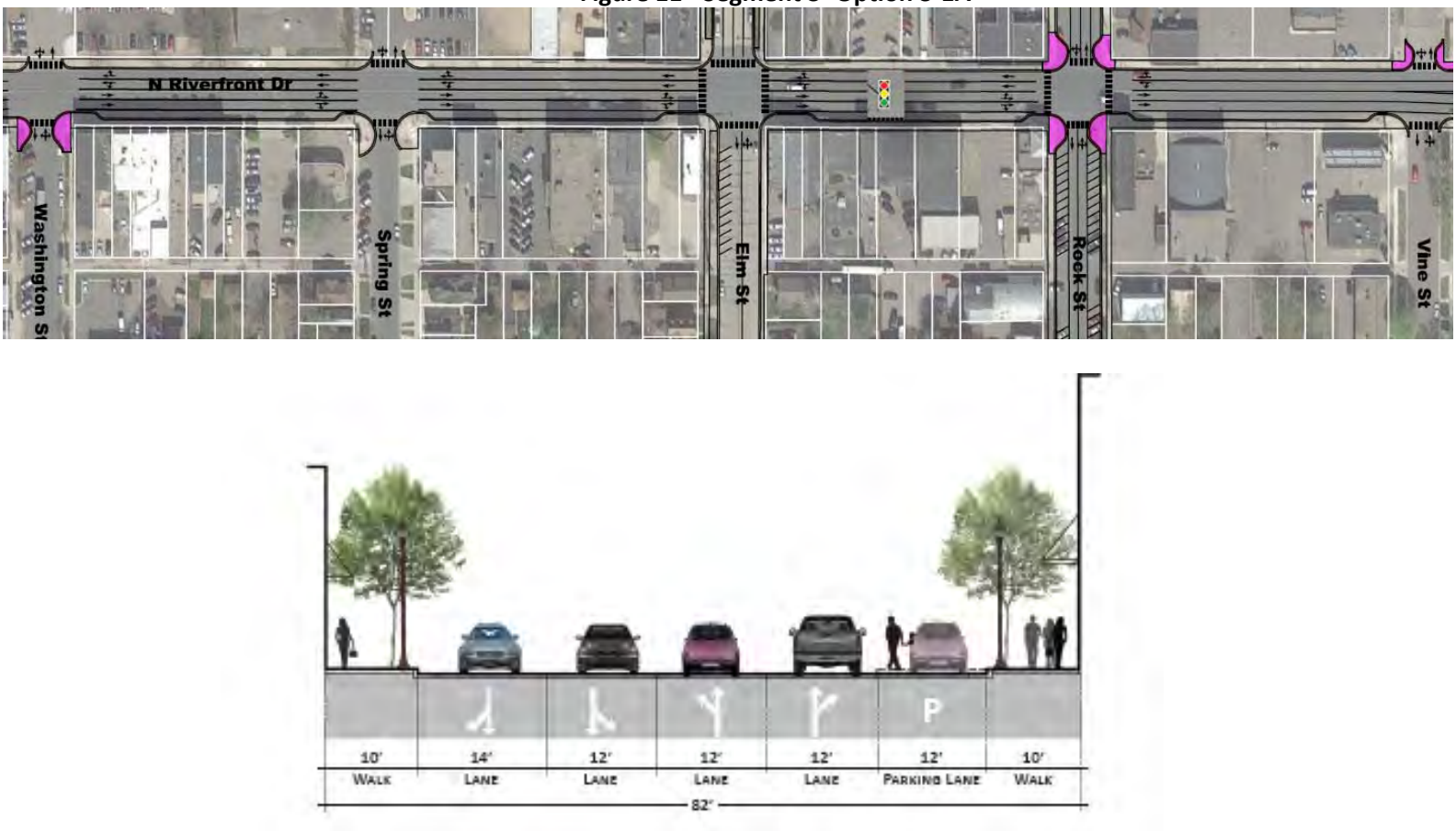
The following improvement options were identified for this segment:

- **Plum Street Intersection Modification** – All of the Segment 3 options include an improvement to Plum Street to remove the free-right movement from northbound Riverfront Drive to eastbound Plum Street. The traffic operations analysis found this free-right movement is not necessary to provide acceptable vehicle operations at this intersection. Therefore, all Segment 3 options include a change to the Plum Street intersection to create more of a traditional intersection with either one or two northbound lanes (depending on the option below) and a right-turn lane. This was considered based on a recommendation from the Old Town Master Plan related to improving pedestrian crossing safety.

Four-Lane Options

- **Option 3-1A:** This is a four-lane roadway with primary vehicle intersections at Plum Street and Elm Street and enhanced pedestrian corridor on Rock Street. This option includes bump-outs on Washington Street, Rock Street and Vine Street.

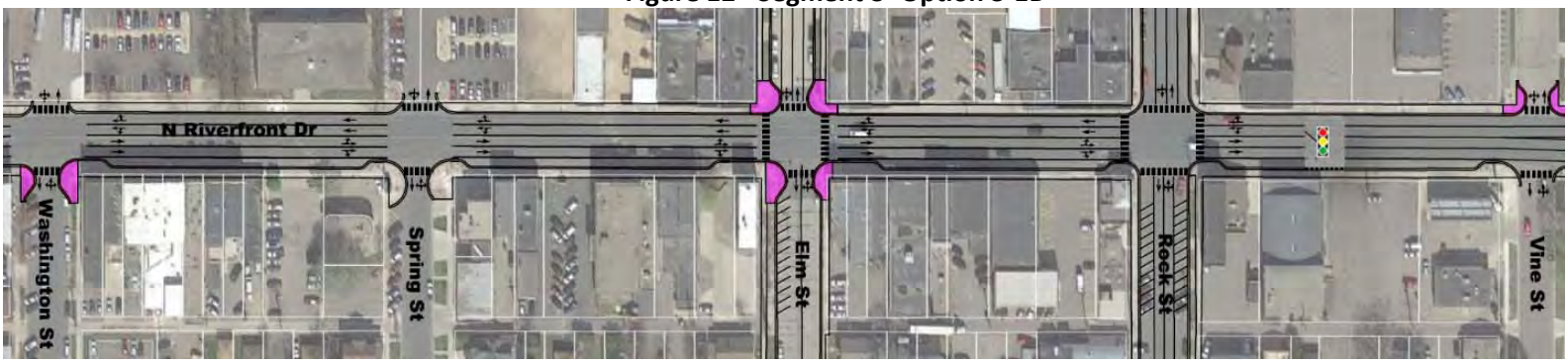
Figure 11 - Segment 3- Option 3-1A



Typical Section of Option 3-1A (and 3-1B)

- **Option 3-1B:** This is a four-lane roadway with primary vehicle intersections at Plum Street and Rock Street and enhanced pedestrian corridor on Elm Street. This option includes bump-outs on Washington Street, Rock Street and Vine Street.

Figure 12 - Segment 3- Option 3-1B



Options 3-1A and 3-1B were developed to identify what improvements could be made to improve the pedestrian environment both along and across Riverfront Drive in Old Town if a four-lane roadway was maintained. Right-of-way is limited in this area and without removing any travel lanes there is no ability to widen existing sidewalks along Riverfront Drive. The options shown above looked at ways to enhance pedestrian crossings at either Elm Street or Rock Street to encourage vehicle traffic at one and pedestrian traffic at another. Option 3-1A would maintain the traffic signal at Elm Street for vehicular traffic and create a pedestrian corridor on Rock Street. Option 3-1B does the reverse by moving the traffic signal to Rock Street for vehicular focus while moving the pedestrian corridor to Elm Street.

An overhead rectangular rapid flashing beacon could be installed at the intersection with emphasis on the pedestrian corridor (opposite of the location where the traffic signal is placed). Traffic operations analysis shows there would be no major issue with keeping the traffic signal at Elm Street or moving it to Rock Street, as long as only one of the two intersections were signalized.

The bump-outs were added to shorten crossing distance for pedestrians on the side streets where possible similar to what already exists at Spring Street.

The advantages of Options 3-1A and 3-1B are the mobility of traffic movements on Riverfront Drive is maintained and similar to today. The disadvantages are the lack of opportunities to expand the sidewalk width for a more comfortable and inviting pedestrian environment. The estimated costs for Option 3-1A and 3-1B range from approximately $325,000 to $575,000.

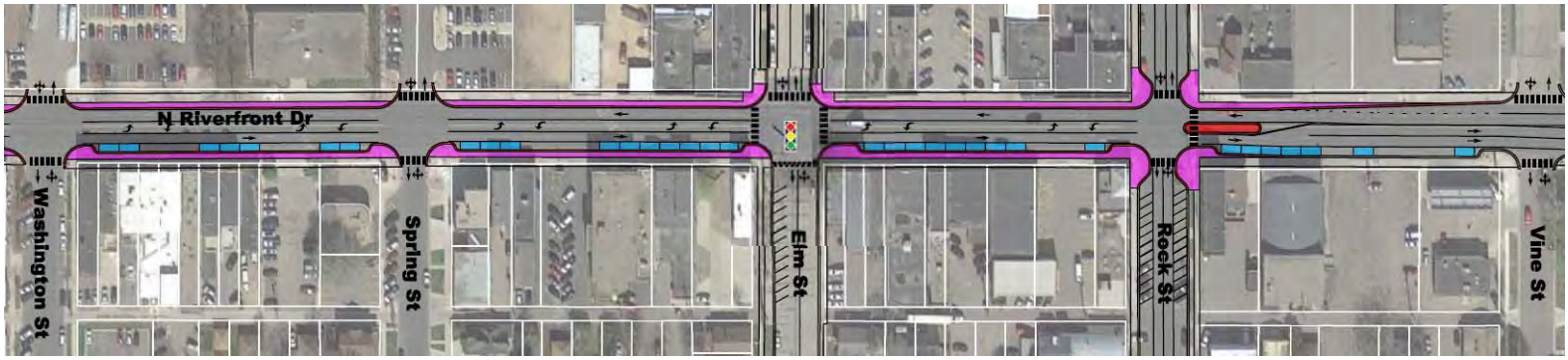
Three-Lane Options

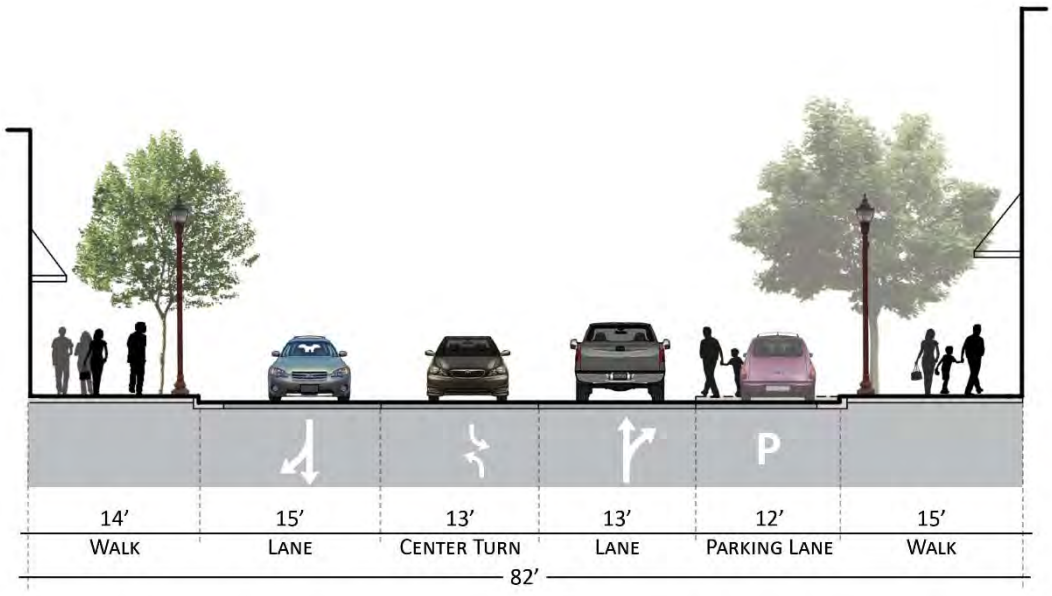
A reduction in traffic lanes on Riverfront Drive in Old Town was recommended by the Old Town Master Plan for study during the Riverfront Drive Corridor Study. The primary goal of the 3-lane options is to better provide for pedestrian accommodations both along and across Riverfront Drive while at the same time keeping traffic moving efficiently and safely. Eight variations of a 3-lane option are described below. The differences across these variations are due to how parking is treated and whether a center turn lane or median is included. All 3-lane options widen back to 4-lanes north of Vine Street in order to provide the needed capacity at the Riverfront Drive/Madison Avenue intersection.

Similar to the 3-lane options in Segment 2, it is anticipated that queuing at the signalized locations in Old Town will increase substantially if 2041 traffic volumes are realized. Although still acceptable from an overall operations standpoint based on traffic engineering standards, the queues projected during the 2041 peak hours will be different than today. No traffic diversion from Riverfront Drive to parallel routes is required to accommodate the projected 2041 volumes.

- **Option 3-2A**: This is a three-lane roadway with primary vehicle intersections at Plum Street and Elm Street and enhanced pedestrian corridor on Rock Street. This option includes on-street parking on along the northbound lanes as it exists today.

Figure 13 - Segment 3- Option 3-2A

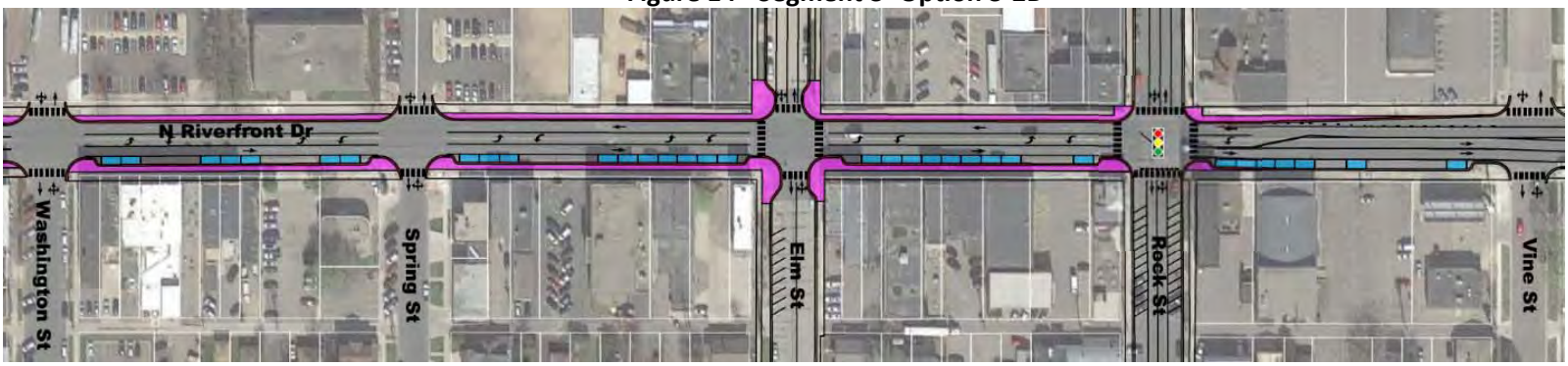




Typical Section of Option 3-2A (and 3-2B)

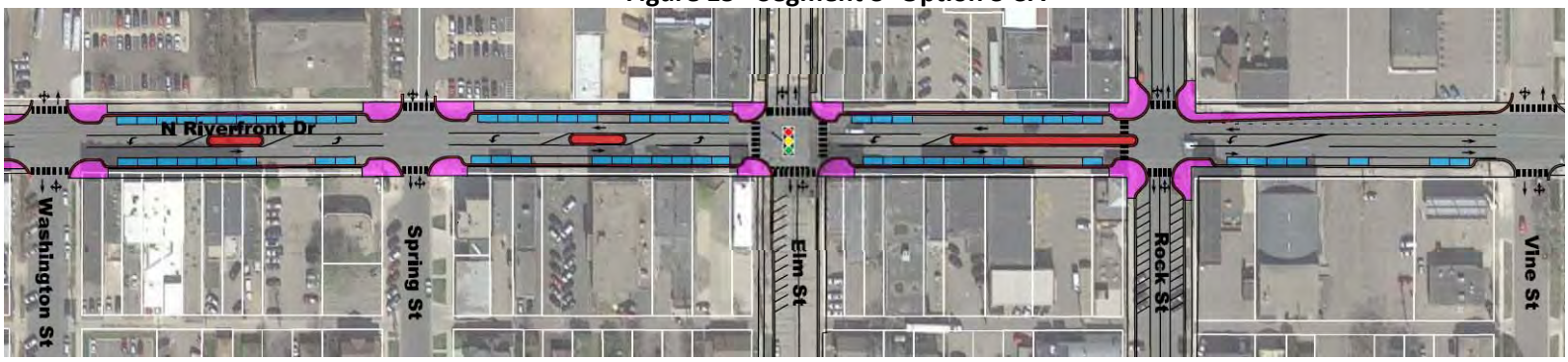
- **Option 3-2B:** This is a three-lane roadway with primary vehicle intersections at Plum Street and Rock Street and enhanced pedestrian corridor on Elm Street. This option includes on-street parking on along the northbound lanes as it exists today.

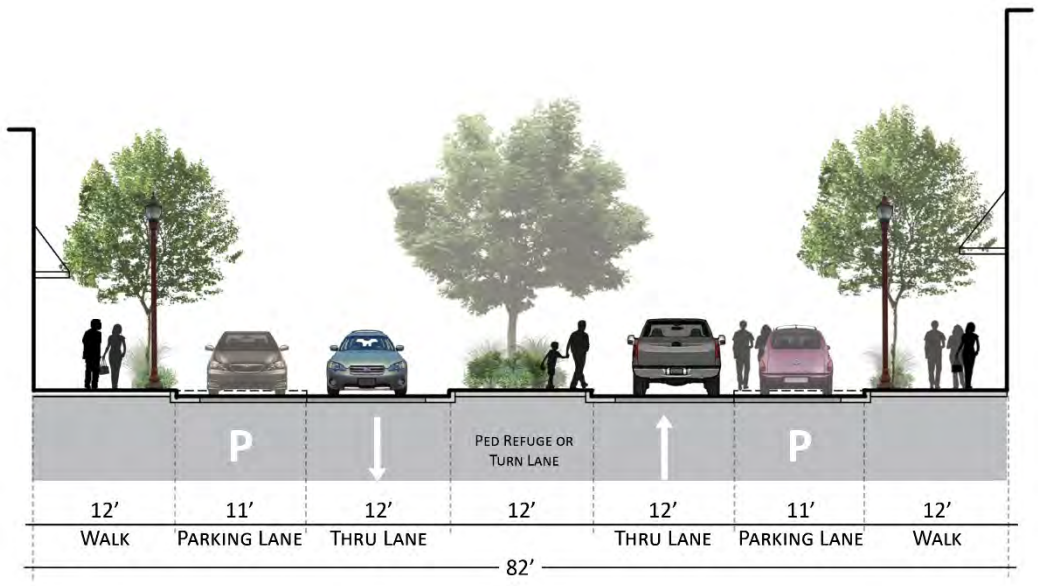
Figure 14 - Segment 3- Option 3-2B



- **Option 3-3A:** This is a three-lane roadway with parking on both sides, left turn lanes between Washington Street and Rock Street and spot safety and pedestrian enhancements. This option includes primary intersections at Plum Street and Elm Street and enhanced pedestrian corridor on Rock Street and a median refuge for pedestrians crossing Riverfront Drive.

Figure 15 - Segment 3- Option 3-3A

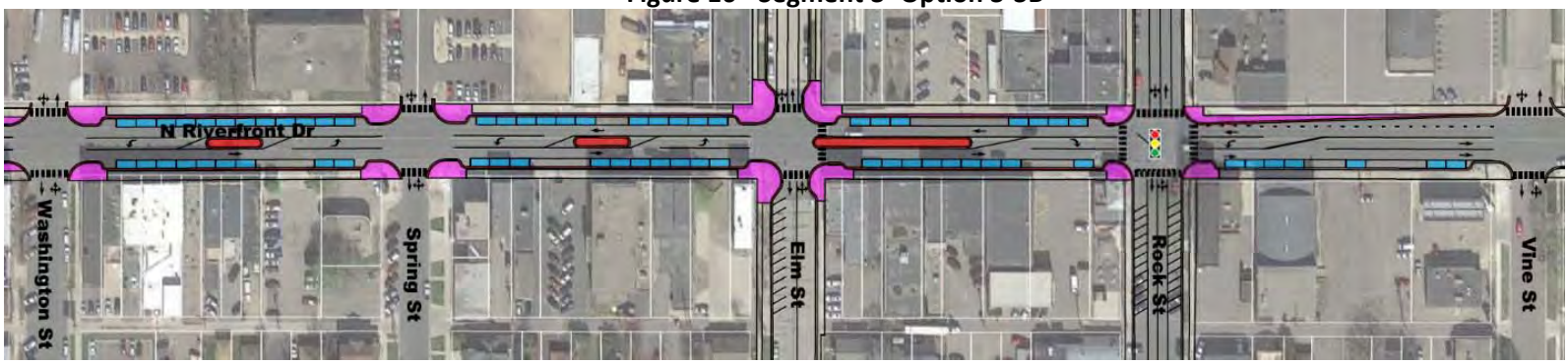




Typical Section of Option 3-3A (and 3-3B)

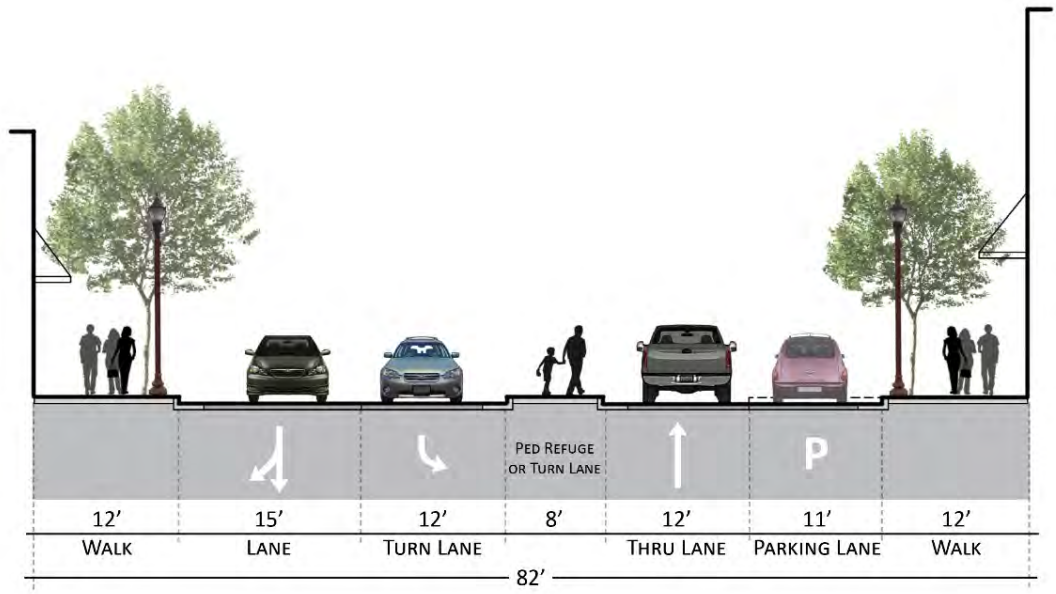
- **Option 3-3B:** This is a three-lane roadway with parking on both sides, left turn lanes between Washington Street and Rock Street and spot safety and pedestrian enhancements. This option includes primary intersections at Plum Street and Rock Street and enhanced pedestrian corridor on Elm Street and a median refuge for pedestrians crossing Riverfront Drive.

Figure 16 - Segment 3- Option 3-3B



- **Option 3-4A:** This is a three-lane roadway with parking on the northbound side, a continuous median with left turn lanes between Washington Street and Rock Street and spot safety and pedestrian enhancements. This option provide primary intersections at Plum Street and Elm Street and an enhanced pedestrian corridor on Rock Street.

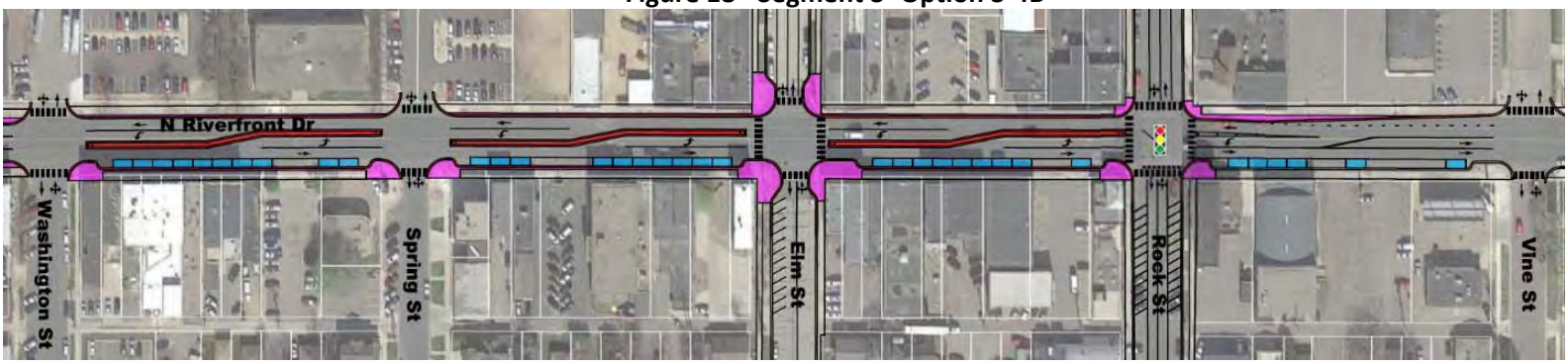
Figure 17 - Segment 3- Option 3-4A



Typical Section of 3-4A (and 3-4B)

- **Option 3-4B:** This is a three-lane roadway with parking on the northbound side, a continuous median and left turn lanes between Washington Street and Rock Street and spot safety and pedestrian enhancements. This option provide primary intersections at Plum Street and Rock Street and an enhanced pedestrian corridor on Elm Street.

Figure 18 - Segment 3- Option 3-4B



In general, Old Town business and property owners seemed to favor the 3-lane options due to the increased pedestrian space and traffic calming effect. However, concerns were also expressed about traffic choosing to divert to 2nd Street if drivers perceive it to be faster, which they did not want to see. They expressed a desire to maintain parking on the northbound lanes of Riverfront Drive with better wayfinding to public parking lots available in the area. There was a lack of support for the continuous median 3-lane options (3-4A and 3-4B) as it was seen as dividing the Old Town into two parts.

Freight operators in the Old Town area shared their needs for getting trucks into and out of their businesses. Any impacts to truck mobility in and out of their properties onto Riverfront Drive would be a concern for them.

The advantages of the 3-lane options are that they are able to better balance vehicles and pedestrians in a downtown environment. The 3-lane options are able to provide adequate operations for vehicles while at the same time increasing the pedestrian and streetscape space on the sidewalks from 10’ today to 12’-16’ in the future based on the option. The reduction in lanes also reduces the

crossing distance for pedestrians and may have a traffic calming effect.

The disadvantages of the 3-lane options are the concern that the community does not have a tolerance for the anticipated change in queues and may choose to use 2nd Street if they feel it is a faster route.

The estimated costs of the three-lane options range from $325,000 to $800,000.

Segment 4: Madison Avenue to Good Counsel Drive

Issues in this segment include:

- Spacing of Madison Avenue and 3rd Avenue (CSAH 5) - The close spacing of Madison Avenue and 3rd Avenue is problematic and the operational and safety concerns of today are anticipated to worsen in the future if not addressed.
- Lack of a Safe Routes to School crossing on Riverfront Drive to Franklin Elementary - A recent Safe Routes to School study identified the lack of a safe crossing across Riverfront Drive in this area to Franklin Elementary School located two blocks east of Riverfront Drive. Students living west of Riverfront Drive are currently bussed to Franklin Elementary due to the lack of an identified safe crossing.
- Traffic speeds and Access onto Riverfront Drive – Traffic speed data indicates this segment of Riverfront Drive exhibits the highest speeds over the posted speed limits. Drivers were observed traveling in excess of 10 mph over the posted speed limits of 30/35 mph. The number of access points to Riverfront Drive in this segment is also highest. There are several areas where these access points are closely spaced and turning movements into and out of each overlap one another. This is typically a safety concern, however, this segment does operate well today with no real safety or operational issues other than high vehicle speeds. The roadway width and number of lanes is likely a contributing factor to the high vehicle speeds. This segment of Riverfront Drive is a five lane roadway with two lanes in each direction and a center turn lane. An access map identifying overlapping access issues and properties with side street access or opportunities for side street access can be seen in **Appendix A (Figure A.10).**

Madison Avenue/3rd Avenue Alignment Options:

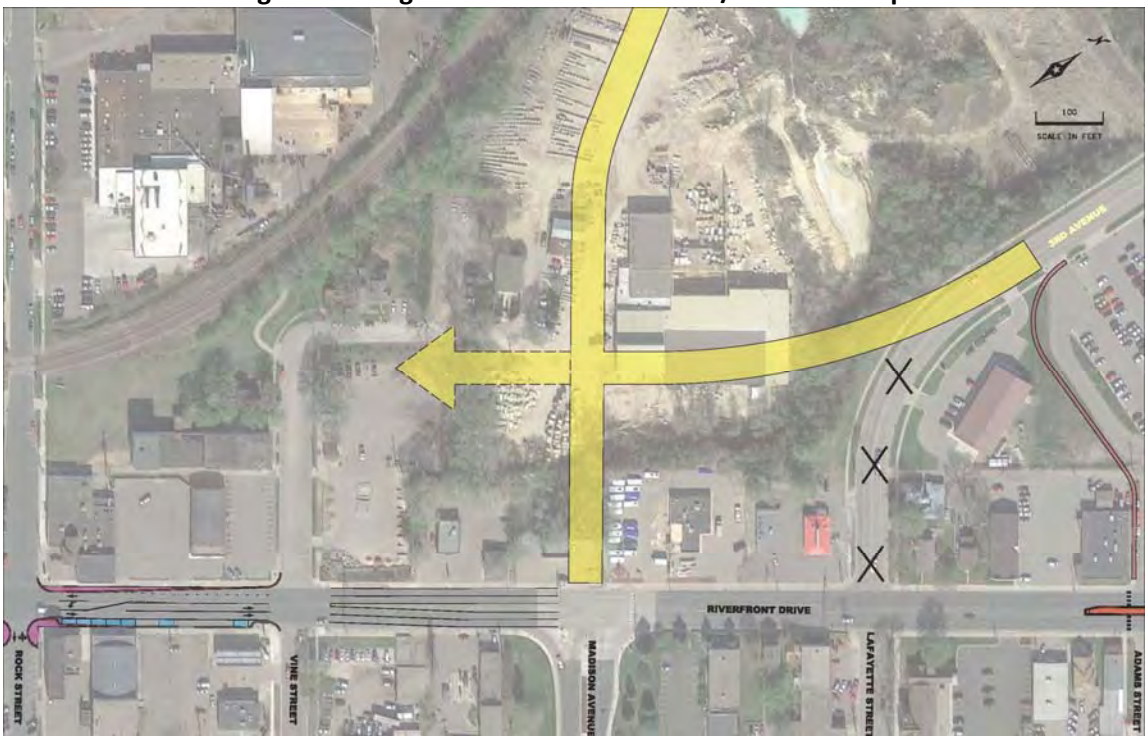
The Old Town Master Plan identified a potential future redevelopment opportunity of the Coughlan Quarry located west of Riverfront Drive near Madison and 3rd Avenue. The Riverfront Drive Corridor Study coordinated with representatives of the Coughlan Quarry during the study to identify potential Riverfront Drive improvements that could work in conjunction with a mine redevelopment project. Four realignment options were identified for the Madison Avenue and 3rd Avenue area. All of these options maintain a traffic signal at the Madison Avenue/Riverfront Drive intersection. A roundabout was tested at this location with a 3-lane option in Segment 3 through the Madison Avenue/Riverfront Drive intersection. A roundabout with a 3-lane through the intersection did not operate acceptably. However, a multi-lane roundabout could be tested further in the future at the time when Coughlan Quarry redevelopment plans are available.

The first option realigns 3rd Avenue to tie into Madison Avenue at Riverfront Drive. This would create a fourth leg on the Madison Avenue/Riverfront Drive intersection. This option is supported by Blue Earth County as a viable option for future consideration as it maintains a direct and free flow condition on 3rd Avenue to Riverfront Drive, similar to today. This is important as 3rd Avenue is county state aid highway and carries substantial freight traffic into/out of the 3rd Avenue industrial area. Although they are still early in their planning process, the Coughlan representatives also felt this was a viable alternative for future study.

Figure 19 - Segment 4- Madison Avenue/3rd Avenue Option 1

The second option for the Madison Avenue and 3rd Avenue area includes extending Madison Avenue into the mine area and tying 3rd Avenue into that extension at a new intersection. The existing 3rd Avenue connection to Riverfront Drive would be closed. This option is supported by Blue Earth County as a viable option for future consideration as well. The county state aid designation of 3rd Avenue (CSAH 5) would likely need to continue from the new intersection onto the Madison Avenue extension to Riverfront Drive so it can terminate at Riverfront Drive as it does today. The Coughlan representatives felt this was a viable alternative for future study.

Figure 20 - Segment 4- Madison Avenue/3rd Avenue Option 2



The third Madison Avenue/3rd Avenue option includes the extension of Madison Avenue into the mine property and extension of Adams Street to connect into the Madison Avenue extension. 3rd Avenue would tie into the Adams Street extension. The county state aid designation of 3rd Avenue would need to continue onto Adams Street to Riverfront Drive. Blue Earth County is not supportive of this option as it does not provide a direct connection for 3rd Avenue to Riverfront Drive. The Coughlan representatives felt this was a viable alternative for future study.

Figure 21 - Segment 4- Madison Avenue/3rd Avenue Option 3

The fourth Madison Avenue/3rd Avenue option was considered to address the operational and safety issues of these two intersections if a mine redevelopment project does not happen. This option reduces the 3rd Avenue/Riverfront Drive access to a right-in/right-out movement. The left-turns in and out of this location would need to be relocated to a full access further north on Riverfront Drive such as Maxfield Street or Chestnut Street. This option is not supported by Blue Earth County as it would require a major shift in traffic patterns for their county road and the industrial/freight users along 3rd Avenue.

Figure 22 - Segment 4- Madison Avenue/3rd Avenue Option 4

Corridor Improvement Options:

The approach to identifying improvement options for the remainder of Segment 4 was to identify primary intersection locations and modifications to the local street network needed to support these primary intersections. Three improvement options were identified as described below. The drawings shown below represent a five-lane section with two lanes in each direction, intermittent partial medians, and a center turn lane for this segment. However, both existing and projected traffic volumes in this segment could be supported by fewer lanes, such as a 3-lane or 2-lane divided with median and turn lanes. The drawings also represent a few of the Madison Avenue/3rd Avenue options described above for illustration.

- **Option 4-1:** This option closes 3rd Avenue at Riverfront Drive, extends Madison Avenue into the Coughlan Quarry area, and extends Adams Street to the Madison Avenue extension. 3rd Avenue is tied into the Adams Street extension. A pedestrian crossing is located at Lafayette Street to a trail connection along the former 3rd Avenue alignment. This provides a Safe Routes to School crossing for students west of Riverfront Drive to access Franklin Elementary School. Primary intersections are located at Madison Avenue, Adams Street, May Street and Good Counsel Drive. Lafayette Street, Lime Street, Ann Street, and Chestnut Street are converted to right-in/right-out intersections.

Figure 23 - Segment 4- Option 4-1 (Part 1: Madison Avenue to Maxfield Street)

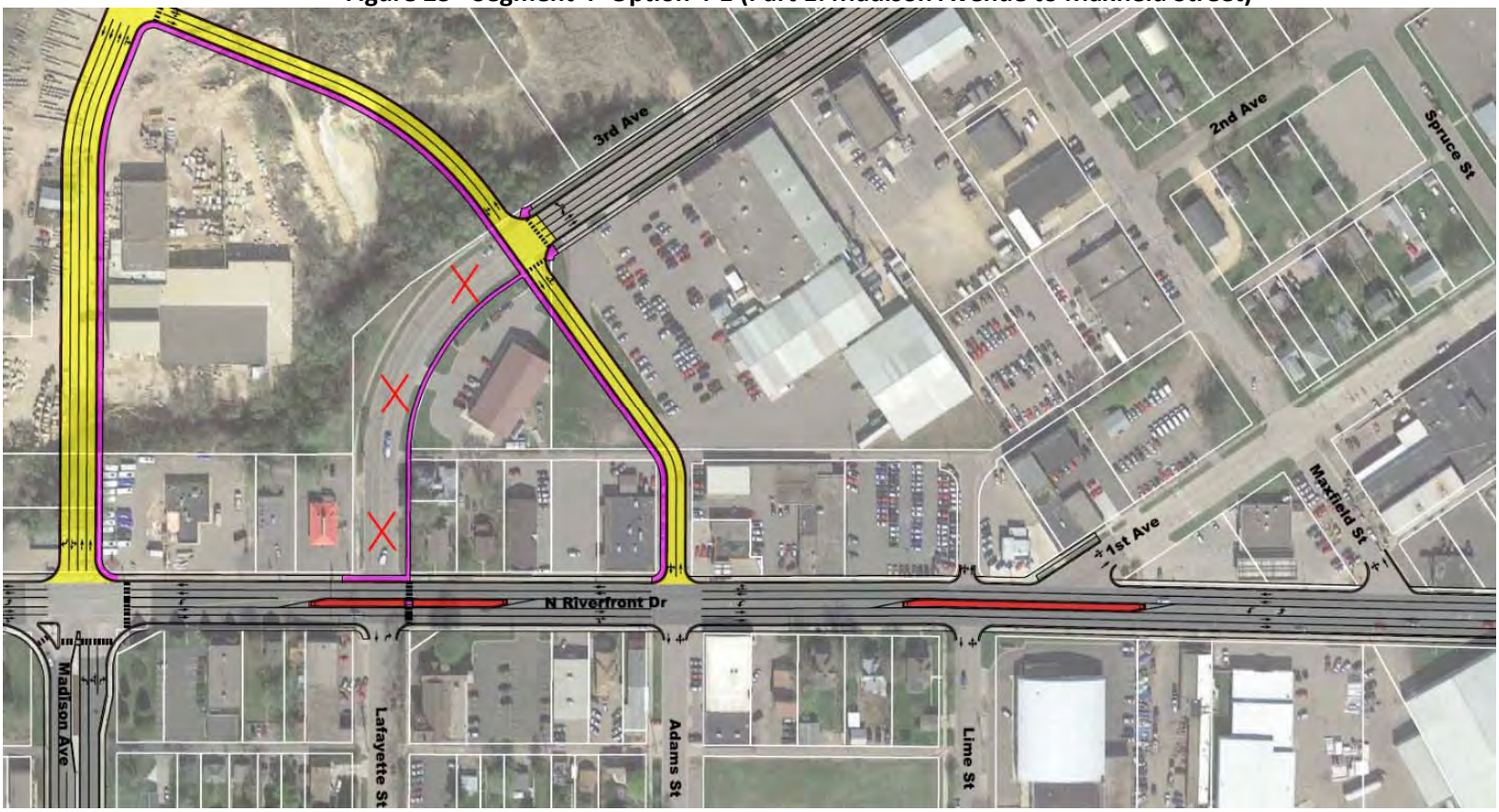
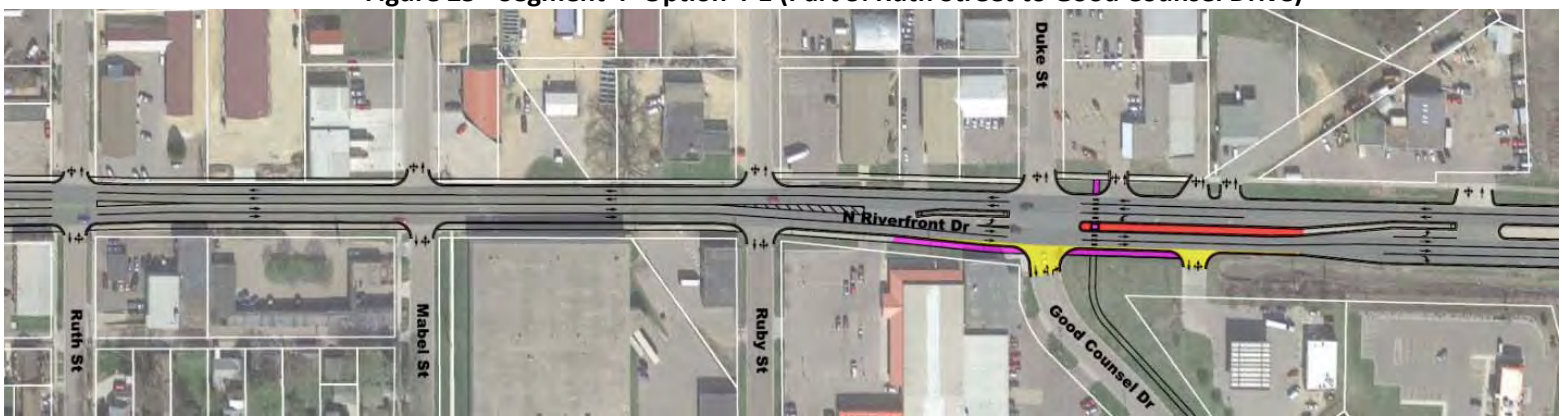


Figure 24 - Segment 4- Option 4-1 (Part 2: Maxfield Street to Ruth Street)

Figure 25 - Segment 4- Option 4-1 (Part 3: Ruth Street to Good Counsel Drive)



- **Option 4-2:** 3rd Avenue to convert to a right-in/right-out. Chestnut Street is realigned and tied into Ann Street. Primary intersections are located at Madison Avenue, Chestnut Street/Ann Street and Good Counsel Drive. A pedestrian crossing is located at Lafayette Street to a sidewalk connection along the 3rd Avenue alignment for a Safe Routes to School connection to Franklin Elementary. Lafayette Street, Lime Street, 1st Avenue, and May Street are converted to right-in/right-out intersections.

Figure 26 - Segment 4- Option 4-2 (Part 1: Madison Avenue to Maxfield Street)

Figure 27 - Segment 4- Option 4-2 (Part 2: Maxfield Street to Ruth Street)

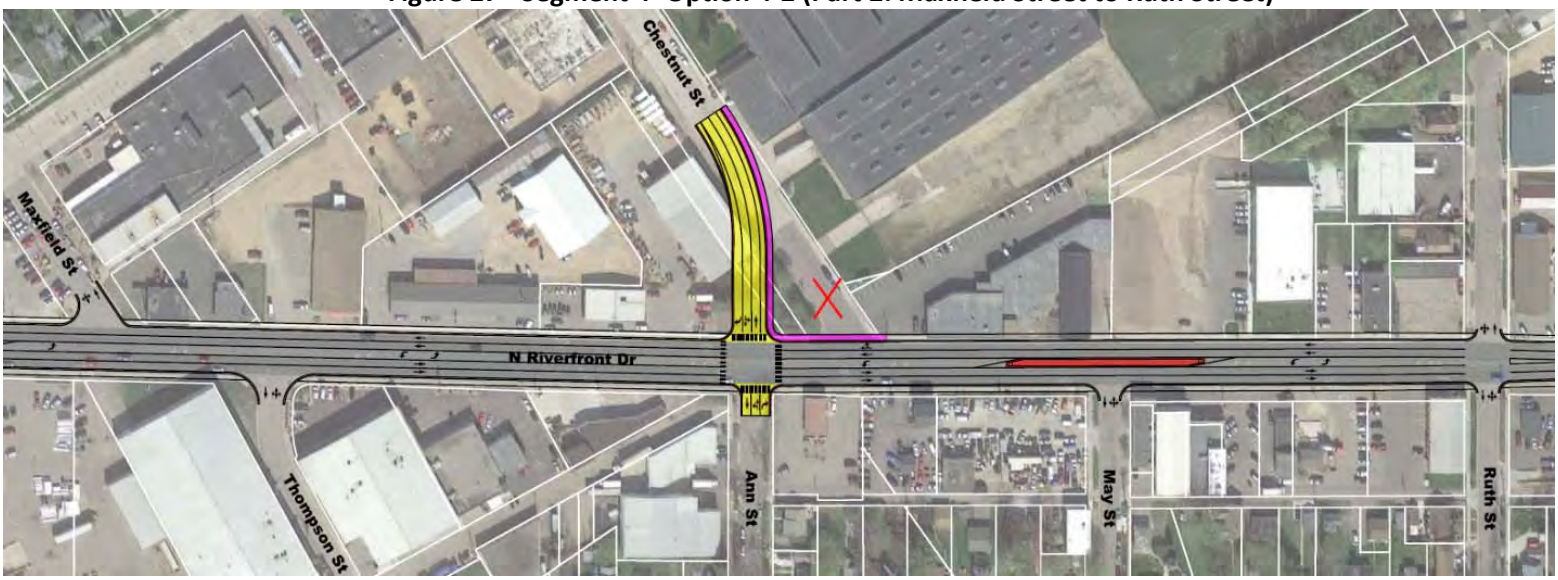


Figure 28 - Segment 4- Option 4-2 (Part 3: Ruth Street to Good Counsel Drive)

- **Option 4-3:** 3rd Avenue is realigned to tie into Madison Avenue, Maxfield Street is realigned to eliminate the skewed intersection. A pedestrian crossing is located at Lafayette Street to a new trail connection along the former 3rd Avenue alignment for a Safe Routes to School connection to Franklin Elementary. Primary intersections are located at Madison Avenue, Maxfield Street, May Street and Good Counsel Drive. 1st Avenue access is closed from Riverfront Drive. Lafayette Street, Lime Street, Ann Street, and Chestnut Street are converted to right-in/right-out intersections.

Figure 29 - Segment 4- Option 4-3 (Part 1: Madison Avenue to Maxfield Street)

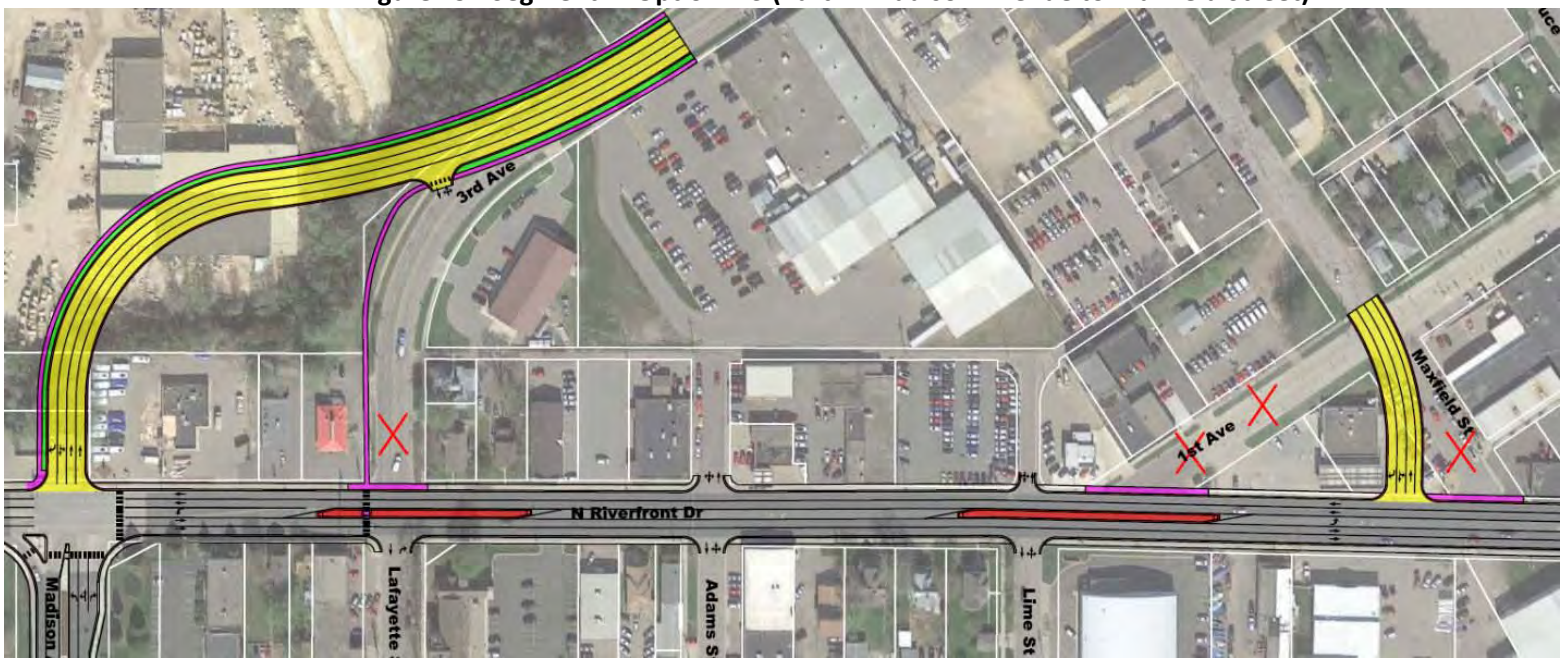
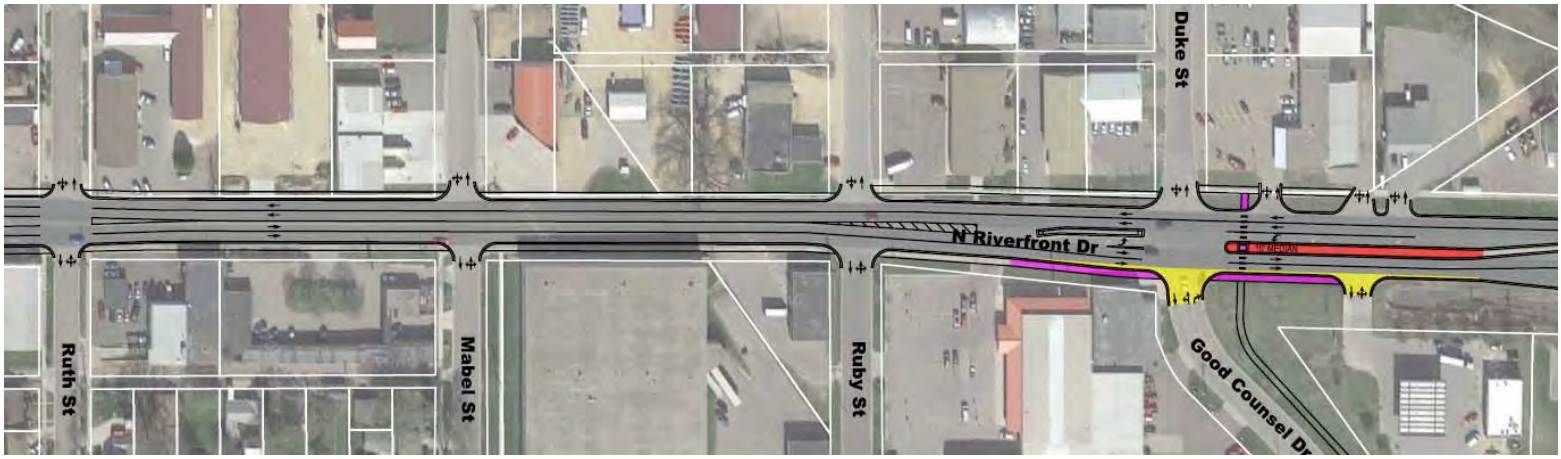


Figure 30 - Segment 4- Option 4-3 (Part 2: Maxfield Street to Ruth Street)

Figure 31 - Segment 4- Option 4-3 (Part 3: Ruth Street to Good Counsel Drive)



A detailed traffic operations analysis and evaluation of the Segment 4 options was not conducted as part of this study. Due to the lower traffic volumes it was assumed that operations would be comparable between all of the options. The implementation of any one of these options will depend on land use changes and opportunities that arise in the future that could steer the City towards one option versus another. Therefore, it was determined that a detailed evaluation and comparison at this time was not necessary.

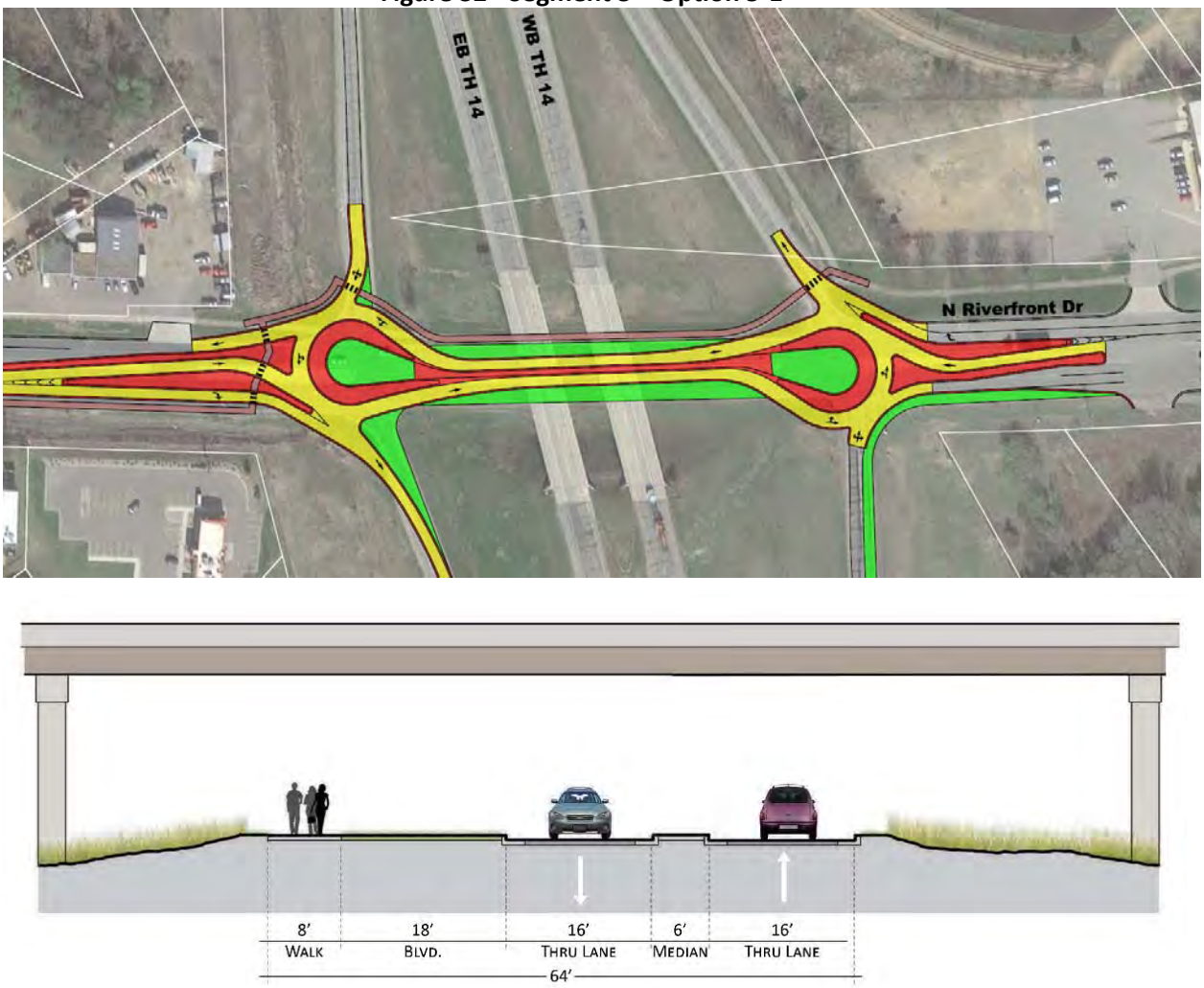
Segment 5: TH 14 Interchange

Issues with the TH 14/Riverfront Drive interchange include delays and back-ups on the westbound TH 14 ramp entering Riverfront Drive and the lack of a pedestrian crossing from Good Counsel Drive to the TH 14 Trail and the Sakatah Singing Hills Trail.

The following improvement options were identified for this segment:

- **Option 5-1:** This option provides a single-lane roundabout at each of TH 14 ramp intersections with Riverfront Drive. A trail connection is also provided along the east side of Riverfront Drive from Good Counsel Drive to the eastbound TH 14 ramp roundabout where it then crosses to the west side of Riverfront Drive to connect into an existing trail under the TH 14 bridge.

Figure 32 - Segment 5 – Option 5-1



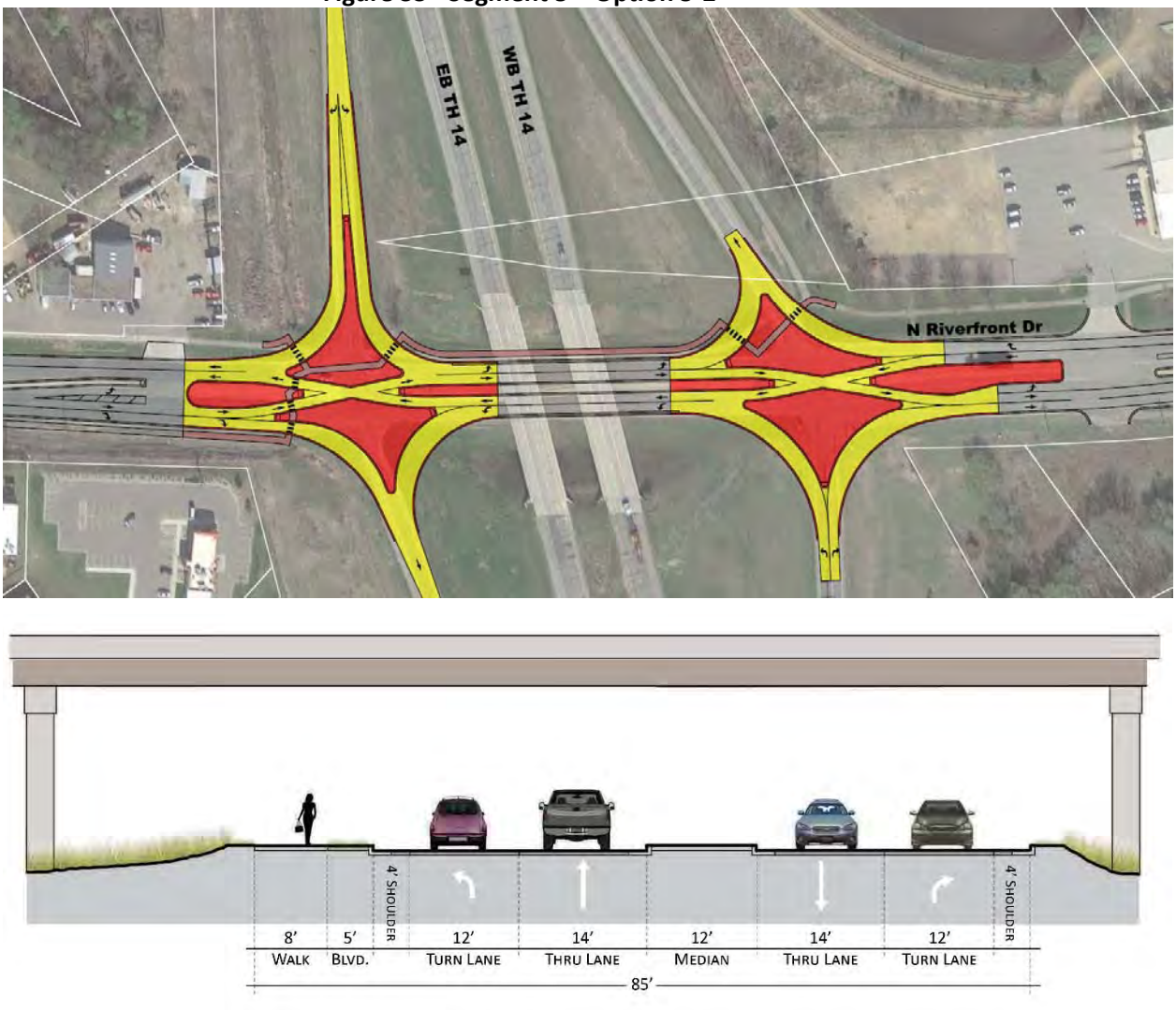
Typical Section of Option 5-1

Option 5-1 illustrates roundabouts at both TH 14 ramp intersections. The traffic analysis completed as part of this study concluded that a traffic control change is only necessary at the westbound TH 14 ramp intersection between now and 2041. The 2041 traffic analysis showed the eastbound TH 14 ramp intersection is expected to operate acceptably as a thru-stop as it currently exists today. Therefore, the City, Blue Earth County and MnDOT may wish to consider only building the north roundabout in the short-term. If only the north roundabout is built first, the City and its partners will need to revisit the design to construct a more traditional roundabout than the tear-drop design illustrated above. In addition, the proposed trail crossing should be studied further to determine the best crossing location if the south roundabout is not constructed initially.

The roundabout option provides adequate traffic operations out to 2041. An additional benefit of this design is the increased buffer space that will exist under the bridge between moving vehicles and pedestrians on the trail with fewer travel lanes. The improvement is anticipated to fit within the exiting right-of-way. The estimated cost for this improvement is approximately $750,000 for the north roundabout or $1,500,000 for both.

- **Option 5-2:** This is a diverging diamond option providing the same trail connection as Option 1. Traffic signals control traffic at each TH 14 ramp location and Riverfront Drive traffic would temporarily cross over to the opposite side of the roadway while highway traffic integrates in and then would shift back to the appropriate lane upon exiting the interchange area.

Figure 33 - Segment 5 – Option 5-2



Typical Section of Option 5-2

A diverging diamond works well at this location due to the heavy westbound TH 14 to southbound Riverfront Drive movement. From a traffic operations standpoint, this option works very comparably to the roundabout option. The improvement is designed to fit within the existing right-of-way and have a cost similar to the roundabouts at approximately $1,600,000.

The disadvantages of this option is that the agencies would need to construct both ramps at the same time in order for the diverging diamond to function properly. This means the cost is higher initially since the problem today exists only at the north ramp. In addition, the pedestrian environment under the bridge would remain similar today with the trail adjacent to four lanes of traffic with little buffer. Study partners expressed concern about community familiarity with this type of design. Because of all of these downfalls when compared to Option 5-1 (roundabouts), study partners agreed to dismiss this option from future study.

X. Recommended Concepts for Future Study and Implementation

The improvement options described in Section VIII and a preliminary implementation plan created by project staff was presented to the public and stakeholders for review and prioritization. Meetings were held with the Mankato City Council, Blue Earth County Board of Commissioners, MnDOT D7 staff and key stakeholders along the corridor including Mankato School District, Mankato YMCA, Cub Foods, Hy-Vee, the Old Town District and Coughlan Quarry representatives. At the April public open house, attendees were asked to help prioritize improvements into implementation timeframes. Attendees were given the opportunity to identify their top three priorities for each of the following implementation timeframes:

- Short-Term (0-5 years) – These improvements are typically smaller, spot improvements that have a lower cost but yet high benefit in terms of addressing existing issues on Riverfront Drive. Because of their smaller size, these improvements could be implemented within the next five years and serve the corridor well for many years into the future.
- Mid-Term (6-15 years) - Projects in this category tend to be larger in size than the short-term projects and may be more feasible to implement in conjunction with a comprehensive infrastructure improvement project such as a street reconstruction project.
- Opportunity/Development/Safety Driven – Projects in this category were identified for the long-term. These are areas that may not have an immediate need for an improvement today but could become problematic over the longer term if 20-year traffic forecasts are realized or safety problems arise. Not all of these improvements are feasible today with the existing land uses along the corridor. They would only be considered if land uses change or opportunities arise that make these options more feasible.

The results of the public's input on the prioritization of projects into the implementation timeframes are included in **Appendix J**. In general, the project team's initial assessment of priorities was very similar to the public's input.

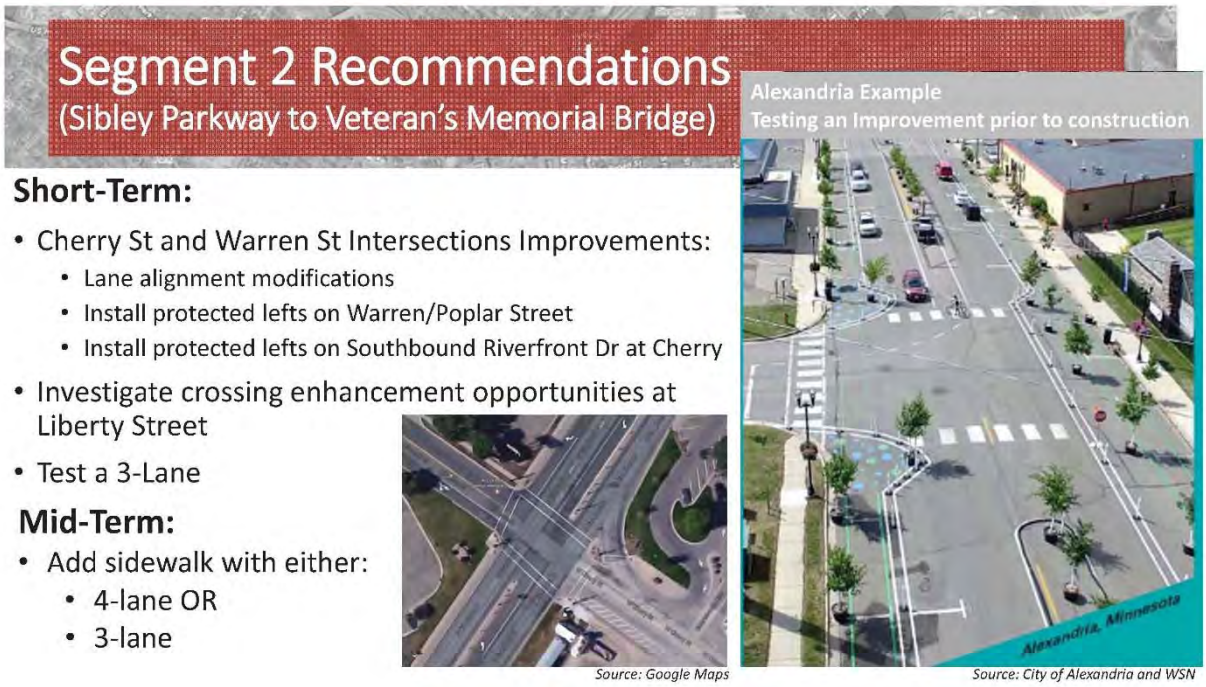
Recommendations

The following summarizes recommendations identified for each segment of Riverfront Drive based on input from study partners, corridor stakeholders, the public and elected officials.

Either Option 1-1A or Option 1-1B is expected to serve traffic operational needs within the Segment 1 area very well for many years into the future. If 2041 traffic volumes are realized, study partners may need to consider a more comprehensive corridor improvement project. Each of the roundabout corridor options and interchange modifications options were recommended to be carried forward for future consideration if needed and as opportunities present themselves from a land use and/or redevelopment standpoint. Study partners agreed to carry a future West Mankato Trail grade separation option near Poplar Street for future consideration as needs dictate.

The extension of a new public street through the Cub Foods area is included with Option 1-1B but should also be considered with any roadway improvement project in this area. Drivers are using this as a cut-thru today and formalizing this as a public street will improve the overall local network. The portion of this extension from Riverfront Drive to Linder Avenue is recommended in the short-term timeframe. The remainder of the new public street extension from Linder Avenue to Sibley Parkway is shown as in the opportunity/development/safety driven timeframe as it will need to be timed in conjunction with the City's redevelopment of their former public works site.

The MAPO 2045 Long Range Transportation Plan identifies a major rehab/reconstruction project on this segment of Riverfront Drive in the 2031-2045 timeframe.



Short-term recommendations for Segment 2 include spot improvements to improve lane alignments and signal operations at Cherry Street and Warren Street/Poplar Street intersections with Riverfront Drive. In addition, it is recommended that potential pedestrian crossing enhancements such as a pedestrian refuge and/or pedestrian flasher be considered at the Liberty Street/Riverfront Drive intersection. The concern for pedestrian crossing safety at this location came up late in the study and was not able to be fully evaluated.

Study partners felt it would be best to test a 3-lane roadway section on Riverfront Drive in Segments 2 and 3 before committing to a 3-lane conversion project. The traffic analysis completed as part of this study shows traffic operations on Riverfront Drive as a 3-lane are expected to operate within an acceptable condition both now and with 2041 traffic volumes. However, queues at some of the major intersections will be longer than today with only one thru lane. The concern is the public's tolerance for these types of queues. Testing a 3-lane will allow the City of Mankato to get a feel for public acceptance prior to investing is a major reconstruction project. Other communities have tested projects such as this with paint, delineators, trees, etc. as shown in the Alexandria example above.

It is recommended that traffic calming improvements on 2nd Street recommended as part of the Old Town Master Plan be tested at the same time as a Riverfront Drive 3-lane. One of the concerns identified with a 3-lane on Riverfront Drive was that traffic will perceive Riverfront Drive as being a slower option and will divert to 2nd Street. Providing traffic calming measures on 2nd Street such as bump-outs and crosswalk enhancements may make 2nd Street as less attractive corridor for thru traffic. Testing both Riverfront Drive and 2nd Street improvements at the same time will give the City the most realistic picture of how traffic could function in the future.

Several attendees at the April 20, 2017 public open house expressed concern with back-ups on Cherry Street that could worsen if a 3-lane begins at Cherry Street. They said it is difficult to merge onto northbound Riverfront Drive at Cherry Street and this will worsen if the 3-lane transition occurs at this same location. They noted this would be extremely difficult during events since the only exit of the parking ramp is onto Cherry Street directly adjacent to this intersection.

Based on this open house feedback, the project team took a closer look at the potential to move the 3-lane transition point on northbound Riverfront Drive. It is believed that moving the northbound

lane drop to north of Main Street will also be an acceptable option. This will keep the 4-lane capacity from Warren Street to Main Street to address the main concern. A sidewalk on the east side of Riverfront Drive could still be added as shown in the 4-lane options described above. A concept drawing should be completed in the future to determine how the lane configuration would work between Main Street and Plum Street. It appears there is sufficient room to drop the northbound lane in this direction but how the lane drop would exactly interact with the right-turn lane formation at Plum Street should be studied further.

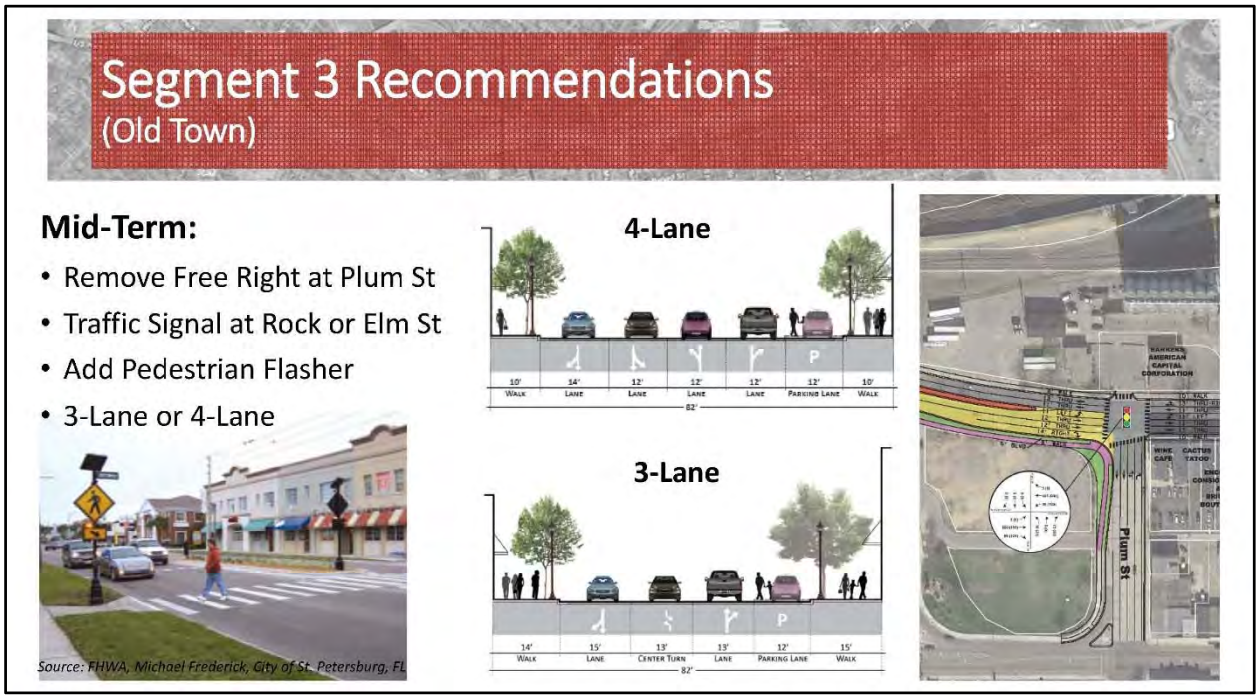
Mid-term recommendations for Segment 2 is to implement either the 4-lane option (Option 2-1A) or 3-lane option (Option 2-2) based on the results of the 3-lane test findings. The timing of this option was shown in mid-term (6-15 years) so that it could be timed with a Riverfront Drive infrastructure reconstruction project. The MAPO 2045 Long Range Transportation Plan identifies a major rehab/reconstruction of Riverfront Drive between Sibley Street and Main Street in the 2031-2045 timeframe. The Mankato City Engineer noted that the portion of Riverfront Drive from Warren Street through Old Town would likely need reconstruction sooner in the 2021-2030 timeframe. This is consistent with the Mid-term recommendation to implement either the 4-lane or 3-lane option in Segment 2 within the next 6-15 years.

Option 2-1B, the four-lane shift west was not recommended for further study at this time as it is incompatible with Hy-Vee's foreseeable future. The option will be documented in the Opportunity/Development/Safety timeframe in the event land uses changes and this becomes a more feasible option.

Short-term recommendations for Segment 3 include testing a 3-lane as noted in the Segment 2 discussion above. Input from freight operators in the Old Town Area will be important as the 3-lane is tested.

Parking in the Old Town area was a topic that came up frequently during the issues identification and concept development phases of study. There seemed to be a general consensus that adequate parking exists in this area but it is hard to find. Old Town businesses that participated in public outreach for this study commented that maintaining parking on the northbound lanes of Riverfront Drive was important. They did not feel strongly that parking should exist on-street on both sides of Riverfront Drive. A short-term recommendation for Segment 3 is to provide better wayfinding

signage to existing parking areas on both sides of the Riverfront Drive corridor in Old Town.



Mid-term recommendations for Segment 3 include removing the free right at the Riverfront Drive/Plum Street intersection and identifying a primary pedestrian crossing corridor at either Rock Street or Elm Street. A pedestrian flasher system such as a rectangular rapid flashing beacon could be added at either Rock or Elm Street, whichever does not have the traffic signal. This would give pedestrians two options to safely cross Riverfront Drive in Old Town at either a traffic signal location or with a rectangular rapid flashing beacon. An overhead rectangular rapid flashing beacon is recommended with a 4-lane Riverfront Drive option as it makes the pedestrian crossing more visible to all four lanes of traffic. A ground mounted rectangular rapid flashing beacon system (as shown in the picture above) could be implemented with a 3-lane option.

It is also recommended the City implement a 4-lane or 3-lane improvement project based on the findings of the 3-lane test. Implementation of either of these options is shown in the mid-term so that it can be timed with a future infrastructure reconstruction project on Riverfront Drive. The MAPO 2045 Long Range Transportation Plan identifies a major rehab/reconstruction of Riverfront Drive from Main Street to Washington Street in the 2026-2030 timeframe and from Washington Street to TH 14 in the 2031-2045 timeframe. The Mankato City Engineer noted that the portion of Riverfront Drive from Warren Street through Old Town would likely need reconstruction sooner in the 2021-2030 timeframe. This is consistent with the Mid-term recommendation to implement either the 4-lane or 3-lane option in Segment 3 within the next 6-15 years.

Segment 4 Recommendations
(Madison Ave to Good Counsel Drive)

Opportunity/Development/ Safety Driven:

- Explore 3rd Ave realignment options with a redevelopment opportunity
- Median at Adams St with trail extension for SRTS

All of the improvements for Segment 4 are shown in the opportunity/development/safety driven timeframe. The improvements identified for Madison Avenue and 3rd Avenue will depend on whether or not the Coughlan Quarry area redevelops. It is recommended the City and County continue to explore opportunities with this redevelopment planning.

A median on Riverfront Drive with a trail extension for Safe Routes to School access to Franklin Elementary is another opportunity that can continue to be explored and implemented when needs dictate and funding becomes available.

Segment 4 Recommendations
(Madison Avenue to Good Counsel Drive)

Opportunity/Development/Safety Driven:

- When reconstruction occurs or opportunities arise, reevaluate:
  - Width of road and number of lanes – fewer lanes possible
  - Access modifications – realign, share, and/or use side streets
  - Primary intersection locations – consistent spacing for best operations

Source: Google Maps

Source: Google Maps

North of 3rd Avenue that are few documented issues today from a traffic operations and safety standpoint. Traffic speeds and overlapping accesses are a concern that the City can look to address in the future when opportunities such as land use or development changes present themselves or a street reconstruction project is needed. At that time, the City is encouraged to reevaluate the width of the road, access to Riverfront Drive and primary intersection locations.

The MAPO 2045 Long Range Transportation Plan identifies a major rehab/reconstruction of Riverfront Drive from Washington Street to TH 14 in the 2031-2045 timeframe. The Mankato City Engineer noted that this portion of Riverfront Drive may need reconstruction sooner in the 2021-2030 timeframe.

Segment 4 Recommendations
(Madison Ave to Good Counsel Drive)

Opportunity/Development/ Safety Driven:

- Explore 3rd Ave realignment options with a redevelopment opportunity
- Median at Adams St with trail extension for SRTS

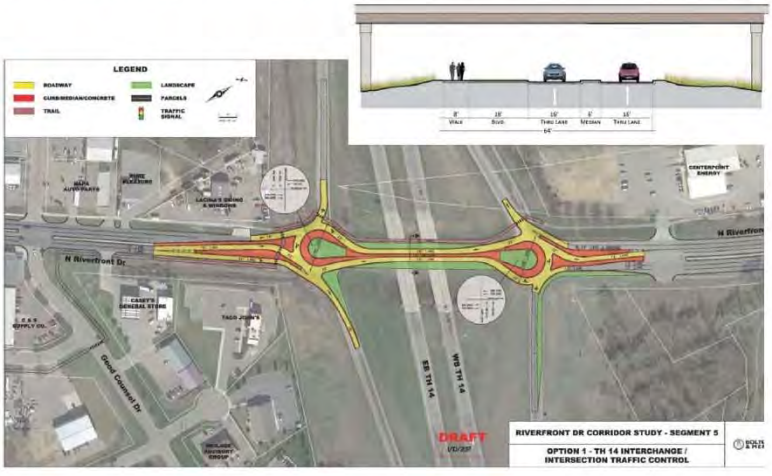
Segment 5 Recommendation
(Highway 14)

Short-Term:

- Roundabout at North Ramp
- Trail extension and crossing to Minnesota River Trail

Operational/Safety Driven:

- Roundabout at South Ramp



Short-term recommendations for the TH 14 interchange area include constructing a roundabout at the north ramp terminal and extending a trail connection from Good Counsel Drive to the existing trail under the TH 14 Bridge. This improvement will require coordination from the City of Mankato, Blue Earth County and MnDOT D7 due to the jurisdiction of affected roadways. The study recommends the south ramp terminal continue to be monitored until such time that traffic operations and/or safety needs dictate. However, the City, County and MnDOT may decide it makes sense to construct both roundabouts at the same time for consistency in driver expectations.

Implementation

The table on the following page documents the study recommendations into implementation timeframes based on input from study partners, corridor stakeholders, the public and elected officials.

Table 7 - Implementation Plan

Priority*	Segment/ Project #	Project Description	Estimated Cost**	Comments
Short-Term 0 to 5 Years	1A OR 1B	Triple Lefts at TH 169 South Ramp, Add Right Turn Lane on Riverfront to YMCA/School, Two-Stage Pedestrian Crossing (School to Cub Foods), Add Right Turn Lane on Stoltzman Double Lefts at TH 169 South Ramp, 3/4 at Poplar Street with Median, Add Right Turn Lane on Stoltzman	$700,000 - $1.0M	Could choose Either 1A OR 1B. Need to further investigate the feasibility of adding a 3rd lane under the TH 169 bridge with Option 1A. Requires coordination with MnDOT and Blue Earth County. MnDOT has a TH 169 bridge rehab project programmed for 2024.
	Cub Foods New Public Street	Establish a public street connection from Riverfront Drive to Linder Ave through the Cub Foods parking lot drive lane	$175,000	Requires close coordination with property owner.
	2	Lane alignment modifications to the Riverfront Drive intersections with Warren Street and Cherry Street	$40,000	Opportunity to study needs at the Warren/Poplar St intersection with Riverfront Drive further during the 2017-2018 Warren Street studies.
	2	Installation of protected lefts on Warren Street/Popular Street and Southbound Riverfront Drive at Cherry Street	$35,500	Opportunity to study needs at the Warren/Poplar St intersection with Riverfront Drive further during the 2017-2018 Warren Street studies.
	2, 3	Test a 3-Lane on Riverfront Drive from Cherry Street to Vine Street Test 2nd Street enhancements (bump-outs, marked crosswalks, etc.) at same time as Riverfront Drive	$55,000 - $65,000	Estimated cost is to test a 3-lane. The lower cost represents using paint and the upper range is for using removable tape striping. Testing 2nd St enhancements would be an additional cost of $900 per bump-out and $900 per crosswalk.
	3	Add wayfinding for public parking locations and public spaces.	$6,000	$500 per sign
	5	Construct roundabout at TH 14 North Ramp	$750,000	Requires coordination with MnDOT and Blue Earth County.
		Subtotal	*$2.0 - $2.5M*	
Mid-term 6 to 15 Years	2-1A OR 2-2	4-Lane narrow median to add sidewalk on east side of Riverfront Drive 3-lanes to add sidewalk on east side of Riverfront Drive.	$1.2M OR $450,000	3-lane in Segment 2 would need to be paired with 3-lane in Segment 3. Both options maintain full access at Civic Center Plaza/back parking lot to Hy-Vee. A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
	All Segment 3 Options	Remove free-right at Plum Street	$60,000	A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
	3-1 OR 3-2, 3-2B, 3-3, 3-4	4-Lane with Pedestrian Flasher (RRFB) at Rock St or Elm St (wherever traffic signal is not present) One of 3-Lane Options (if comfortable after 3-Lane test period)	$300,000 - $800,000	These costs include removing the free right at Plum. Consider an overhead RRFB system if a 4-lane is maintained on Riverfront Drive. A ground mounted RRFB system could be considered with a 3-lane. A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
		Subtotal	*$750,000 - $2.0M*	
Opportunity / Development / Safety Driven	All Segment 1 Options	Extend a public street the proposed Cub Food public street extension at Linder Ave to Sibley Parkway	$300,000	Development driven with former City Public Works site
	All Segment 1 Options	Grade Separated Trail Crossing near Poplar Street	$1- $1.5M	Reevaluate need after short-term improvements to Segment 1 of Riverfront Drive are implemented.
	1-2A	Roundabouts at TH 169 Ramp intersections with Riverfront Drive and Stoltzman Road.	$5M	Will require right-of-way acquisition and coordination with adjacent property owners. A major rehab/reconstruction project on Riverfront Drive in this segment is anticipated in the 2031-2045 timeframe.
	1-2B	Roundabout at TH 169 South Ramp and Stoltzman Road. Six-legged roundabout with 169 North Ramp and Poplar Street.	$6.5M	Not supported by YMCA or School
	1-3A	Diverging Diamond at TH 169; right-in/right-out at Poplar St/YMCA and School access	$4.5M	Not supported by YMCA or School
	1-3B	Add a loop ramp to the TH 169 interchange; raise Riverfront Drive to accommodate.	$4.5M	Will require additional city street network enhancements. A major rehab/reconstruction project on Riverfront Drive in this segment is anticipated in the 2031-2045 timeframe.
	2-1B	4-Lane Shift West	$2.2M	Feasible only if Hy-Vee decides to expand on a new building footprint. Allows wide center median to remain.
	4	Median on Riverfront Drive at Adams Street with trail extension to 3rd Avenue	TBD	Trail extension addresses need identified in Safe Routes to School Plan.
	4	3rd Avenue/Madison - 3rd Avenue Realignment to 4th Leg of Madison Ave/Riverfront Dr intersection	TBD	Development driven in conjunction with Coughlan Mine redevelopment
	4	3rd Avenue/Madison - 3rd Avenue T-intersection at extended Madison Ave	TBD	Development driven in conjunction with Coughlan Mine redevelopment
	4	3rd Avenue/Madison - 3rd Avenue T-intersection to Adams Street extension	TBD	Development driven in conjunction with Coughlan Mine redevelopment. This option not supported by Blue Earth County.
	4	3rd Avenue/Madison - Median at 3rd Avenue	TBD	Development driven in conjunction with Coughlan Mine redevelopment. This option not supported by Blue Earth County.
	4	Madison Ave to Good Counsel Drive: Reevaluate - with of the street, number of lanes, access to Riverfront, and primary intersection locations	TBD	Consider when infrastructure improvements are needed, land use changes or as opportunities arise with individual business/property owners. A major rehab/reconstruction of Riverfront Drive in this segment is anticipated in the 2021-2030 timeframe.
	5	Construct roundabout at TH 14 South Ramp	$750,000	Consider when operational and/or safety need is present or construct at same time as TH 14 North Ramp roundabout for consistency in driver expectations.

**Timing of all projects dependent upon funding availability.*

*** All estimated costs are for individual improvements only. Costs do not account for any reconstruction needs of Riverfront Drive.*

XI. Next Steps

Additional design, studies and public input will be needed for each of the recommended improvement options to move forward. The purpose of the Riverfront Drive Corridor Study was to develop a long-term plan for improvements to Riverfront Drive. The concepts developed as part of this study are high-level and will need additional refinement through preliminary and final design. Environmental review and permitting will also be required with exact requirements based on the scope of the project and the funding source.

The improvement options identified within this study and the projects prioritized as part of the implementation plan will help the City of Mankato continue to maintain a functioning yet safe minor arterial roadway.

Study partners must continue to work together to further plan, obtain funding, design, and implement the recommended improvement projects. All partners have an active role in implementing these improvements. All competitive funding sources should be considered. Agencies should also update their comprehensive and transportation plans to include these findings to better leverage funding sources.