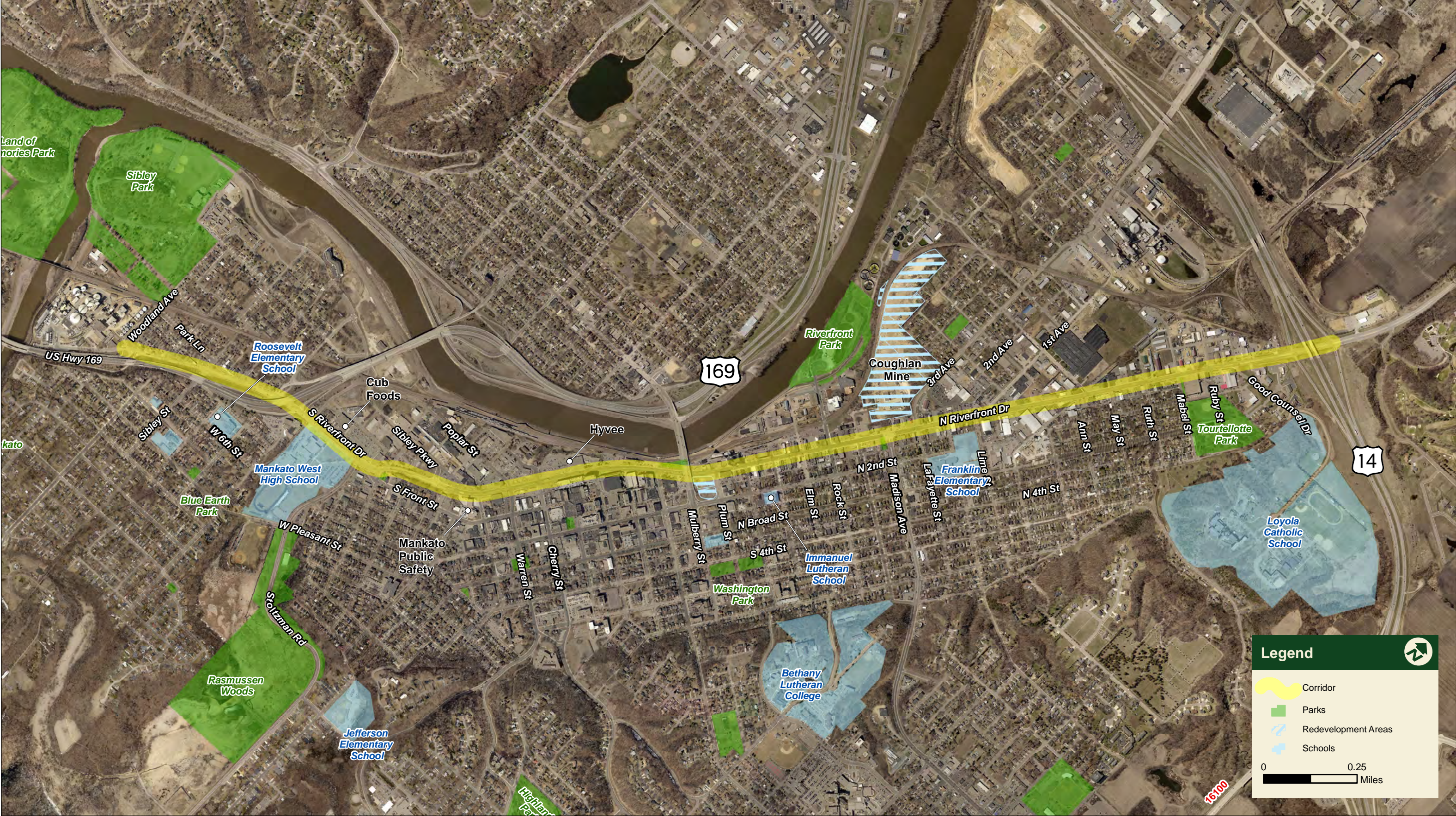


## Appendix A: Report Figures A.1 – A.10





Figure A.1



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# Riverfront Drive Corridor Study

Mankato/North Mankato Area Planning Organization

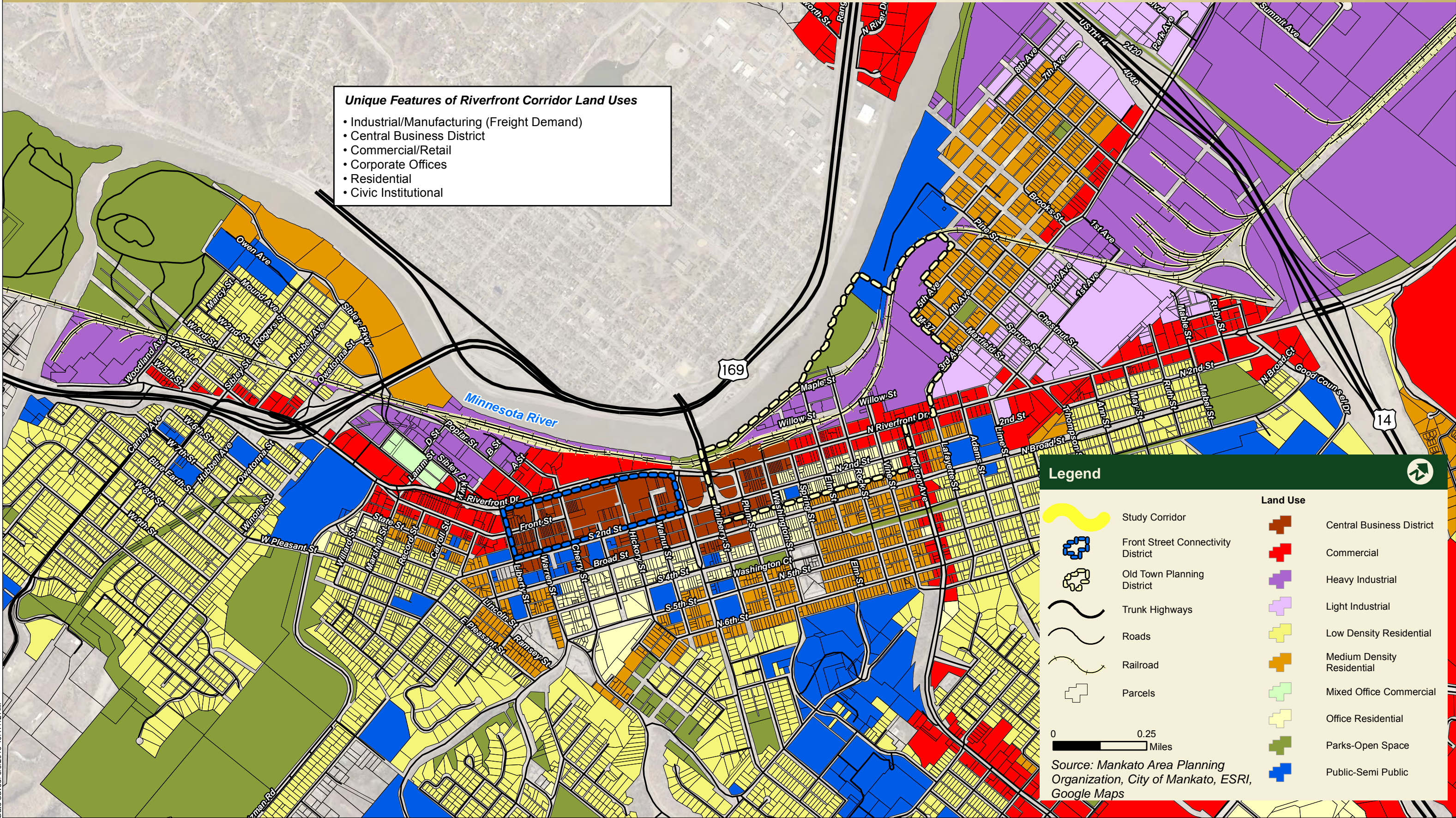
## Existing Land Use

August, 2016



Figure A.2

- Unique Features of Riverfront Corridor Land Uses**
- Industrial/Manufacturing (Freight Demand)
  - Central Business District
  - Commercial/Retail
  - Corporate Offices
  - Residential
  - Civic Institutional



**Legend**

Study Corridor

Front Street Connectivity District

Old Town Planning District

Trunk Highways

Roads

Railroad

Parcels

Source: Mankato Area Planning Organization, City of Mankato, ESRI, Google Maps

**Land Use**

Central Business District

Commercial

Heavy Industrial

Light Industrial

Low Density Residential

Medium Density Residential

Mixed Office Commercial

Office Residential

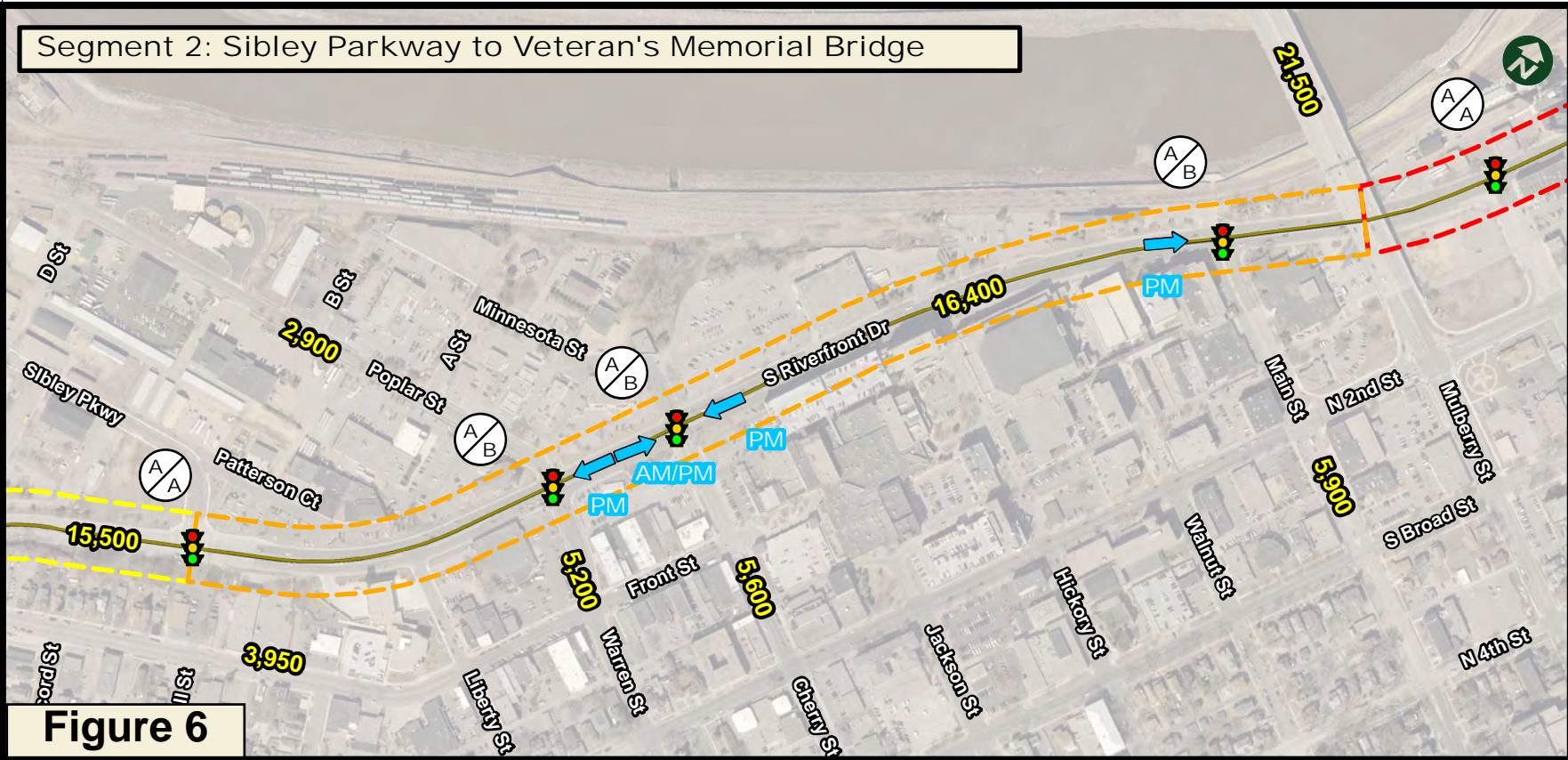
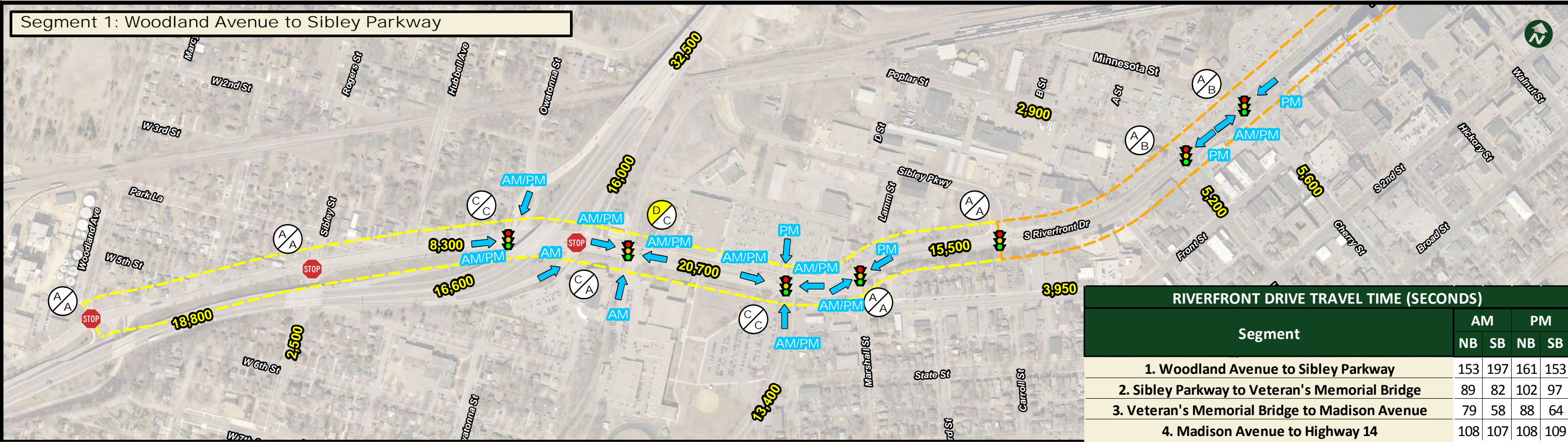
Parks-Open Space

Public-Semi Public





Figure A.3a



**Legend**

**Average Annual Daily Traffic (AADT) Volumes - Existing**  
### Average Annual Daily Traffic (AADT) Volumes - Existing

**Problematic Traffic Back-Ups**  
← Problematic Traffic Back-Ups

**Intersection Level of Service**  
AM/PM Intersection Level of Service

**Traffic Control**  
STOP Side Street Stop  
Traffic Signal

**Level of Service Grade**  
A-C  
D  
E  
F

**Corridor Study Segments**  
Woodland Avenue to Sibley Parkway  
Sibley Parkway to Veteran's Memorial Bridge  
Veteran's Memorial Bridge to Madison Avenue  
Madison Avenue to Highway 14

0 500 Feet  
Source: MnDOT, Blue Earth County, City of Mankato, ESRI, Google Maps



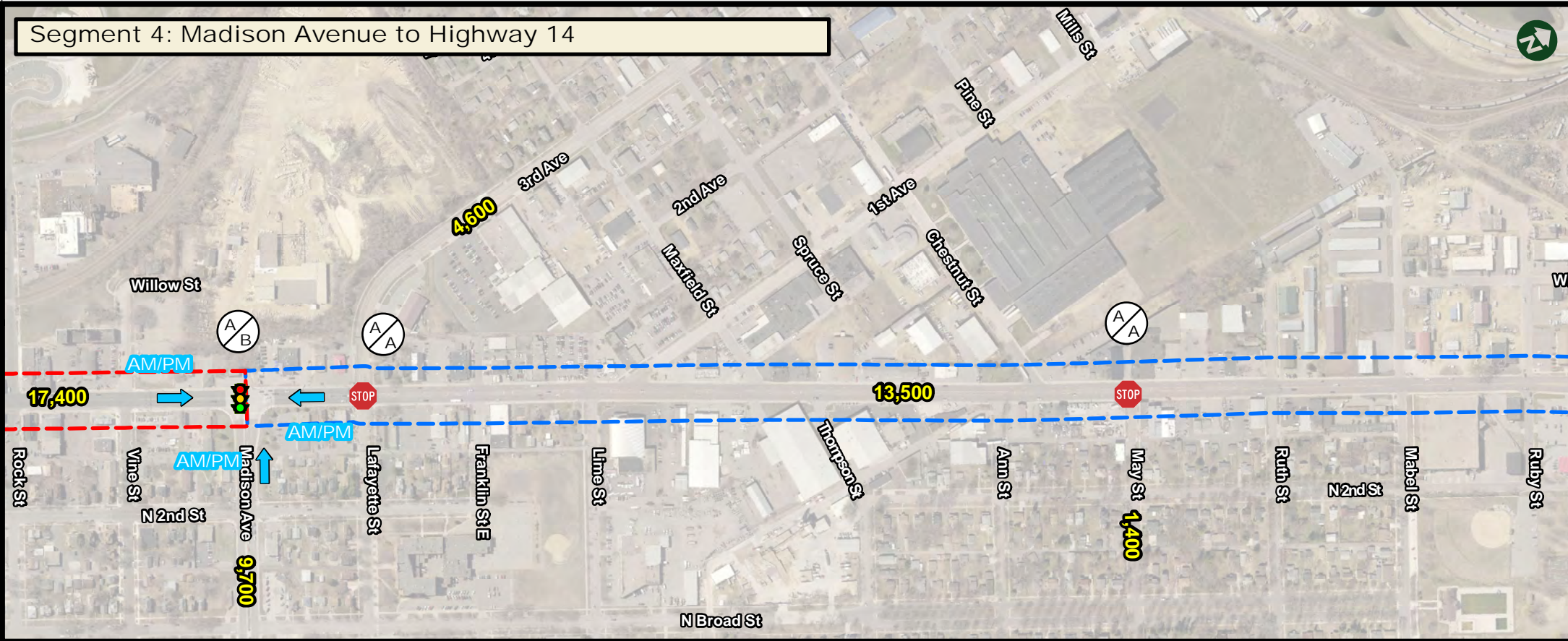
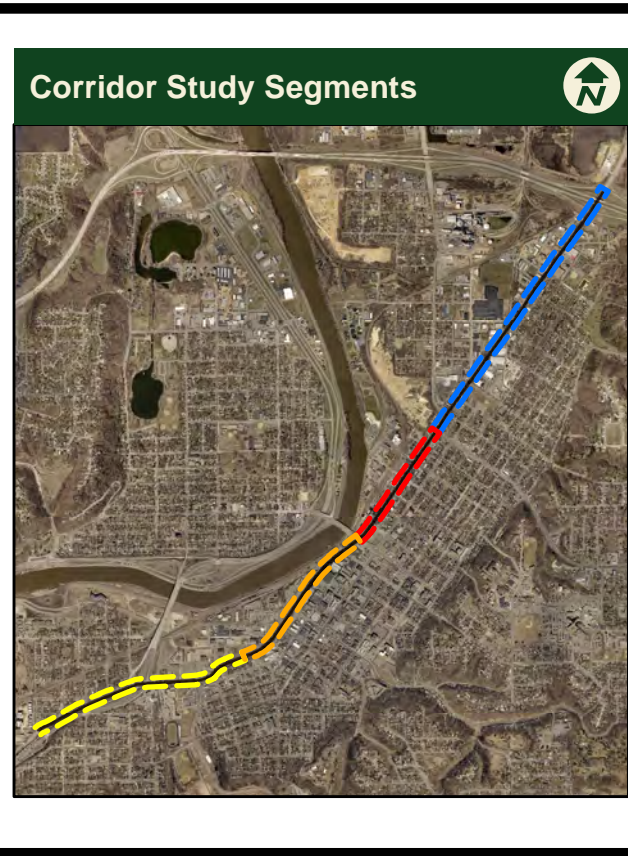
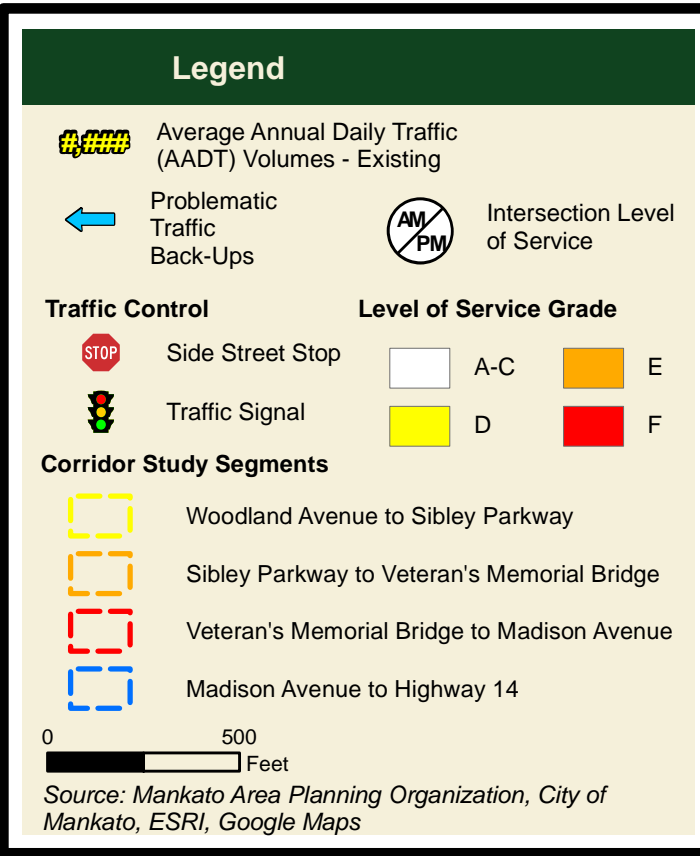
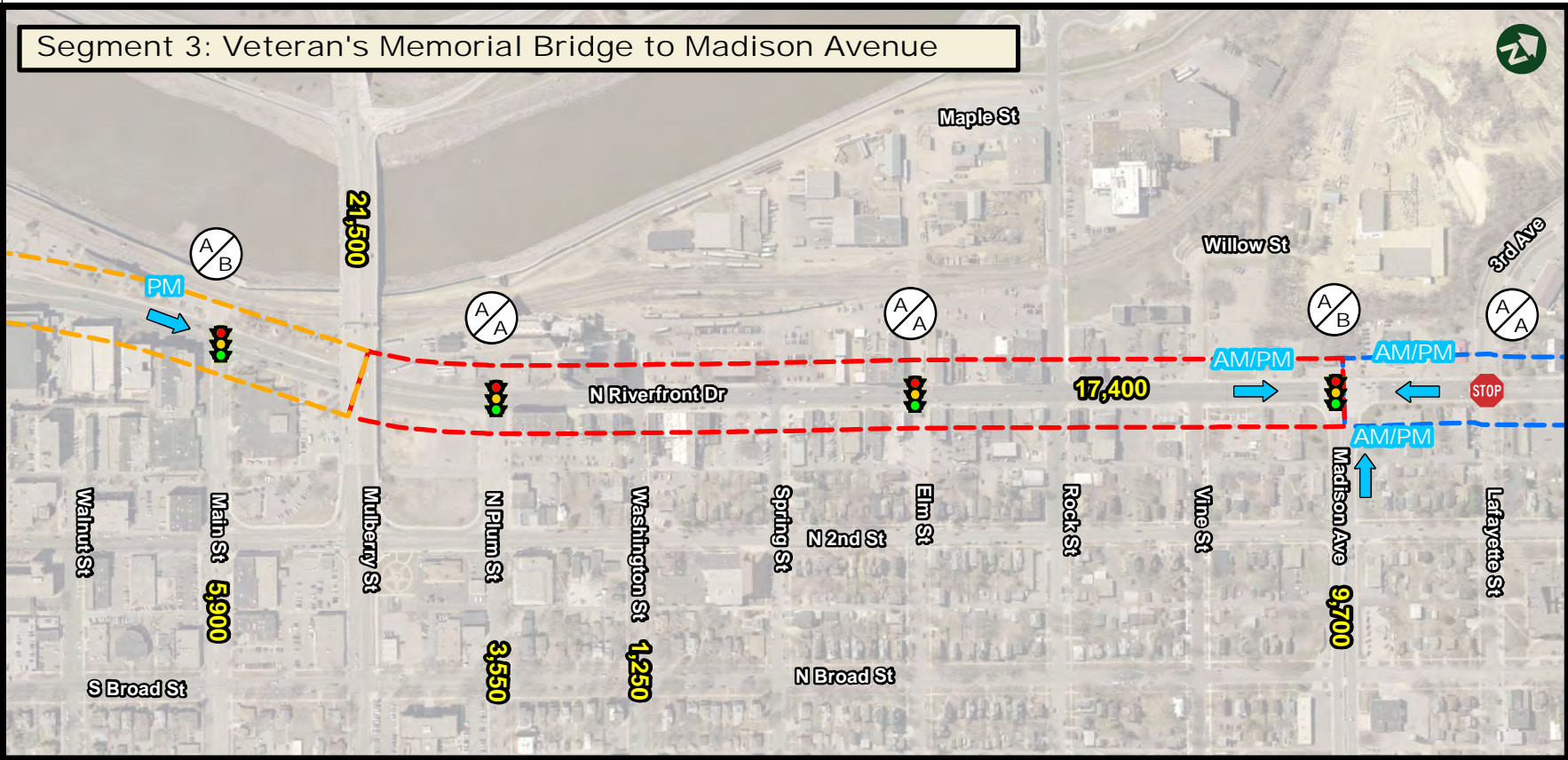
Figure 6

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Figure A.3b



RIVERFRONT DRIVE TRAVEL TIME (SECONDS)				
Segment	AM		PM	
	NB	SB	NB	SB
1. Woodland Avenue to Sibley Parkway	153	197	161	153
2. Sibley Parkway to Veteran's Memorial Bridge	89	82	102	97
3. Veteran's Memorial Bridge to Madison Avenue	79	58	88	64
4. Madison Avenue to Highway 14	108	107	108	109





Figure A.4a

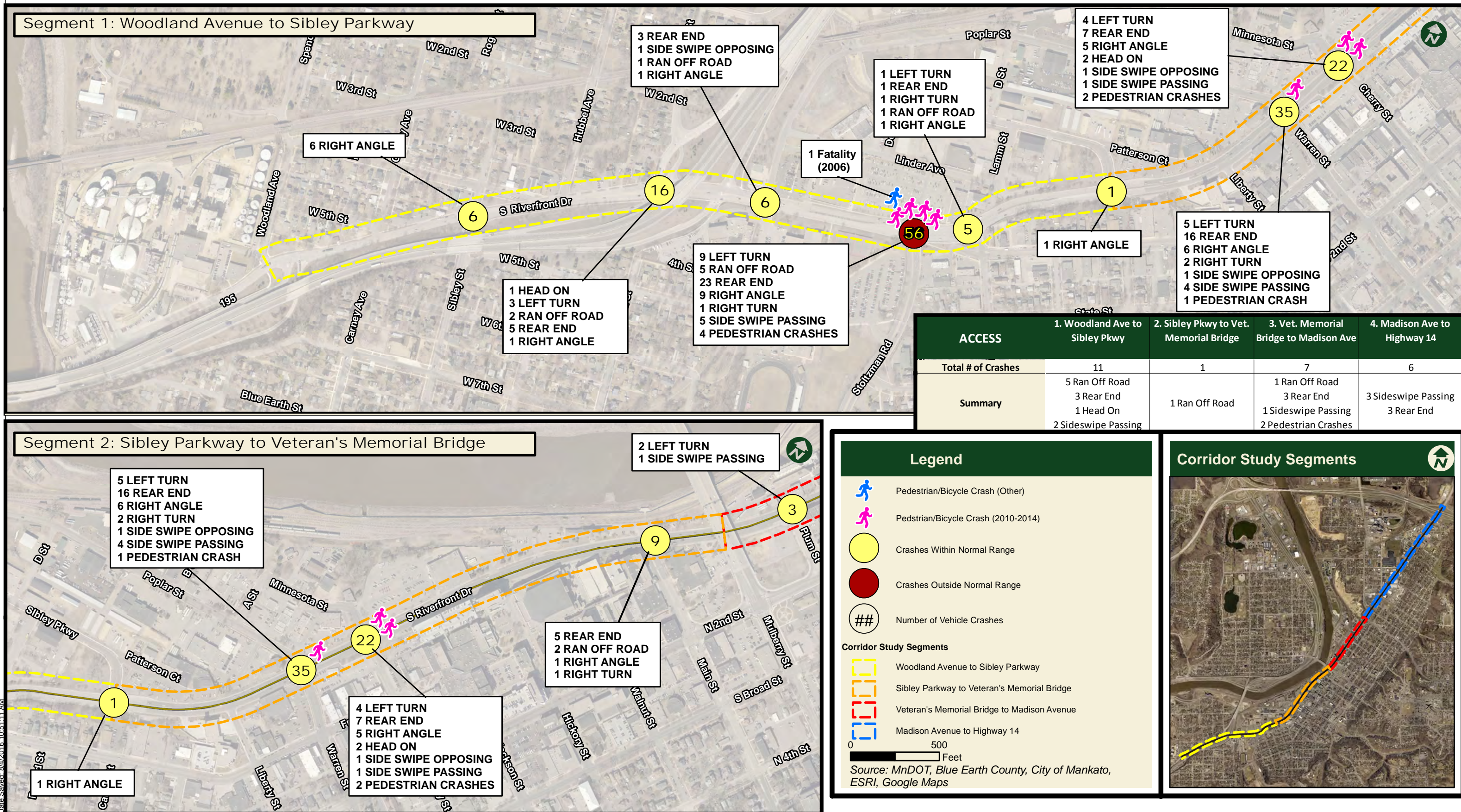
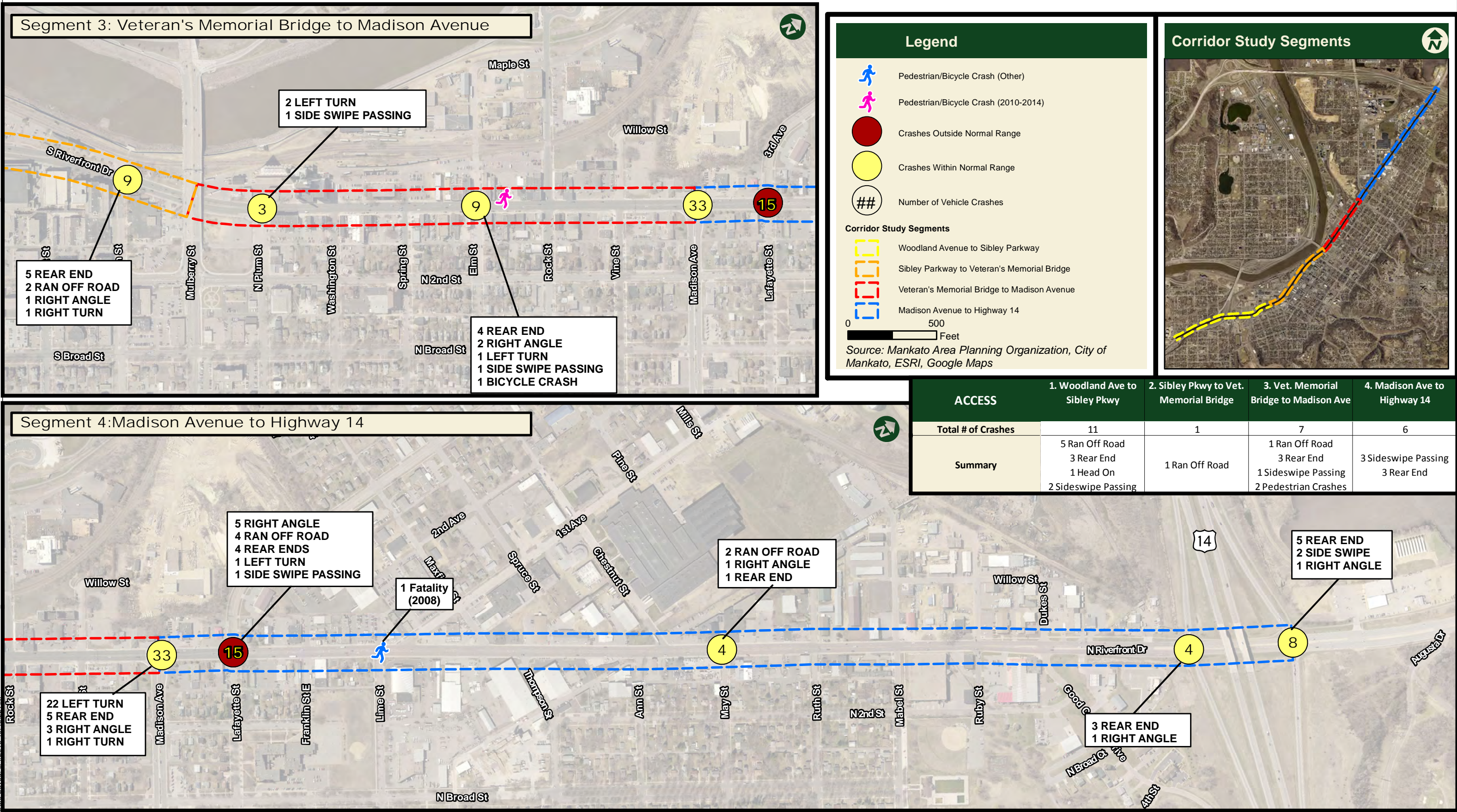






Figure A.4b







# Riverfront Drive Corridor Study

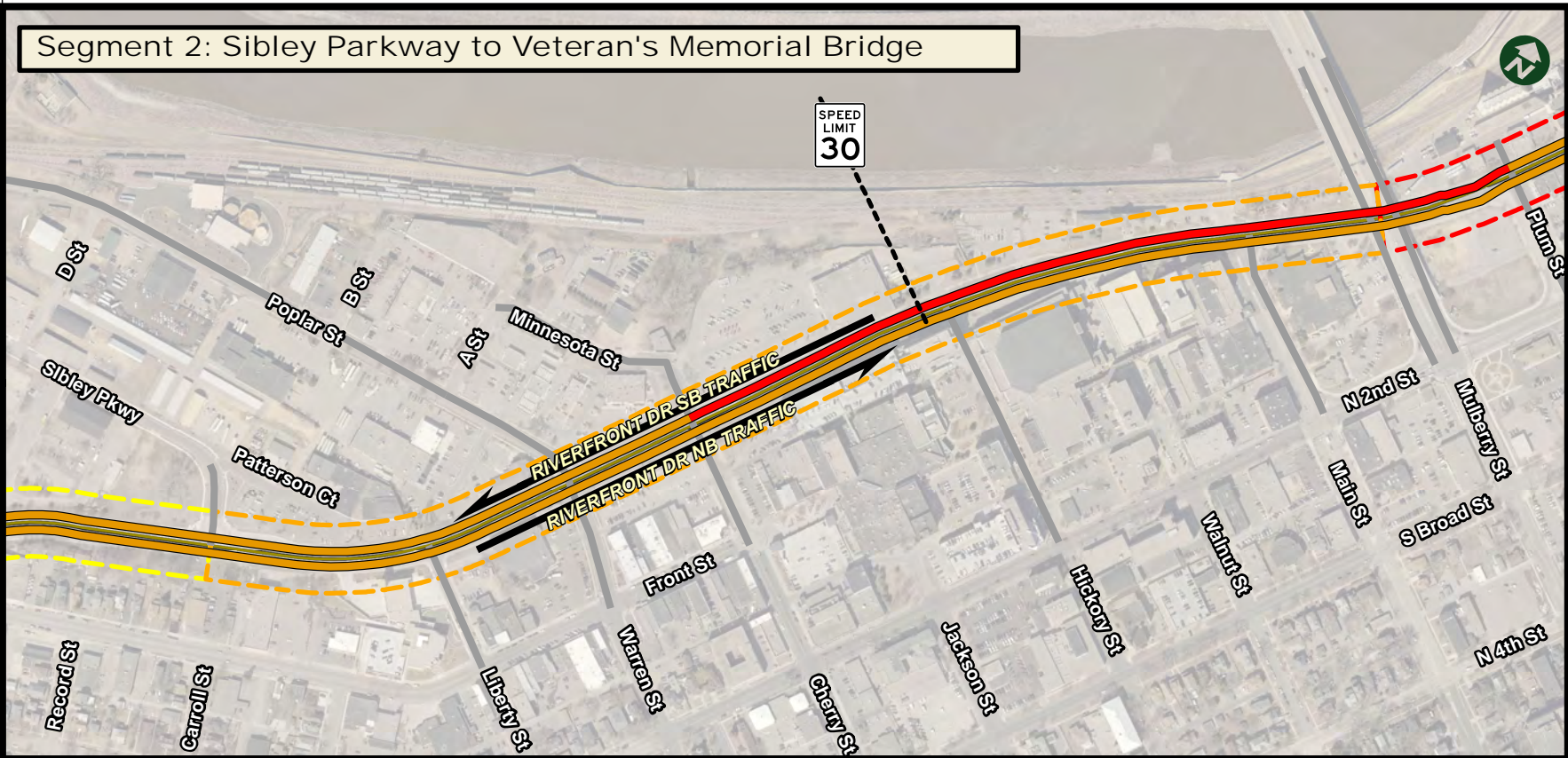
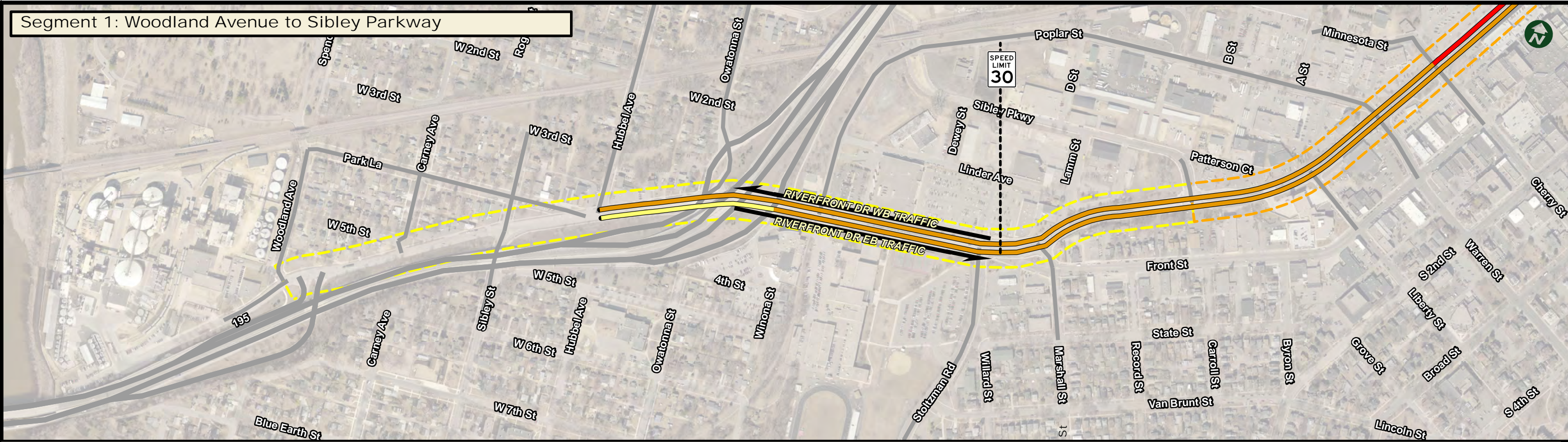
Mankato/North Mankato Area Planning Organization

# Traffic Speeds - Segments 1 & 2

October, 2016



Figure A.5a



**Legend**

**Roads**

- Roads

**Speed of Traffic**

- Traveling at or below posted SL
- Traveling 1-4 mph above posted SL
- Traveling 5-9 mph above posted SL
- Traveling 10+ mph above posted SL

**Corridor Study Segments**

- Woodland Avenue to Sibley Parkway
- Sibley Parkway to Veteran's Memorial Bridge
- Veteran's Memorial Bridge to Madison Avenue
- Madison Avenue to Highway 14

0 500 Feet

Source: Mankato Area Planning Organization, City of Mankato, ESRI, Google Maps



Map Document: \\arserver1\gis\MAPO\_MUT4211867\ESRI\Maps\Areas of Excess Traffic Speeds - Segments 1 & 2.mxd  
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Figure A.5b

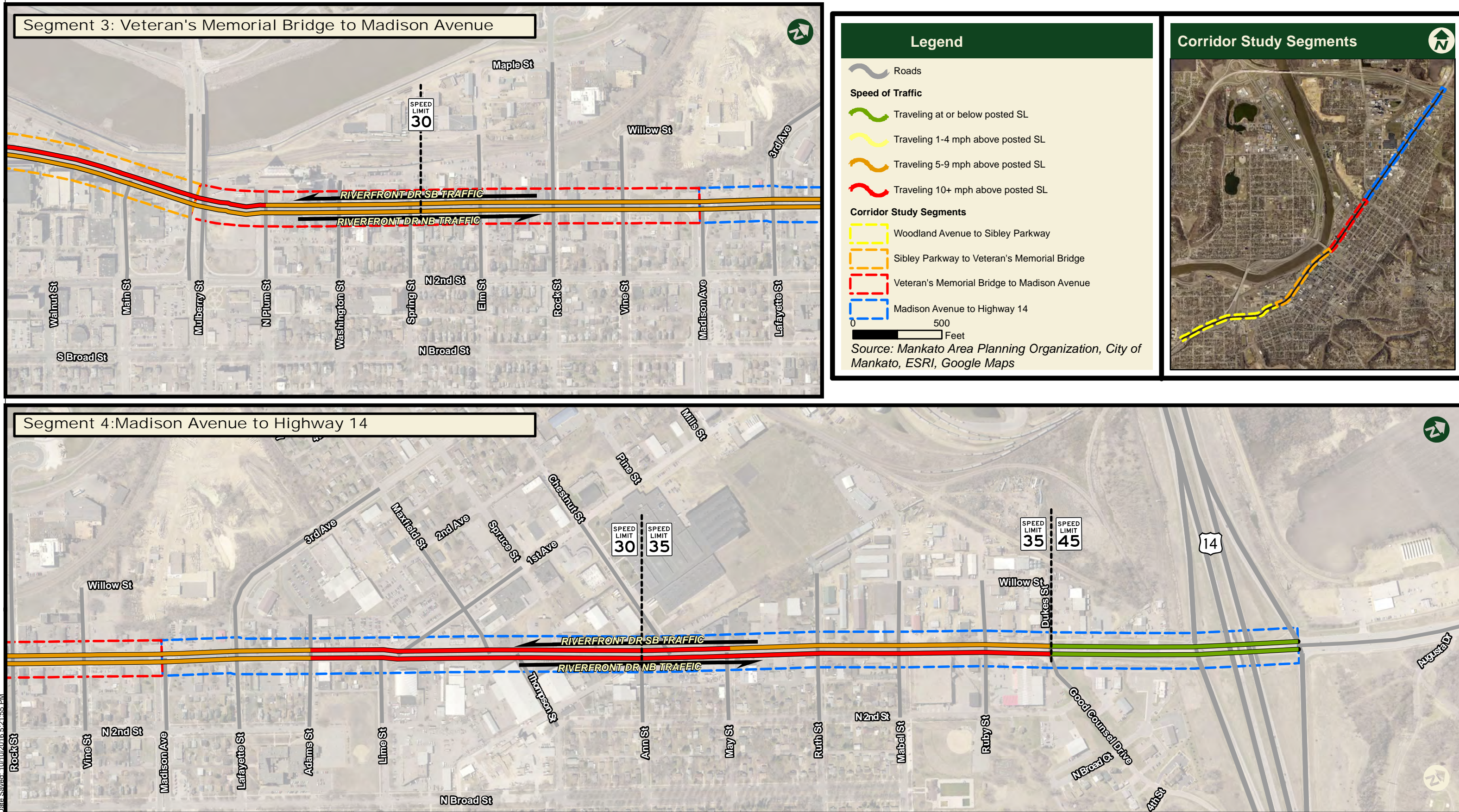
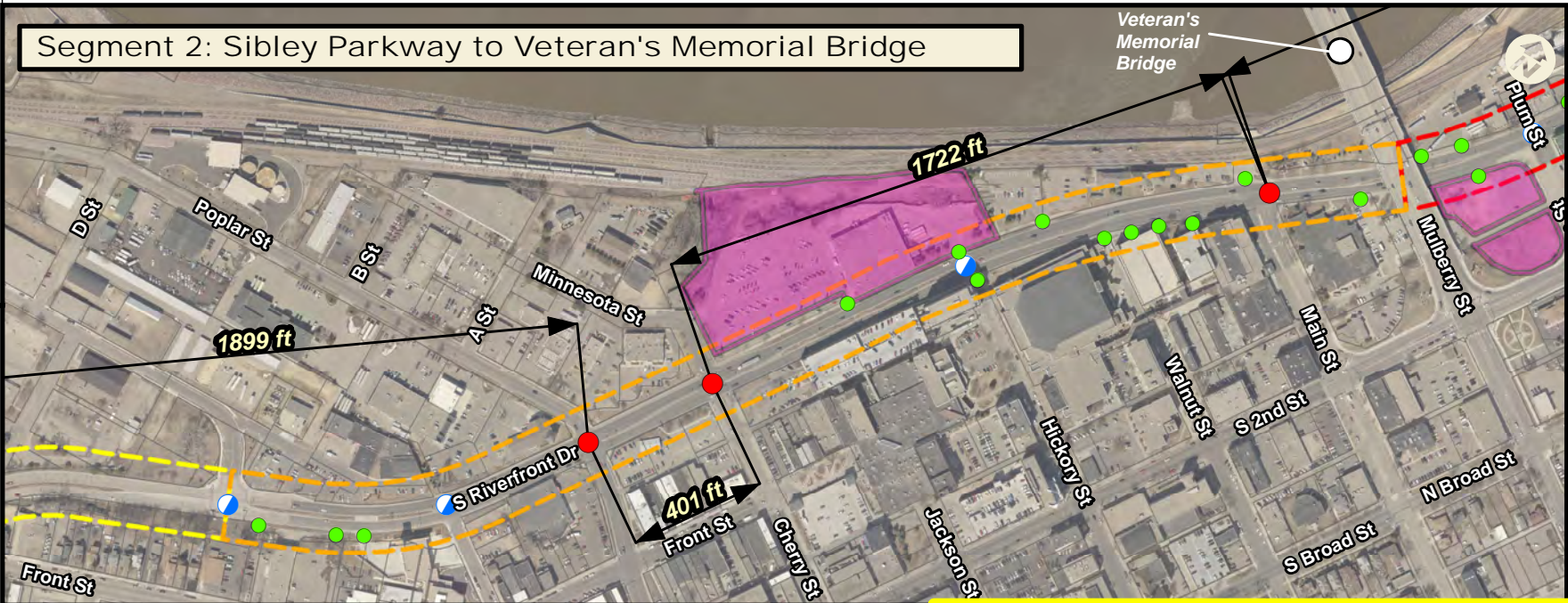
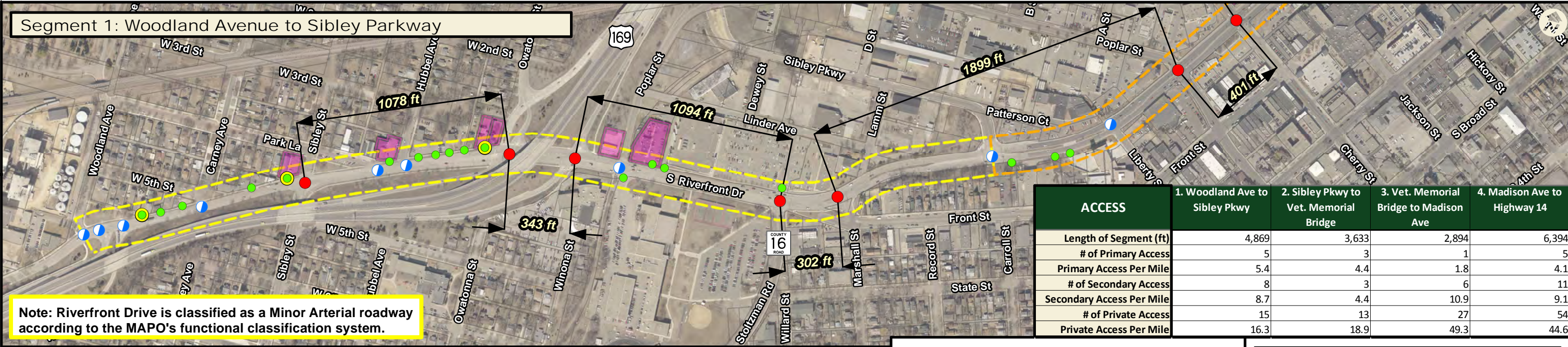






Figure A.6a



**Legend**

**Access Type**

- Primary Intersection
- Secondary Intersection
- Private Access
- Private Shared
- Parcels with Side Street Access
- Parcels

**Corridor Study Segments**

- Woodland Avenue to Sibley Parkway
- Sibley Parkway to Veteran's Memorial Bridge
- Veteran's Memorial Bridge to Madison Avenue
- Madison Avenue to Highway 14

0 500 Feet  
1/8 Mile = 660 ft  
1/4 Mile = 1320 ft

Source: Mankato Area Planning Organization, City of Mankato, ESRI, Google Maps



PRINCIPAL ARTERIALS	Primary (Full - Movement) Intersection Spacing		
	Rural	1 mile	2 access / mile
	Urban/Urbanizing	1/2 mile	3 access / mile
	Urban Core	300-660 feet	9-19 access / mile
	Secondary Intersection Spacing		
	Rural	1/2 mile	3 access / mile
	Urban/Urbanizing	1/4 mile	5 access / mile
	Urban Core	300-660 feet	9-19 access / mile

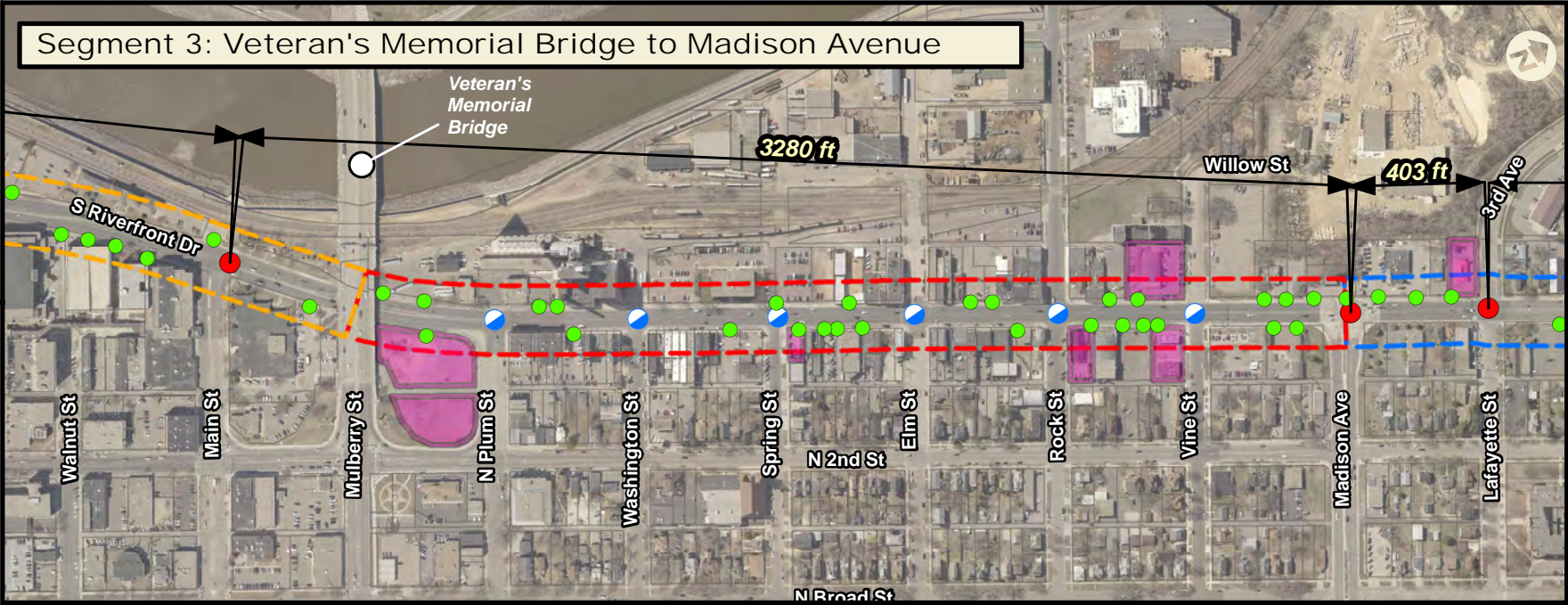
MINOR ARTERIAL	Primary (Full - Movement) Intersection Spacing Guidelines		
	Rural	1/2 mile	3 access / mile
	Urban/Urbanizing	1/4 mile	5 access / mile
	Urban Core	300-660 feet	9-19 access / mile
	Secondary Intersection Spacing		
	Rural	1/4 mile	5 access / mile
	Urban/Urbanizing	1/8 mile	9 access / mile
	Urban Core	300-660 feet	9-19 access / mile

COLLECTORS	Primary (Full - Movement) Intersection Spacing Guidelines		
	Rural	1/2 mile	3 access / mile
	Urban/Urbanizing	1/8 mile	9 access / mile
	Urban Core	300-660 feet	9-19 access / mile
	Secondary Intersection Spacing		
	Rural	1/4 mile	5 access / mile
	Urban/Urbanizing	N/A	N/A
	Urban Core	300-660 feet	9-19 access / mile





Figure A.6b



**Legend**

**Access Type**

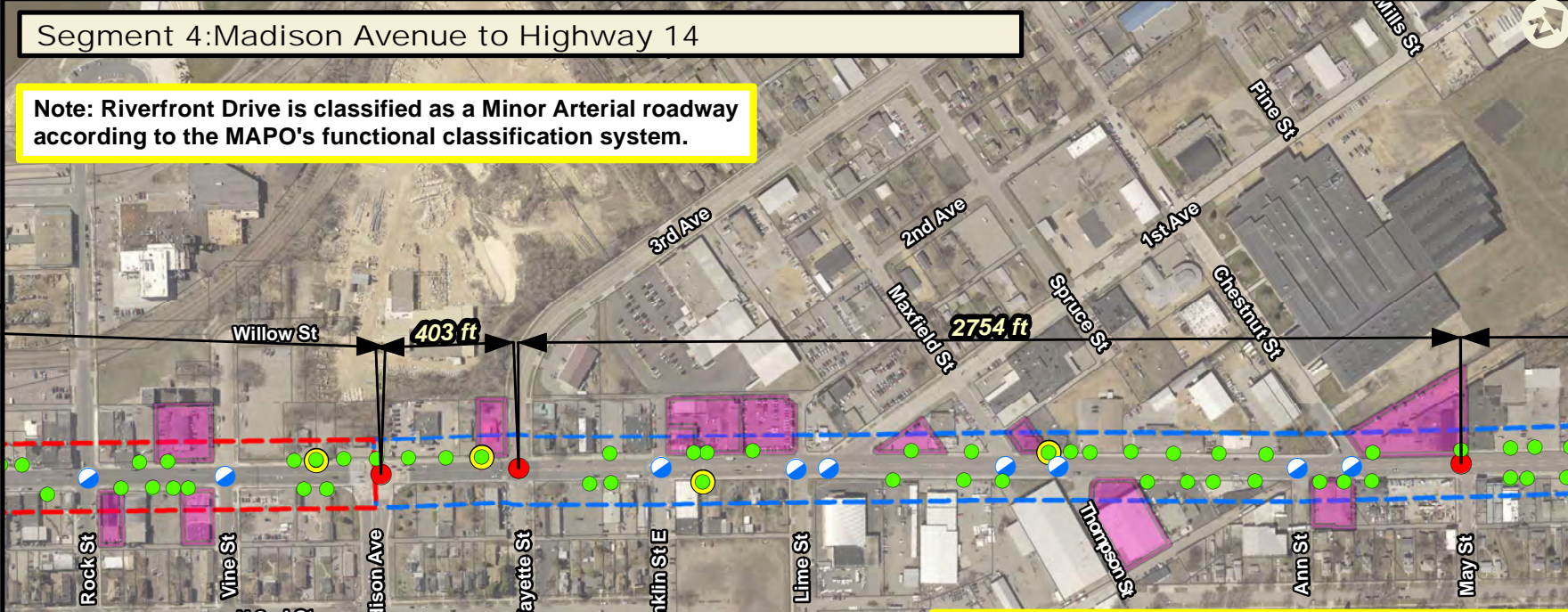
- Primary Intersection (Red dot)
- Secondary Intersection (Blue dot)
- Private Access (Green dot)
- Private Shared (Yellow dot)
- Parcels with Side Street Access (Pink outline)
- Parcels (White outline)

**Corridor Study Segments**

- Woodland Avenue to Sibley Parkway (Yellow dashed line)
- Sibley Parkway to Veteran's Memorial Bridge (Orange dashed line)
- Veteran's Memorial Bridge to Madison Avenue (Red dashed line)
- Madison Avenue to Highway 14 (Blue dashed line)

0 500 Feet

Source: Mankato Area Planning Organization, City of Mankato, ESRI, Google Maps



ACCESS	1. Woodland Ave to Sibley Pkwy	2. Sibley Pkwy to Vet. Memorial Bridge	3. Vet. Memorial Bridge to Madison Ave	4. Madison Ave to Highway 14
Length of Segment (ft)	4,869	3,633	2,894	6,394
# of Primary Access	5	3	1	5
Primary Access Per Mile	5.4	4.4	1.8	4.1
# of Secondary Access	8	3	6	11
Secondary Access Per Mile	8.7	4.4	10.9	9.1
# of Private Access	15	13	27	54
Private Access Per Mile	16.3	18.9	49.3	44.6

PRINCIPAL ARTERIALS	Primary (Full - Movement) Intersection Spacing		
	Rural	1 mile	2 access / mile
	Urban/Urbanizing	1/2 mile	3 access / mile
	Urban Core	300-660 feet	9-19 access / mile
	Secondary Intersection Spacing		
	Rural	1/2 mile	3 access / mile
	Urban/Urbanizing	1/4 mile	5 access / mile
	Urban Core	300-660 feet	9-19 access / mile

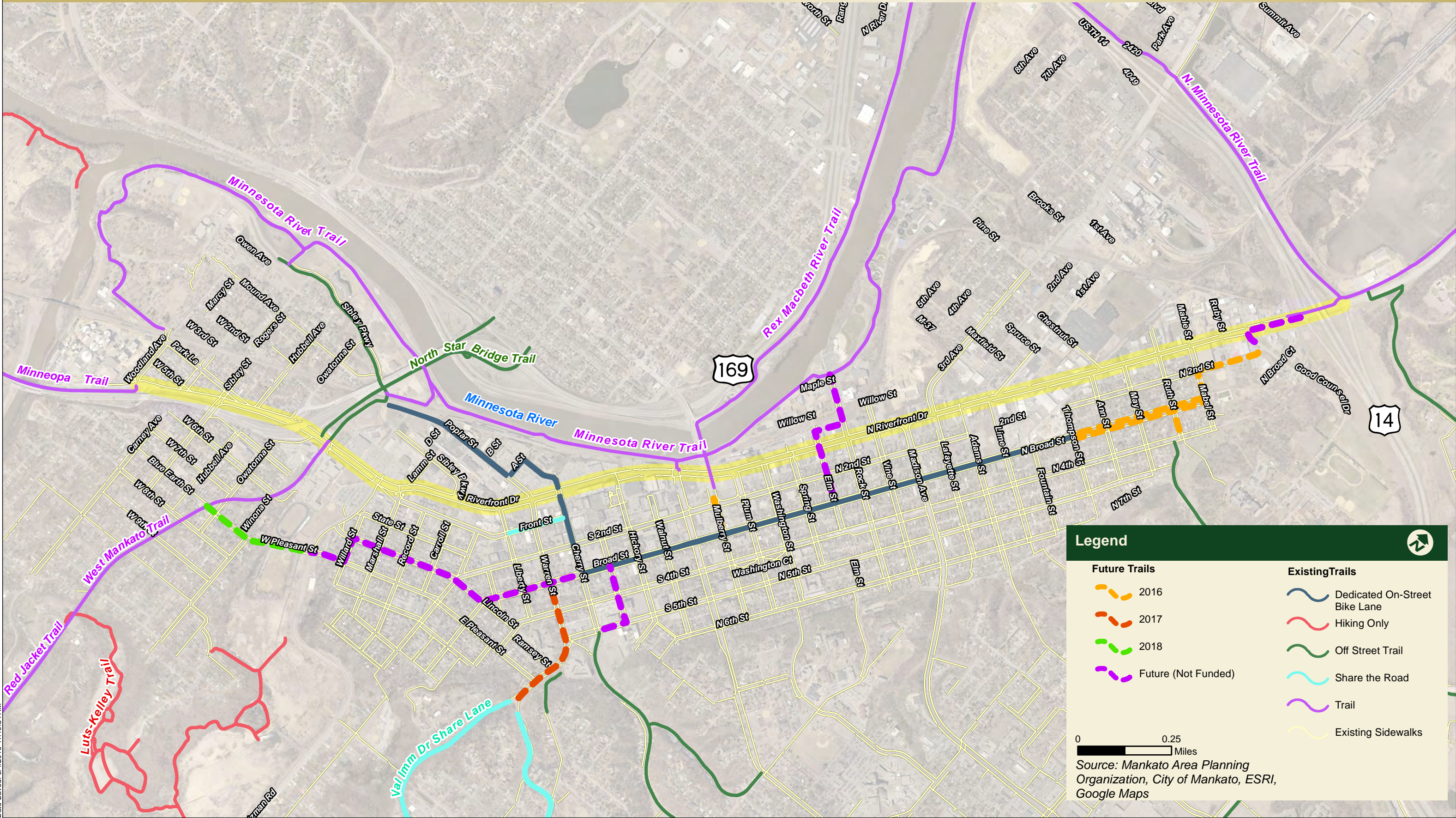
MINOR ARTERIAL	Primary (Full - Movement) Intersection Spacing Guidelines		
	Rural	1/2 mile	3 access / mile
	Urban/Urbanizing	1/4 mile	5 access / mile
	Urban Core	300-660 feet	9-19 access / mile
	Secondary Intersection Spacing		
	Rural	1/4 mile	5 access / mile
	Urban/Urbanizing	1/8 mile	9 access / mile
	Urban Core	300-660 feet	9-19 access / mile

COLLECTORS	Primary (Full - Movement) Intersection Spacing Guidelines		
	Rural	1/2 mile	3 access / mile
	Urban/Urbanizing	1/8 mile	9 access / mile
	Urban Core	300-660 feet	9-19 access / mile
	Secondary Intersection Spacing		
	Rural	1/4 mile	5 access / mile
	Urban/Urbanizing	N/A	N/A
	Urban Core	300-660 feet	9-19 access / mile





Figure A.7





**Figure A.8**

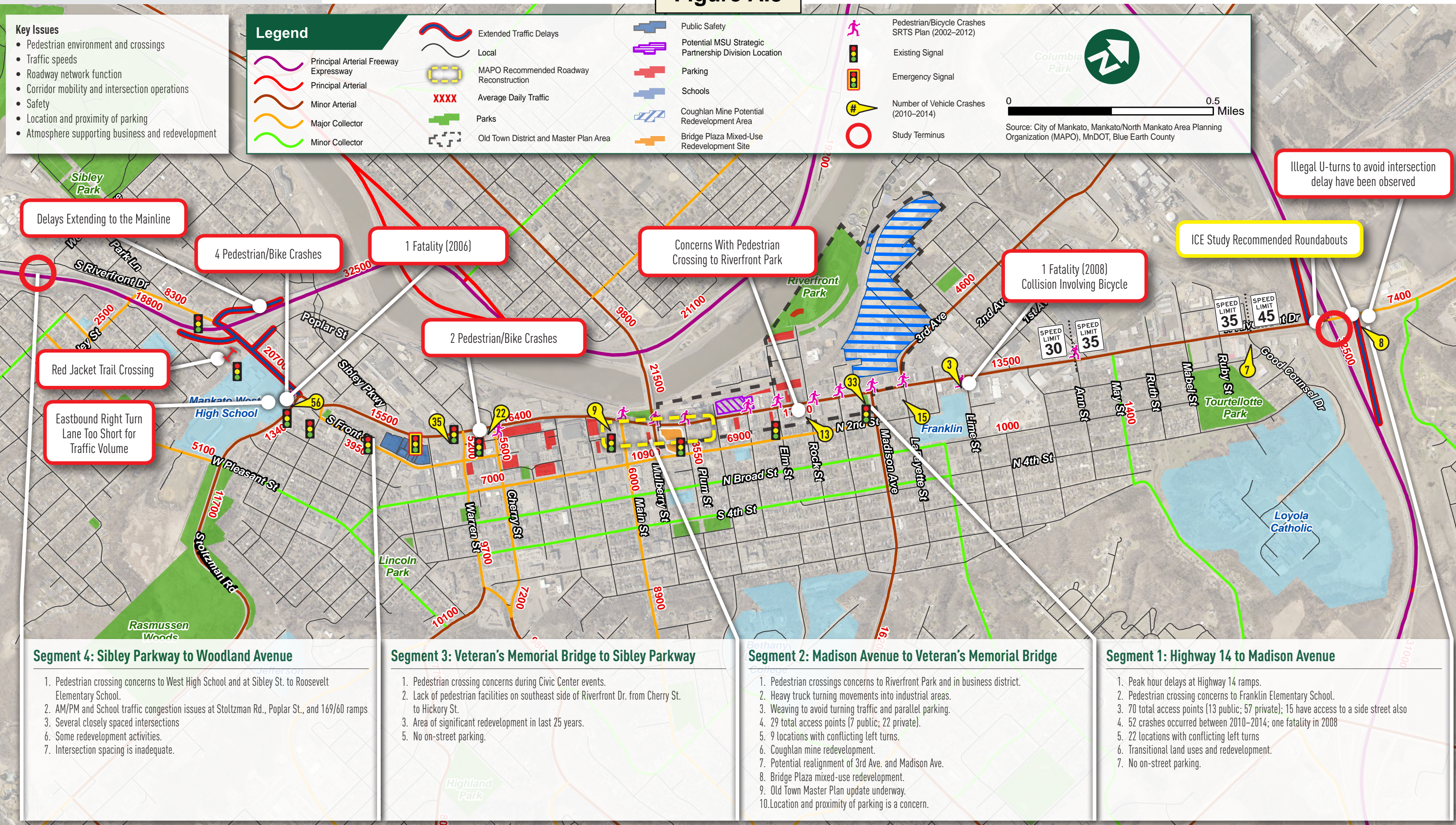






Figure A.9

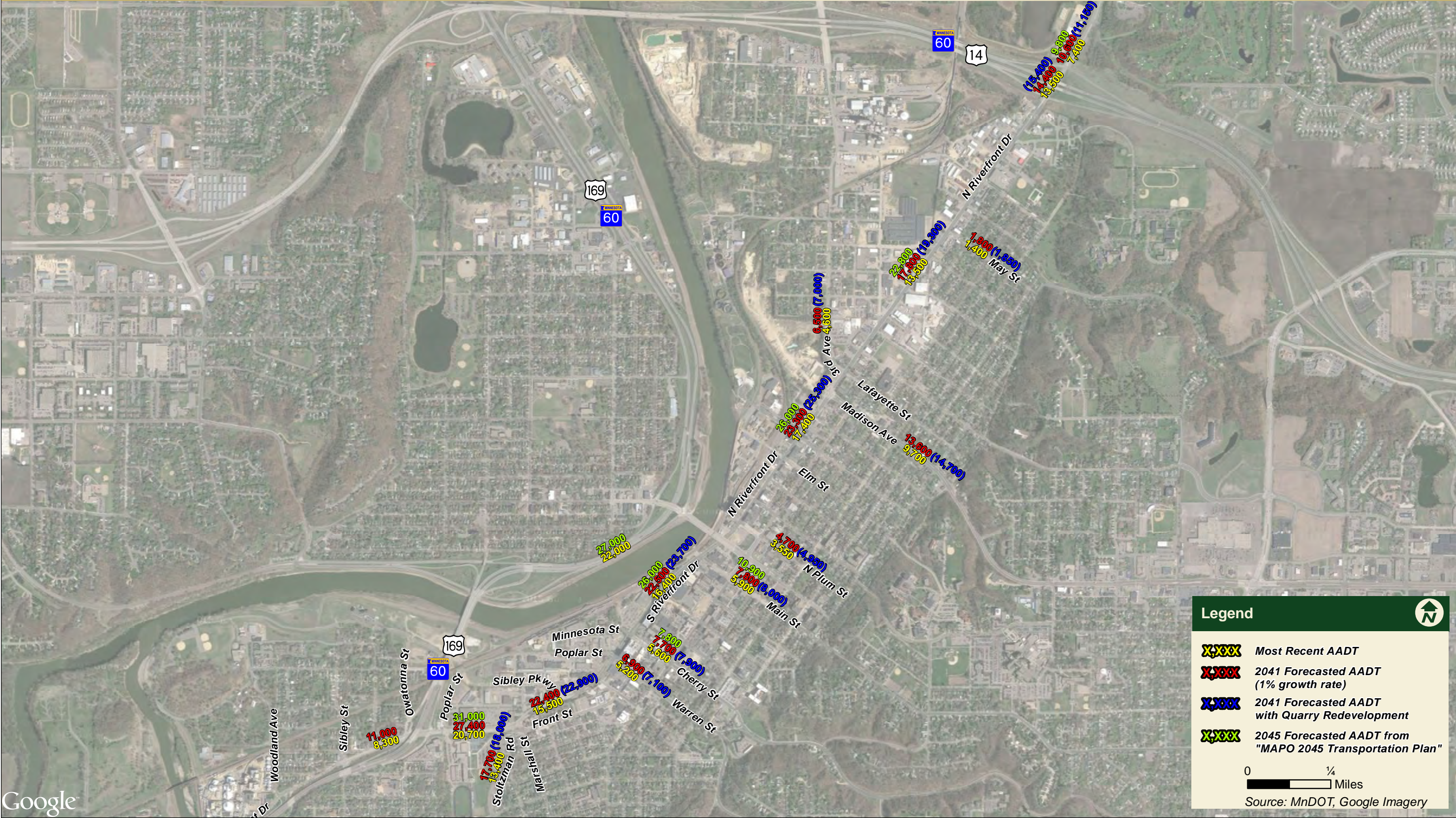
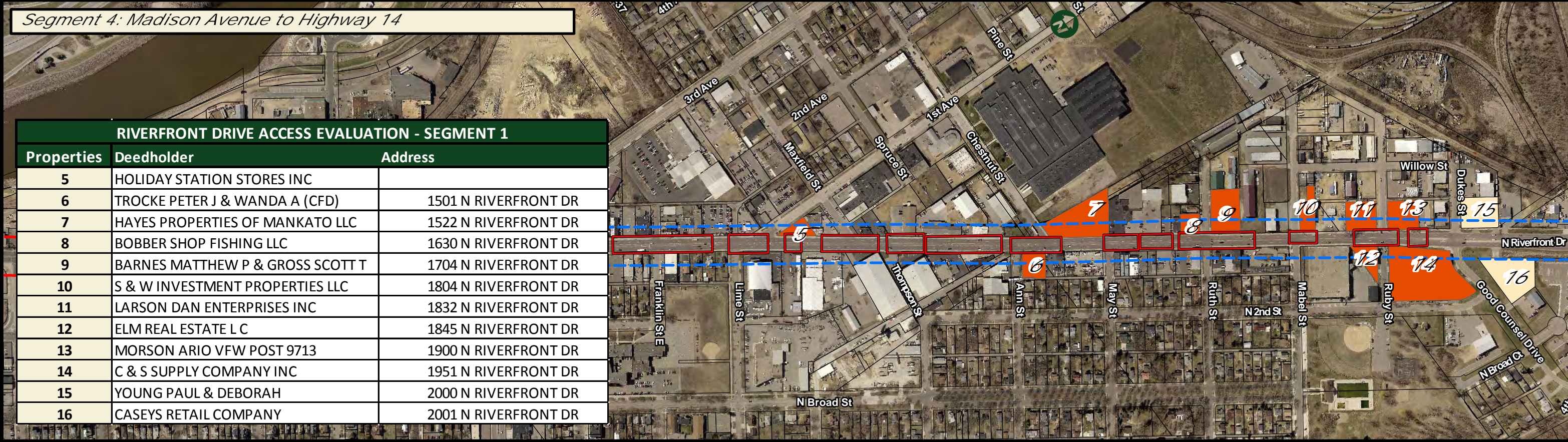
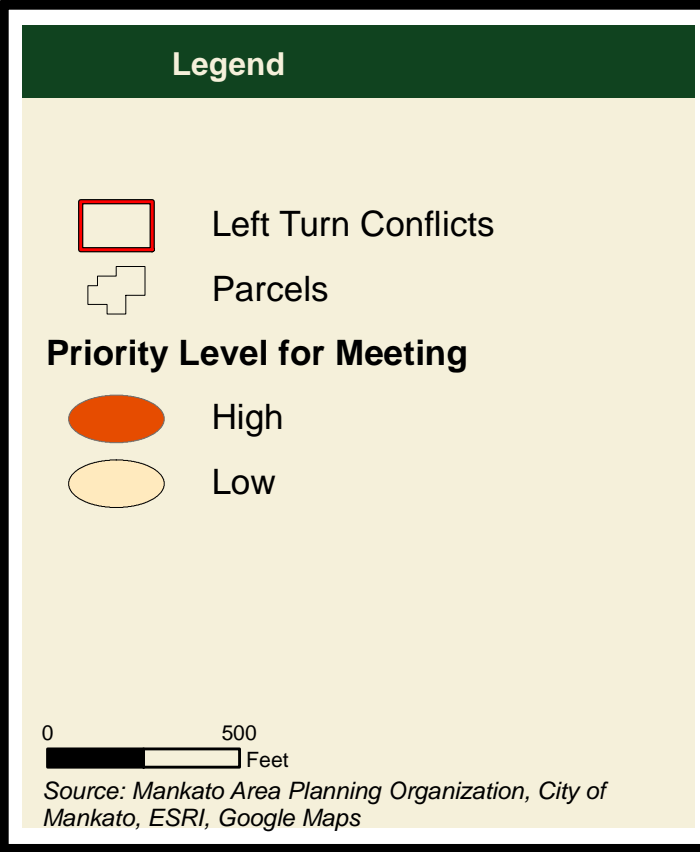
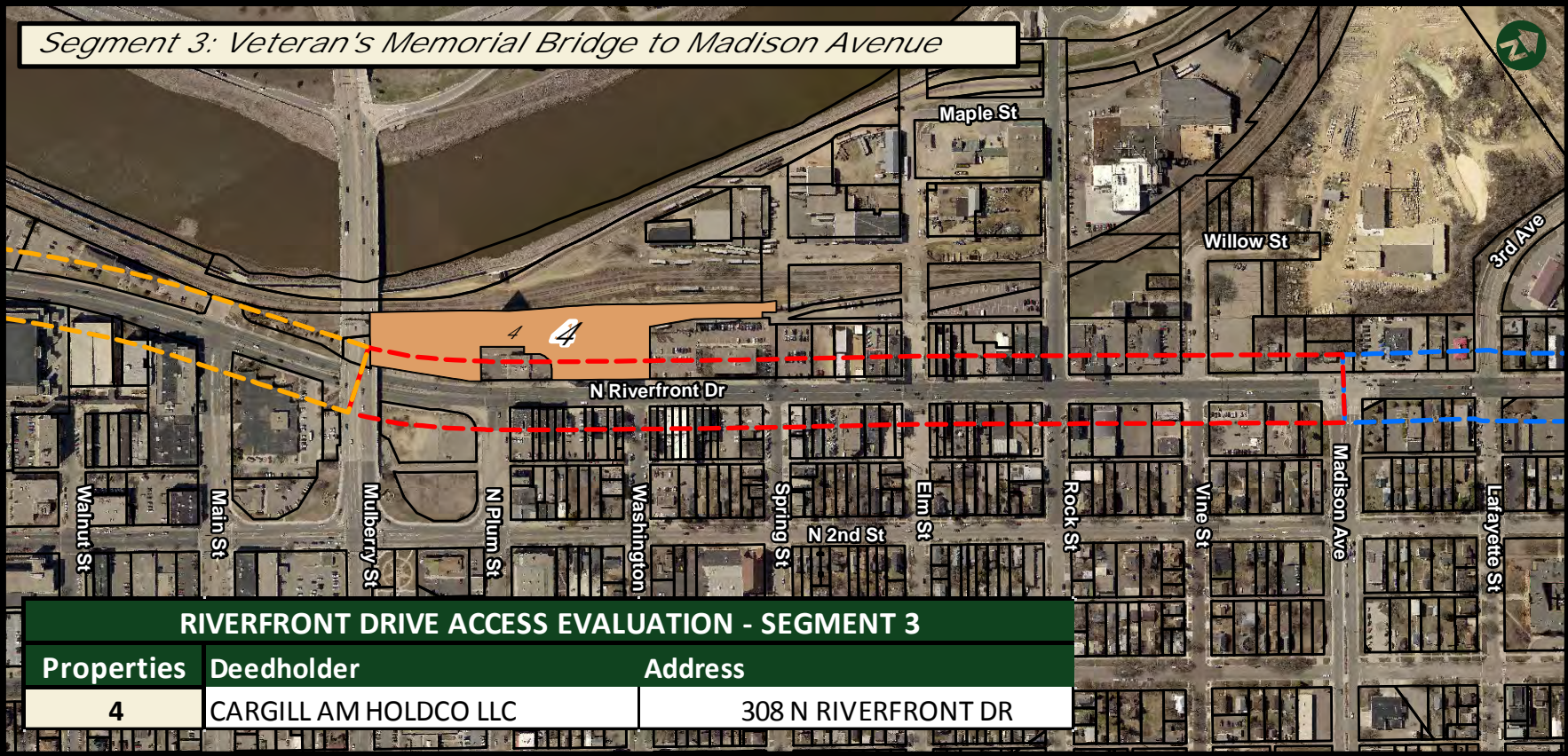






Figure A.9





## Appendix B: Public Information Meeting Summaries



**Riverfront Drive Corridor Study**  
**Open House 1 Summary**  
**October 18, 2016 – 5:30 to 7:30 PM**  
**Intergovernmental Center – Mankato Room**



**Purpose:**

The purpose of the Riverfront Drive Corridor Study Public Information Meeting was to introduce the study and to solicit input on issues, needs and opportunities along the corridor.

**Attendees:**

28 people signed in at the meeting. The following agency representatives were also in attendance:

- Paul Vogel, Director at the Mankato/North Mankato Area Planning Organization (MAPO)
- Jake Huebsch, Transportation Planner at Mankato/North Mankato Area Planning Organization (MAPO)
- Mark Konz, Planner at City of Mankato
- Greg Ous, Transportation District Engineer, Minnesota Department of Transportation (MnDOT)

**Materials Presented:**

The meeting was set up in an open house format giving attendees the opportunity to view materials and visit with project staff at their leisure. A brief presentation began at 6:00 PM. The following existing conditions information was available for public review and input:

- Study Purpose & Goals
- Old Town Master Plan Informational Board
- Study Schedule
- Access Inventory
- Traffic Operations
- Crash History
- Traffic Speeds
- Pedestrian/Bicycle Connections
- Land Use Context
- Historic Considerations

**Comments Received:**

Public input was collected throughout the duration of the open house through discussions with staff and written comments. The following summarizes public comments collected:

**Written Comments (Comment Forms and Map Notes)**

- I would like to see better pedestrian connectivity to south of the bridge. Lighting under the bridge may be helpful. Plants are nice but pinch sidewalk space quite a bit.



- Stop the Riverfront Drive speedway.
- Old Town needs more parking without decreasing traffic flow. There is a lack of customer parking.
- Pedestrian safety is very important. Pedestrian crossings need to be safer. Encourage more drivers to bike and walk to destinations in the valley thus reducing traffic.
  - Consider green paint for bikes across at Sibley, Poplar, Stoltzman and the Red Jacket Trail.
  - There should be a signal under the Highway 169 Bridge to let bikers through before the turn onto 169.
  - Need signage at bike route crossings.
  - Route from Red Jacket to Minneopa Park is not the shortest route possible.
  - Would be good to have safe route for children from West Mankato to Sibley Park.
    - Suggest protected bike lane, eliminating one side of parking.
  - I ride in Minneopa and use Riverfront to get to Front Street and also the North Star Bridge and there is no safe or easy way to cross at the Highway 169 intersection. This could be a protected bike lane or an off road path from the Minneopa Trail connection at Woodland to the Red Jacket Trail to accommodate bike traffic.
  - The free right turn onto the Highway 169 ramp is hazardous for bikers. There is also a street light located directly in the center of the sidewalk on the corner of the trail entrance at the ramp that is in the way of pedestrian and bicycle traffic.
- Would like to see a bike/pedestrian crossing at Good Counsel Drive for better connection to the northeast side of Riverfront near the Highway 14 interchange.
- Need more event parking and better event access. Concerts kill sales.
- Highway 14 ramps need roundabouts or a better way to make traffic flow. This would be beneficial for the school road access as well.
- Segment 1: Log Jam of Traffic; Segments 2 & 3: Pedestrian Crossings; Segment 4: Speed. Old 22 to 1200 N. Riverfront is way too fast.
- There is no safe access from bike lanes in eastern residential neighborhoods to cross Riverfront at Good Counsel Drive.
- Signal timing is an issue for both Warren and Cherry Street intersections with Riverfront Drive.
- Need a left-turn arrow added at the Riverfront/Cherry traffic signal for the southbound to eastbound movement. Northbound traffic is heavy on Riverfront and only 1-2 cars can actually make the left onto Cherry before the light turns red again.
- Traffic control at Elm Street and Rock Street should be examined further.
- Pedestrian lighting along Rock Street should be improved.
- Truck staging/parking along Rock Street, public parking lots and across from Dotson is a problem.
- It's difficult to turn left out of the Tourtellotte neighborhood onto Riverfront Drive during peak hours and lunch time. Perhaps install a traffic light at May Street? Also at Good Counsel Drive?
- Difficult to enter Riverfront from May Street
- May Street is used by drivers as a shortcut from North Victory Drive via Thompson Ravine Road. It is difficult to access Riverfront from this street.
- Traffic on Good Counsel Drive backs up. Hard to get onto Riverfront. Loyola and Dane Express generate traffic.
- Traffic back-ups on the Highway 14 westbound off ramp entering Riverfront Drive are problematic and cause delay.



### **Verbal Comments (Staff/Public Discussion)**

- Entering Riverfront Drive from side streets near the Tourtellotte Park neighborhoods is problematic. Overall transportation network that serves this neighborhood is difficult with the heavy volumes on Riverfront, the existing one-way system and sight distance issues to cross Madison Avenue.
- Consider closing some local street accesses to Riverfront between Good Counsel Drive and Thompson Street to funnel people to a traffic signal at May Street. This would allow people a safe opportunity to get onto Riverfront Drive from surrounding neighborhoods.
- In the event of accidents on Highway 14, traffic is rerouted onto Riverfront and this causes huge delays.
- Lane reduction in Old Town may push vehicles onto Second Street making larger problems.
- The idea of a 3-lane in Old Town is interesting but not sure how it can accommodate all the traffic. Please do not create a problem elsewhere. Second Street has enough traffic already.
- How can we encourage people to walk/bike within one mile from locations such as grocery stores, coffee shops such as they do in Minneapolis?
- Will businesses be assessed for improvements?
- Existing streetscape along Riverfront is ok but some of the planters and light poles make the sidewalks narrow in some locations.
- Consider closing access from local streets in Old Town to Riverfront Drive as was suggested in the Old Town Master Plan. This would provide room for community events and could help funnel traffic and pedestrians to the appropriate crossing locations.



**Riverfront Drive Corridor Study**  
**Open House 2 Summary**  
**April 20, 2016 – 5:30 to 7:30 PM**  
**Intergovernmental Center – Mankato Room**



**Purpose:**

The purpose of the Riverfront Drive Corridor Study Public Information Meeting was to solicit input on the range of improvement options studied, preliminary study recommendations, and draft implementation plan.

**Attendees:**

44 people signed in at the meeting. The following agencies were also in attendance: MAPO, City of Mankato, Blue Earth County and MnDOT.

**Materials Presented:**

The meeting was set up in an open house format giving attendees the opportunity to view materials and visit with project staff at their leisure. A brief presentation began at 6:00 PM. The following information was available for public review and input:

- Study Purpose & Goals
- Segment Issues and Recommendations Boards
- Several Concept Layouts for each segment
- Implementation Board

**Comments Received:**

Public input was collected throughout the duration of the open house through discussions with staff and written comments. The following summarizes public comments collected:

**Written Comments (Comment Forms and Map Notes)**

- Segment 1 –
  - Do all short-term ASAP. Support for Option 1-A. Concern with Option 1-B. Do not like right-only out of West High School. Do not like the extension of Stoltzman Road to Sibley Parkway. Long-term – Do not like all the roundabouts at TH 169.
  - Many supported the idea of a short-term improvement in this segment that could occur soon and then a wait and see attitude for a more comprehensive corridor improvement.
  - A property owner adjacent to the TH 169 ramp expressed concern with how to fit a third left turn lane in this area without requiring full acquisition of his home.
  - Many supported the idea of a public street through the Cub Foods area. A developer commented the street extension increases the attractiveness of the redevelopment site between Linder Avenue and Sibley Parkway.
  - Many liked the idea of the two-phased pedestrian crossing from the school to Cub Foods.



- Segment 2 –
  - A lot of support for adding a sidewalk along the east side.
  - Keep it a four-lane but add sidewalk along parking ramp.
  - A few liked the idea of a 3-lane through Segment 2 to carry the downtown feel to Cherry Street.
  - Many supported the idea to test a 3-lane with temporary materials.
  - Many also expressed concern with the reduction to a 3-lane in Segment 2. They liked the idea of a 3-lane in Old Town but were concerned about traffic operations in Segment 2, especially during events at the Civic Center. How would traffic control work with Civic Center events? The only exit for the parking ramp is onto Cherry Street which backs-up today. Concern that a 3-lane will worsen conditions at Cherry Street. Consider starting the 3-lane between Cherry Street and Main Street.
- Segment 3 –
  - Bump-outs will make turns difficult and slow for trucks backing up traffic on Riverfront
  - Many supported the idea to test a 3-lane roadway with temporary materials.
- Segment 4 –
  - One attendee felt this segment should remain four-lanes
  - Traffic does get heavy at times, but turning onto Riverfront just takes patience. Some people get frustrated to wait 1 – 2 mins, but they would also have to wait for signal if there were ever installed.
- Segment 5 –
  - There was a lot of support expressed to construct the roundabout at the TH 14 north ramps right away
  - Concern with the tear drop roundabout design at TH 14/Riverfront. In a regular roundabout if you miss your turn, you can continue around again and then take the exit of your choosing. Tear drop roundabouts make this impossible.

## Implementation Dot Exercise

In an effort to garner input on the short-term, mid-term, and opportunity/development/safety driven implementation strategies identified by project staff, participants were asked to identify their preferences for the implementation timing of projects through a dot exercise. The first image below represents how the dots corresponded with the implementation timeframes. The second image is a picture of the results of the exercise followed by a summary of those results. The table cells containing the dot exercise summary are colored to reflect the majority of the dots placed by meeting participants

**PROVIDE YOUR INPUT**

Apply the color dots to your Top 3 priority preferences for each timeframe. You may move projects around to different timeframes.

Short-Term 0-5 Years	→	●
Mid-Term 6-15 Years	→	●
Opportunity/ Development/ Safety Driven	→	●

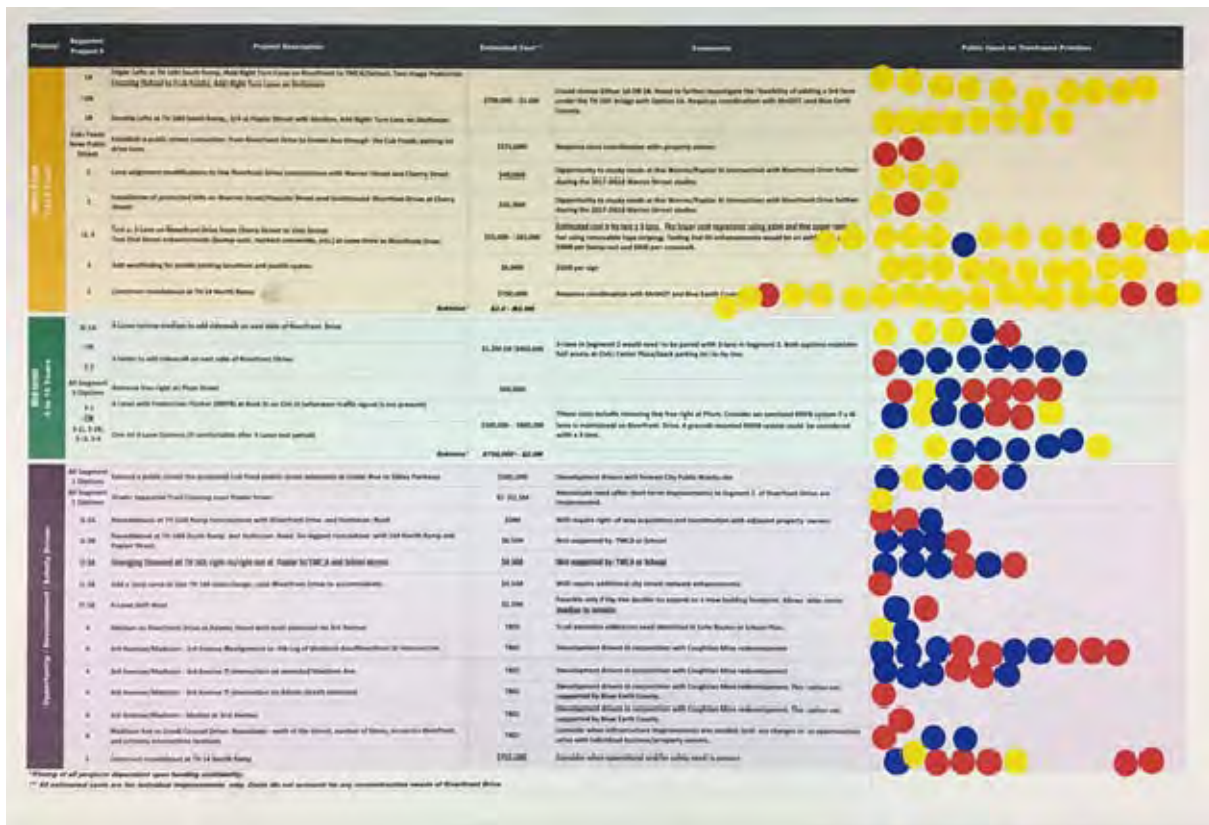


indicating implementation preference.

Most participants agreed with short-term recommendations. The establishment of a public street connection to Linder Avenue was the only option that received votes indicating a desire to have this moved to opportunity/development/safety driven implementation.

Of the mid-term options, there were two that received a majority of dots indicating they should be moved to alternative implementation timeframes. Option 2-1A received three short-term recommendations out of five votes. The removal of the Plum Street free-right received five opportunity/development/safety driven recommendations out of seven total.

Three of the seven opportunity/development/safety driven options received a majority of recommendations indicating they should be moved to mid-term options. These included the extension of a public street from Linder Ave to Sibley Parkway (four out of five votes), Option 1-2B (three out of four votes), and Option 1-3A (four out of six votes). The grade separated trail crossing received one vote to move to short-term implementation.





## Appendix C: Property/Business Owner Meetings Summaries



**Riverfront Drive Corridor Study**  
**Mankato, Minnesota**  
**Business Owner Meetings**  
September 2016 – November 2016



**1. Mom and Pop's (629 N Riverfront Drive) – 8:30 AM - 9/7/16**

**Attendees:**

- Erin Gatchell – Owner
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Angie Bersaw – Senior Transportation Planner, Bolton & Menk, Inc.

**Discussion:**

- Erin provided the following information about his business operations:
  - He has no off-street parking with the exception of 2 employee stalls next to the dumpster in the rear. He did assist with the cost to enhance the on-street parking on Rock Street for his business use. This parking is generally adequate.
  - The parking lot just south of his building is owned by Diamond Vogel.
  - Deliveries occur approximately every other week at varying times of the day. The delivery truck backs in on the north side of his building (along Rock Street). The truck unloads in the no-parking zone adjacent to the bump-out.
  - Front and rear entrances to his business are both used. Handicap entrance is located in rear. Patio is a big attraction and parking on Rock Street supports this.
  - Peak period is the summer and spring seasons. He is concerned about future construction timing and staging during his peak business periods. His business is open in the fall and winter but goes to reduced hours.
- Erin noted Rock Street is a primary crossing location for pedestrians and bicyclists. He said the demand for this type of crossing at Rock Street is high and has increased since the Riverfront Park opened. He also does see a lot of bicyclists making this crossing after visiting the Nicollet Bike Shop (607 N Riverfront Dr).
- Erin has witnessed many close calls with pedestrian/vehicles and vehicle/vehicle crashes at the Riverfront Drive/Rock Street intersection. He felt the lack of gaps to get across Riverfront is the biggest issue.
- His suggestions for improvements to Riverfront Drive include:
  - Consider traffic signal and/or enhanced pedestrian crossing at Rock Street.



- Slow traffic
- Investigate turn lanes to determine if it would help and what are the trade-offs.
- Streetscape is adequate but interested in opportunities to improve. Mentioned Northfield as an example of unique downtown atmosphere that would be good for business.
- Sidewalk space is a little tight at the intersection and corner of his building is a bit tight. Occasionally, sidewalk traffic conflicts here.
- Consider overnight parking restrictions on Rock Street. Vehicles parking overnight are a problem for snow removal.
- Interested in more downtown promotional efforts to support businesses.

## **2. Mankato Area Public Schools (1351 S Riverfront Drive) – 9:30 AM - 9/7/16**

### **Attendees:**

- Scott Hogen – Facility Department Director
- Jerry Kolander – Director of Business Affairs
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Angie Bersaw – Senior Transportation Planner, Bolton & Menk, Inc.

### **Discussion:**

- The rear parking lot off the Poplar Street/Riverfront Drive intersection is used for staff and visitor parking, the majority of parent drop-offs and bus loading/unloading. The Palmer Bus Company uses this loading/unloading zone and have approximately 3 buses in both the morning and afternoon in this location. School estimated 30-40 parent drop-offs in the rear parking lot in morning and afternoon.
- The front parking lot (off of Stoltzman Road) is used for student parking. Parking permits are issued to students on a lottery system for juniors and seniors. Senior students have first priority on the permits and have the two weeks before school starts to obtain the permit. Juniors are then in a random lottery for the remaining spaces. There is a waiting list of 35 to 50 students for a permit each year. Sophomores are not included for permits. The lot on the other side of Pleasant Street does not require a permit and is designated for sophomores.
- Buses also load/unload on the front of the building as well. The Yaegar Bus Company which handles transfers take place in the front of the building. 7 buses come into/out of the front lot in both the morning and afternoon.
- School planning to conduct a long-range facility plan soon. With opening of Prairie Winds Middle School some space transitions are already occurring. The technology department is scheduled to move out of West High School and into the Prairie Winds Middle School. This change along with the potential to renovate the annex, a separate building in the rear parking lot, will open up more space to increase student capacity at West.
- Tennis courts are heavily used in spring and summer. The school recently moved



3 tennis courts on the W Pleasant Street side of their site to the Riverfront side of the site so all courts are now together.

- Pool needs a rehab and that could include expansion towards Riverfront Drive.
- Bus companies and parents have made complaints that the Poplar Street traffic signal phase is too short to move traffic out of rear parking lot during peak periods.
- Afternoon release time is the most congested. Morning drop-offs, buses and student parking occurs over a longer period and generally works ok.
- Concern for students and other pedestrians crossing Riverfront Drive. Safest location to cross is at Poplar Street but students cross in multiple locations to get to the Cub Foods area.

### **3. Crown Cork and Seal (174 Chestnut Street) – 10:30 AM - 9/7/16**

Attendees:

- Tom Rinehart – Plant Manager
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Angie Bersaw – Senior Transportation Planner, Bolton & Menk, Inc.

Discussion:

- Crown Cork and Seal manufactures the top of beverage cans.
- Business is a 24/7 manufacturing operation with 100 employees working in shifts of 25.
- Shipping of materials in and product out generally occurs from 7:30 am – 4:00 pm Monday through Friday.
- Four to 15 semi-trucks per day come into and out of their loading docks located on Chestnut Street.
- The majority of the trucks coming to and leaving their site use 3<sup>rd</sup> Avenue to Highway 14 instead of Riverfront Drive. This patterns works best for turning the semi-trucks around to unload into the docks. Most trucks have learned it's easier to go out Chestnut to 3<sup>rd</sup> Avenue rather than trying to take a left onto Riverfront Drive.
- No major complaints with the function of Riverfront Drive to their business since they also have good access to 3<sup>rd</sup> Avenue.
- Noted the ramp delay issues at Riverfront Drive and Highway 14.
- Their site occupies 22 acres. They currently use the entire building space and have no plans to expand or sell off the unused portions of their site.

### **4. Gerring's Car Wash (821 N Riverfront Drive) – 8:30 AM - 9/8/16**

Attendees:

- Jeff Johnson –Owner
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Angie Bersaw – Senior Transportation Planner, Bolton & Menk, Inc.



Discussion:

- Jeff requested meeting to learn more about the corridor study. His primary concern is the proposed 3-lane concept identified during the Old Town Master Planning Study.
- Jeff is concerned that a 3-lane will not be able to adequately handle the traffic that exists on Riverfront today. He is concerned traffic will back-up and prevent access into and out of his business. He understands what is trying to be accomplished in Old Town but does want it to be at the detriment of his business.
- He is concerned about access changes or traffic congestion making his site less desirable.
- He said his business is an impulse business and depends largely on the weather therefore there is no predictable business period of the day or week.
- Access to Riverfront Drive and maintaining the traffic volumes that exist today on Riverfront is important to him. He is concerned about any potential shift in traffic off of Riverfront onto other streets. He said the car wash noticed a drop in business when 2<sup>nd</sup> Street was opened and began carrying additional trips.
- The car wash has two accesses onto Riverfront Drive. The south driveway is an entrance only and the north access is the exit from the conveyor belt. Both are needed for this business to operate.
- Although his north driveway is full access, customers are encouraged to go right only since waiting for left turns will back up his conveyor.
- The car wash receives one delivery a month and the semi-truck stops in the center left turn lane with flashers on.
- Alley behind his business is a public alley.

**5. Friesen's Bakery (515 N Riverfront Drive) – 1:00 PM, 9/8/16**

Attendees:

- Tony Friesen – Owner
- Natasha Friesen – Owner
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Matt Lassonde – Transportation Planner, Bolton & Menk, Inc.

Discussion:

- Walkability and bikability are extremely important in the district.
- Width of the roadway and crossings are seen as barriers to pedestrian movements.
- Natasha suggested that walkability maps that show the time it takes to walk between different areas of interest be created to give people a better sense of access by foot.
- Tony suggested a large master ped/bike map at a gateway to the Old Town



District that would educate the public on the available ped/bike paths in the area and trailhead signage to guide users. One major complaint is that the bike connections happening in the City along 2<sup>nd</sup> Street are too far removed from the Riverfront Trail and that efforts should be made to provide that connection in a more accessible manner.

- Wider sidewalks are important for a sidewalk café atmosphere. They discussed the benefits seen within the Front Street district with streetscaping improvements and how that has led to a safer environment.
- They suggested a median similar to that of US 169 in St. Peter, MN might be a good fit. This would include a decorative concrete median with plantings and turn lanes. This would also provide pedestrian refuge along the corridor.
- Safety is a big concern for Tony and Natasha. Not only do they own and operated Friesen's Bakery, but they reside two blocks behind the business along Elm Street and often use that road to walk to work. They have experienced the feeling of being unsafe as street lighting in this area seems inadequate. The same was mentioned regarding the alleyways in the rear of the buildings. This lighting issue is exacerbated in the winter months. They wondered if there are opportunities for camera placement along the corridor in the Old Town District. Other concerns were mentioned regarding the Elm Street/2<sup>nd</sup> Street intersection as vehicles have been observed not yielding to pedestrians in crosswalks.
- Natasha mentioned that there have been two significant accidents in front of the business with patrons entering the parking lot. These were vehicles taking a left while traveling southwest on Riverfront and she described them as "fender benders."
- They were concerned with the state of the alleys and the quality of the rear business entrances stating that the alleys need to be cleaned up and power lines need to be buried as the poles pose issues with entering trucks that bring supplies to the businesses.
- They suggested that parking has not been an issue with their business as they are fortunate enough to have a lot adjacent to the building that provides adequate parking. However, they suggested that there is a public lot nearby that is not well known by the public. They state that sidewalks can be troublesome in the winter time but that they keep them clean.
- Signage was a preference for wayfinding for parking, a gateway to the Old Town to allow people to acknowledge that they are entering the district. Plaques on buildings were discussed as a way to garner more interest in the buildings' histories and add to the ambience of the District.
- Natasha and Tony suggested that considerations for environmental justice were largely missing from the Old Town Plan discussions.
- They plan to expand into the garage space next door in the future.
- They were concerned with blighted properties and the effects that those have on other businesses in the area. Stephen's Cleaners was foreclosed on and the business has been in a non-operational state for some time.



## **6. Dotson Iron Castings (200 W Rock Street) – 2:00 PM, 9/8/16**

### **Attendees:**

- Jean Bye – President
- Eric Nelson – Technology Manager
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Matt Lassonde – Transportation Planner, Bolton & Menk, Inc.

### **Discussion:**

- Dotson reps expressed concerns with truck staging operations on Rock Street and adjacent parking lots. They said that they have approximately 20 heavy trucks that access their company each day along Rock Street. There are issues with trucks traveling to Ardent Mills staging along Rock Street and occupying public parking lots behind buildings between Rock Street and Spring Street. This staging causes congestion. They would like to see more enforcement that limits trucks staging.
- They discussed the trucks accessing their business do so from all directions (i.e., Highway 14, US 169, etc.)
- They do a lot of business with the paint shop across Rock Street and vehicle travel between the two facilities is frequent.

## **7. CHS Oilseed Processing (2020 S Riverfront Drive)– 3:00 PM, 9/8/16**

### **Attendees:**

- Jim Graham – Plant Manager (and two other representatives).
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Matt Lassonde – Transportation Planner, Bolton & Menk, Inc.

### **Discussion:**

- Plant runs 24 hours a day/7 days a week and accommodates over 500 trucks per day from all directions within a 60 to 80 mile radius. This takes a large toll on the pavement of Riverfront Drive. Traffic slows on the weekends.
- They have a staging facility in Le Hillier and acknowledged that this allows them to prevent congestion in the area with trucks waiting along Riverfront. The congestion is placed a distance away from the facility.
- There are no particular peak times during the day.
- There is a segment of Riverfront Drive west of Woodland Avenue that borders their property in which they are the sole users. They mentioned that they have interest in obtaining this portion of the roadway to accommodate trucks.

## **8. Ardent Mills (200 N Riverfront Drive)– 8:00 AM, 9/14/16**

### **Attendees:**

- Darin Elliot – Plant Manager
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning



#### Organization (MAPO)

- Angie Bersaw – Senior Transportation Planner, Bolton & Menk, Inc.

#### Discussion:

- Plant runs 24 hours a day/7 days a week. Monday through Fridays are their busiest times of the week. They still operate on weekends but it is lighter.
- Currently accommodate the following:
  - 20-25 wheat trucks/day
  - 3-5 feed trucks/day
  - 5-20 bag trucks/day
- Their business operations are growing as it is cheaper to move product by truck than rail and they were recently certified for organic. Darin anticipates wheat and feed trucks will grow to 30-35 trucks per day each and bag trucks will increase to 20-25 trucks per day. He anticipates they will be 100% truck operations by early next year with the exception of any specialty wheat coming in by train.
- He noted the number of trucks fluctuates greatly per day and is related to other plant operations in Lake City, Hastings and Rush City. Sometimes they plan to get 40 trucks one day but only 20 arrive and that means 60 will show up the next day.
- Darin said approximately 80% of their trucks use Riverfront Drive to access Highways 14 and 169. He said approximately 15-20 trucks per day would use Highway 169 and the Veterans Memorial Bridge to access their site if they could take a left in under the bridge.
- Darin observes trucks frequently crossing over the median on Riverfront Drive when exiting their site to get to Plum Street and the Veterans Memorial Bridge.
- Their busy times of year are September through February.
- Realize they have a truck staging issue on Rock Street and adjacent parking lots. This does conflict with Dotson's trucks and operations at times. He felt 8-10 am is the peak for this staging issue. Ardent Mills is in the final stages of purchasing an additional piece of property from the railroad behind Ardent Mills to allow room for truck staging. Darin anticipates this deal to be final by November 2016 which will alleviate the staging issues noted.
- They post notice of Riverfront Park events to truck drivers and try to restrict operations during the event times. This has worked well so far.
- No major issues with Riverfront Drive except a note that traffic speeds are a concern. Darin he has seen the activity level of walkers and people in and around the Old Town area with recent revitalization efforts which is a positive for the community. Calming traffic through this area would help.



## **9. Tourtellotte Park Neighborhood - 11/1/16**

Attendees:

- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)

Discussion:

The following input was provided by neighborhood representatives:

- Provide assistance with making left turns onto Riverfront Drive
- Concerns with speeds on Riverfront Drive (area adjacent to Tourtellotte Park Neighborhood)
- Provide a turn lane for Lime Street and 1st Avenue along Riverfront Drive (straighten out or better define turn lanes)
- Provide a stop light at Riverfront Drive/May Street
- Provide assistance for bikes crossing Riverfront Drive to get on trails
- Provide a traffic signal at Rock Street to Riverfront Park
- Provide additional lighting along bike lanes (Broad Street)
- Concerns with crossing Second Street to Riverfront Drive; will be more difficult if traffic is diverted to Second.
- Provide reflective speed limit signs along Riverfront Drive
- Repaint North 5th Street driving lanes
- Access & safety issues around Holiday gas station
- Look into Riverfront and Cherry traffic sensor
- Concerns about plant heights in median at bike crossing areas especially concerning the median at Broad and Madison Ave
- Concern with sign retro-reflectivity along Riverfront Drive Broad and Madison Ave
- Look into business meeting with Kendell Door
- Suggestion route the bike lane from the Thompson Ravine bike path onto 4th Street then go north between the Good Council meadow and Tourtellotte Park all the way to Good Council Drive rather than using Ruth Street to Broad. There are only houses on one side of the street on that section of 4th up to the park, and from the park to Good Council Drive is now paved with typically minimal parking along there. An alternative to that would be to run the bike lane on 4th until it gets to Mabel (in front of the pool). Or run it out to May Street if a traffic light is installed there at Riverfront.
- Adding signs regarding bike traffic, to look both ways (especially on one way streets)

## **10. Kendell Doors (1711 N Riverfront Drive)– 9:00 AM, 11/18/16**

Attendees:

- Kevin Engelbrecht – Manager
- Jake Huebsch – Transportation Planner, Mankato/North Mankato Area Planning Organization (MAPO)
- Matt Lassonde – Transportation Planner, Bolton & Menk, Inc.



Discussion:

- Company is located adjacent to the transition between five-lane with center turn lane and four-lane undivided sections.
- Kevin mentioned that there are issues with turning left from Riverfront into the company's parking lot due to the number of lanes and high traffic counts.
- He was wondering if the speed limit is too slow for this section of Riverfront as the roadway seems really large and 30 mph seems slow.
- It's hard to get on and off Riverfront during peak traffic hours.
- Ruth Street is tight for delivery trucks to access the business.
- Company has worked with the neighborhood to get the section of Ruth designated as a no parking zone to assist with ease of delivery. Has built relationship with neighborhood over the years.
- Kevin acknowledged that the Highway 14 access is problematic saying that he often observes people performing the illegal U-turn north of the interchange.
- He also mentioned that left turns onto Riverfront from Good Counsel are problematic due to traffic and number of lanes.

#### **11. MnDOT District 7 - 1/19/17**

Attendees:

- MnDOT District 7 – Planning and Engineering Staff
- Jake Huebsch – MAPO
- Paul Vogel – MAPO
- Chris Chromy, Bolton & Menk
- Angie Bersaw, Bolton & Menk

Discussion:

- Chris and Angie presented the initial range of concepts for Segments 1 and 5 since they intersect with MnDOT highways.
- No major concerns expressed on the range of alternatives.
- Minor design improvements were suggested for future consideration.

#### **12. Mankato School District and YMCA – 2/20/17**

Attendees:

- Sherri Allen – Mankato School District Superintendent
- John Kind – Mankato YMCA Executive Director
- Jake Huebsch – MAPO
- Paul Vogel – MAPO
- Chris Chromy, Bolton & Menk
- Angie Bersaw, Bolton & Menk

Discussion:

- Chris and Angie presented the initial range of concepts near the West High School and Mankato YMCA.
- Sherri confirmed the school has no current plans to move or expand its footprint.
- Both Sherri and John expressed concern with improvement options that would change their access to Riverfront Drive. They felt Option 1B could be a workable



option in the future but would need further consideration. Option 1A was also supported as it leaves their existing access as is today.

### **13. Hy-Vee – 2/23/17**

#### **Attendees:**

- Jeff Thompson – Hy-Vee Store Director
- Kacie Bonjour – Hy-Vee Real Estate Director
- Jeff Stein – Hy-Vee Site Planning Director
- Paul Vogel – MAPO
- Angie Bersaw, Bolton & Menk

#### **Discussion:**

- Angie reviewed the Segment 2 options adjacent to Hy-Vee.
- Hy-Vee representatives supported the addition of a sidewalk.
- Kacie and Jeff Stein confirmed they have no current plans to expand their store on a different footprint; therefore, the option to expand the 4-lanes west to accommodate a sidewalk is not feasible.
- Jeff Thompson noted almost all of their trucks leave the back parking lot to head north on Riverfront Drive. Therefore, the  $\frac{3}{4}$  access idea at Civic Center Plaza/Hy-Vee back parking lot access are not feasible.
- The other options – 4-lane narrow median and 3-lane options are acceptable to Hy-Vee. Maintaining access to their property as it exists today is very important to Hy-Vee.

### **14. Cub Foods – 2/23/17**

#### **Attendees:**

- Mike – Cub Foods Assistant Store Manager
- Paul Vogel – MAPO
- Angie Bersaw, Bolton & Menk

#### **Discussion:**

- Angie reviewed the Segment 1 options adjacent to Cub Foods.
- Cub representatives liked the idea of a public street from Riverfront Drive to Linder Avenue. They said many use this today and it would be good to formalize it as such. Cub's main concern is the location of parking lot accesses to the new street. They want to ensure there is adequate circulation, particularly for the liquor store side of their business.
- Mike noted Cub Foods does not own the property and the property owner would need to be consulted as well.
- No other concerns were expressed with the Segment 1 options.

### **15. Coughlan Mine Representatives – two meetings**

#### **Attendees:**

- Brett Skilbred – Coughlan Mines
- Dave Schoof – Coldwell Banker
- Jason Femrite – Bolton & Menk/Old Town business owner



- Paul Vogel – MAPO
- Jake Huebsch - MAPO
- Chris Chromy, Bolton & Menk
- Angie Bersaw, Bolton & Menk

Discussion:

- Two meetings with representatives from the Coughlan Mines were held during the Riverfront Drive Corridor Study.
- Brett noted a group of community volunteers and Coughlan Mines representatives have begun a visioning process for future redevelopment of the mine property. They shared information about potential ideas generated during the Old Town Master Plan process and their process which is still in its infancy stages.
- Chris and Angie shared information on potential future improvements near the Madison Avenue and 3<sup>rd</sup> Avenue intersections. A few of these included realignment ideas to bring 3<sup>rd</sup> Avenue into a future fourth leg of the Madison Avenue/Riverfront Drive intersection.
- Brett, Dave and Jason had no initial concerns with the realignment options being discussed at the corridor planning level.

## 16. Old Town District Meeting – 2/15/17

Attendees:

- Old Town District members
- Mark Konz, City of Mankato
- Angie Bersaw, Bolton & Menk

Discussion:

- Angie provided an update on the corridor study at a regularly scheduled Old Town District meeting. She reviewed the Segment 2 and 3 improvement options under consideration.
- Segment 2:
  - Attendees like the idea of starting the 3-lane near Cherry Street – viewed as a benefit to slowing traffic and extending the downtown feel to most of the Segment 2 area.
  - There was a lot of support for adding the sidewalk on the east side of Riverfront through this area, coupled with the 3-lane option.
- Segment 3:
  - Support for removing free right at Plum.
  - Not much support for the 4-lane since it does not change sidewalk widths which seemed to be the main goal for many of the attendees.
  - Liked the idea of moving the traffic signal to Rock and some type of enhanced pedestrian flasher at Elm with any of the options. Recognition that walkers/bikers are going to cross at both but Rock should be the primary.
  - Parking – General consensus was there is enough parking in Old Town but better wayfinding signage is needed. Many did not feel on-street parking



was needed on both sides of Riverfront Drive. Would rather use that additional space with the 3-lane options for wider sidewalks.

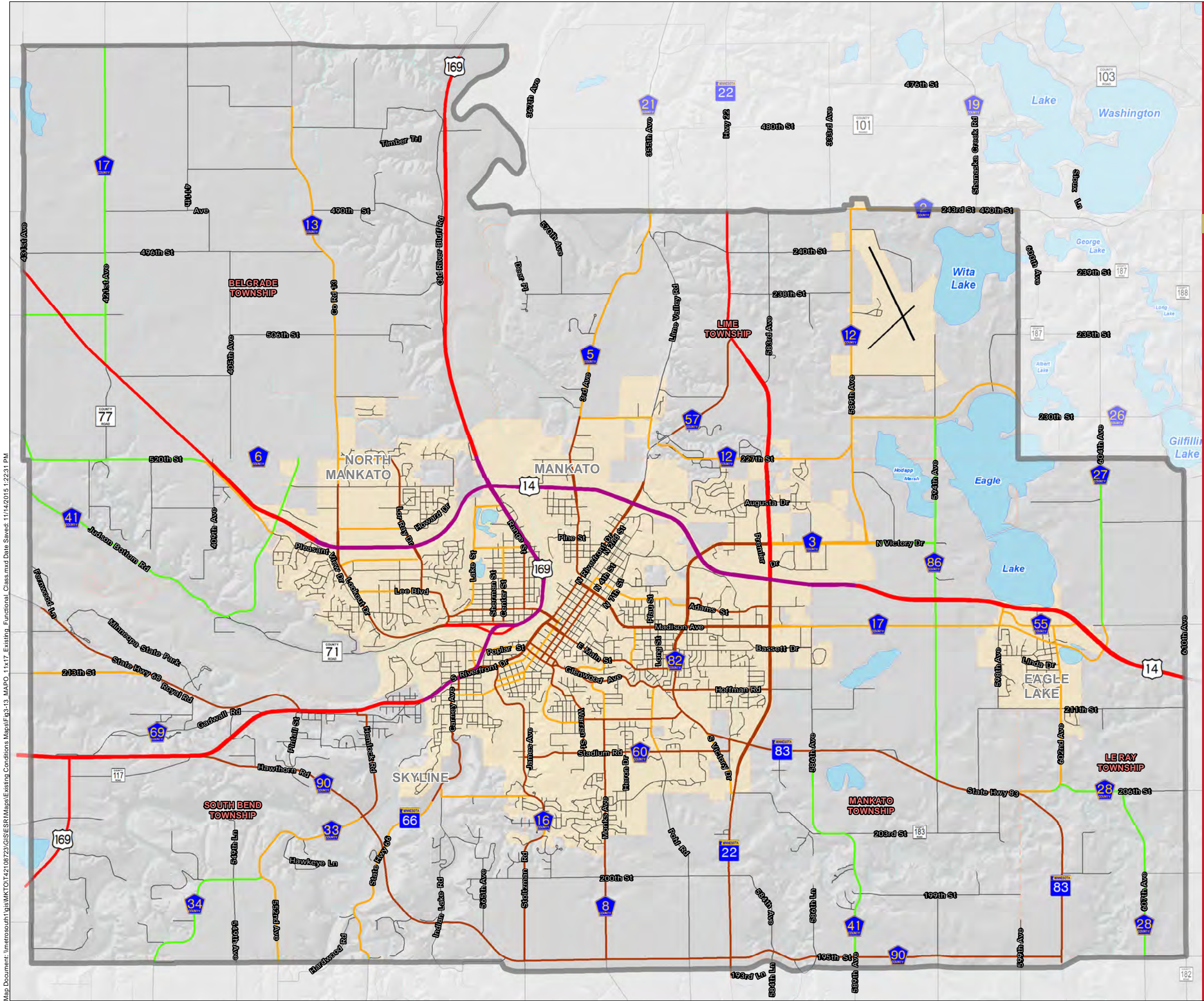
- Many liked the 3-lane option with intermittent medians to assist with pedestrian crossings (as attached). They suggested a hybrid option with parking on east side and use extra space for additional sidewalk width. Attendees did not feel like they were gaining much with 12' sidewalks in the option with parking on both sides.
- Not much support for the 3-lane with continuous median option. They felt this really divided Old Town with not much benefit to show for it in terms of wider sidewalks or medians of adequate width for pedestrian refuges.
- Main concerns related to the 3-lane was any potential traffic diversion to 2<sup>nd</sup> Street. Many expressed concern with changes on Riverfront increasing traffic on 2<sup>nd</sup> Street. They questioned if changes to 2<sup>nd</sup> Street would be considered in the near future to address traffic speeds and the difficulties in trying to walk across the busy road.



## Appendix D: MAPO Functional Classification Map



Map Document: \\netrosouth1\gis\mkt\TOT\2108723\GIS\ESR\Maps\Existing Conditions Maps\Fig3-13\_MAPO\_11x17\_Existing\_Functional\_Class.mxd Date Saved: 11/14/2015 1:22:31 PM



# Existing Functional Classification

Figure 3-13

## Existing Functional Class

- Principal Arterial Freeway Expressway
- Principal Arterial Other
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Outside Planning Area



MAPO Planning Area

Source: Blue Earth County, Nicollet County, MnDOT, North Mankato, Mankato, MnDNR, Esri Imagery



0 1 2 Miles





# Appendix E: Existing Conditions Traffic Analysis Memorandum





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## **MEMORANDUM**

**Date:** August 11, 2016

**To:** Paul Vogel

**From:** Ross B. Tillman, P.E.

Kelsey E. Retherford, E.I.T.

**Subject:** Existing Traffic Conditions

Riverfront Drive Corridor Study, Mankato, MN

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### **Introduction**

The Mankato/North Mankato Area Planning Organization in cooperation with the City of Mankato have requested a corridor study along Riverfront Drive from TH 14 to Woodland Avenue. Riverfront Drive is located along the western edge of the City of Mankato. This memorandum provides a summary of the existing conditions as a baseline to understand the needs and potential solutions.

### **Data Collection**

13-hour turning movement counts were completed at the intersections analyzed in May of 2016. The AM peak hour was found to be from 7:15-8:15am and the PM peak hour was found to be from 4:30-5:30pm. The existing traffic volumes are shown in **Figure 1** of **Appendix A**.

### **Segment Analysis**

The corridor was split into four segments to better analyze the operations and key issues at different locations along Riverfront Drive. The extents of each segment are listed below.

Segment 1 –Woodland Avenue to Sibley Parkway

Segment 2 –Sibley Parkway to Veterans Memorial Bridge

Segment 3 –Veterans Memorial Bridge to Madison Avenue

Segment 4 –Madison Avenue to TH 14

### ***Segment 1 –Woodland Avenue to Sibley Parkway***

### **Existing Conditions**

The intersections along Riverfront Drive in Segment 1 that were analyzed include Woodland Avenue, Sibley Street, TH 169 SB Ramps/Owatonna Street, TH 169 NB Ramps, Poplar Street/Mankato West High School, Stoltzman Road, and Marshall Street. Riverfront Drive is a two lane undivided roadway between Woodland Avenue and Sibley Street. From Sibley Street to TH 169 SB Ramp/Owatonna Street, Riverfront Drive is a four lane undivided roadway and east of TH 169 SB Ramp/Owatonna Street it





transitions to a four lane divided roadway. The intersections of TH 169 SB Ramps/Owatonna Street, Poplar Street/Mankato West High School, Stoltzman Road and Marshall Street are signalized with dedicated left turn lanes along Riverfront Drive. Along Riverfront Drive there are dedicated right turn lanes at Marshall Street and Stoltzman Road.

The speed limit along Riverfront Drive and all side streets is 30 MPH. TH 169 is classified as a Principal Arterial Freeway Expressway. Stoltzman Road, Riverfront Drive, and Sibley Street south of Riverfront Drive are classified as Minor Arterials. All other roadways are classified as Local roadways.

### Safety Analysis

A crash review was completed using the Minnesota Crash Mapping Analysis Tool (MnCMAT) for the previous five years (2010-2014). MnDOT uses a comparison of the crash rate and the critical rate when determining whether or not there is a safety issue 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.

**Table 1** shows the critical index at each intersection analyzed in Segment 1.

**Table 1. Intersection Crash Indices**

Intersection	Total Crash Critical Index	Fatal & Serious Injury Crash Critical Index
Woodland Avenue at Riverfront Drive	-	-
Sibley Street at Riverfront Drive	0.72	0
TH 169 SB Ramps/Owatonna Street at Riverfront Drive	0.54	0
TH 169 NB Ramps at Riverfront Drive	-	-
Poplar Street/ Mankato West High School at Riverfront Drive	0.14	0
Stoltzman Road at Riverfront Drive	1.14	0.62
Marshall Street at Riverfront Drive	0.27	0

The critical index for the intersection of Stoltzman Road at Riverfront Drive was found to be 1.14 which shows that this intersection is experiencing a higher than usual number of crashes compared to similar intersections statewide. All other intersections have a critical index less than one showing that they are operating within the normal range.

**Table 2** below summarizes the crashes reported at the intersection of Stoltzman Road at Riverfront Drive from 2010 to 2014. There were a total of 56 reported crashes.





**Table 2. Crash Type and Severity at Stoltzman Road at Riverfront Drive**

Crash Type	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Rear End	-	-	5	18	23
Left Turn	1	-	3	5	9
Right Angle	-	1	2	6	9
Ran off Road	-	-	-	5	5
Sideswipe Passing	-	-	-	5	5
Pedestrian	-	-	3	1	4
Right Turn	-	-	-	1	1

**Table 2** shows that rear end crashes are the most common type of crash at this intersection. Of the 23 rear end crashes 17 of them were north or southbound traveling vehicles likely caused by confusion with the protected-permitted shared thru-left turn lane on the northbound approach. North-south left turning crashes were the second most common crash at the intersection with one resulting in an incapacitating injury crash, three possible injury crashes and five property damage only crashes. There were also nine right angle crashes at the intersection with seven of them involving a westbound traveling vehicle. Additionally pedestrian safety is a concern at this intersection as there were four pedestrian crashes reported between 2010 and 2014.

At the intersection of TH 169 SB Ramps/Owatonna Street at Riverfront Drive there were 16 crashes reported. **Table 3** below summarizes the crashes.

**Table 3. Crash Type and Severity at TH 169 SB Ramps/Owatonna Street at Riverfront Drive**

Crash Type	Possible Injury	Property Damage	Total
Rear End	2	3	5
Left Turn	1	2	3
Ran off Road	-	2	2
Sideswipe Passing	-	2	2
Sideswipe Opposing	-	1	1
Right Angle	-	1	1
Head On	-	1	1
Right Turn	-	1	1

At the intersections of Riverfront Drive with Sibley Street, Poplar Street/Mankato West High School, and Marshall Street there were six or less reported crashes between 2010 and 2014. At Sibley Street all of the crashes were right angle crashes with three being possible injury crashes and three property damage only crashes. At both Riverfront Drive at Poplar Street/Mankato West High School and Marshall Street there was one possible injury crash and the rest were property damage only crashes. There were no crashes reported at the intersections of Riverfront Drive with Woodland Avenue or the TH 169 NB Ramps. The intersection crash rate worksheets are included in **Appendix B**.

### Segment Crashes

A crash analysis was also completed along each of the segments to analyze of non-intersection related crashes along the corridor from 2010 to 2014. **Table 4** below shows the types and severity of crashes





along Segment 1. Crashes due to people driving off the road were the most common with one resulting in a non-incapacitating injury, one in a rear end and three property damage only crashes. There were also three rear end crashes, one head on crash and two sideswipe passing crashes that were all property damage only.

**Table 4. Crash Type and Severity of Segment 1 Corridor Crashes**

<b>Crash Type</b>	<b>Non-Incapacitating Injury</b>	<b>Possible Injury</b>	<b>Property Damage</b>
Ran off Road	1	1	3
Rear End	-	-	3
Head On	-	-	1
Sideswipe Passing	-	-	2

### **Existing Operational Analysis**

A level of service (LOS) analysis of the peak hours was completed using the existing turning movement counts in SimTraffic. The LOS results are based on average delay per vehicle as calculated by the 2010 Highway Capacity Manual (HCM), which defines the level of service, based on control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. Intersections and each intersection approach are given a ranking from 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. **Table 5** includes the results of the existing traffic analysis for Segment 1.





**Table 5 - Existing (2016) Traffic Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay- LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Woodland Ave at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	2	A	7	A	SBT	SBT	7	35
	PM	2	A	8	A	NBT/SBT	WBT	5	48
Sibley St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	4	A	17	C	NBL	WBL/T	35	116
	PM	6	A	24	C	NBL	WBL/T	55	207
TH 169 S Ramp-Owatonna St at Riverfront Dr <i>Signalized Intersection</i>	AM	29	C	38	D	SBL	SBL/T	233	588
	PM	25	C	39	D	SBL	SBL/T	191	382
TH 169 N Ramp at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	19	C	130	F	NBR	NBR	172	419
	PM	7	A	22	C	NBR	WBT	100	263
Poplar St-West Mankato H.S. at Riverfront Dr <i>Signalized Intersection</i>	AM	45	D	154	F	NBL	WBT/R	308	759
	PM	22	C	55	D	NBT	WBT/R	220	547
Stoltzman Rd at Riverfront Dr <i>Signalized Intersection</i>	AM	24	C	71	E	NBT	NBT	249	458
	PM	28	C	86	F	NBT	NBT	289	445
Marshall St at Riverfront Dr <i>Signalized Intersection</i>	AM	4	A	25	C	NBL	EBT	34	128
	PM	7	A	36	D	NBL	NBL	82	167

\*Delay in seconds per vehicle

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

\*\*\*Limiting Movement is the highest delay approach.

#### AM Peak Hour

- Intersection delay is acceptable with LOS D or better for all of the intersections.
- The limiting movement operates with LOS F at the following intersections:
  - TH 169 N Ramp at Riverfront Drive
  - Poplar Street-West Mankato High School at Riverfront Drive
- The limiting movement operates with LOS E at the intersection of Stoltzman Road at Riverfront Drive.
- Queue Lengths
  - TH 169 S Ramps/Owatonna Street at Riverfront Drive
    - Southbound average queue extends beyond channelized turn lanes
    - Eastbound through maximum queue extends beyond channelized left turn lane
  - TH 169 N Ramps at Riverfront Drive
    - Northbound maximum queue is approximately 17 vehicles long
  - Poplar Street-West Mankato High School at Riverfront Drive
    - Westbound though maximum queue extends beyond channelized left turn lane
    - Eastbound though maximum queue extends beyond channelized left turn lane
    - Northbound maximum queue is approximately 20 vehicles long
  - Stoltzman Road at Riverfront Drive
    - Eastbound though maximum queue extends beyond channelized right turn lane
    - Westbound though maximum queue extends beyond channelized turn lanes
    - Northbound average queue extends beyond channelized left turn lane

#### PM Peak Hour

- Intersection delay is acceptable with LOS C or better at all of the intersections.
- The limiting movement operates with LOS F at the intersection of Stoltzman Road at Riverfront Drive.





- Queue Lengths
  - TH 169 S Ramps/Owatonna Street at Riverfront Drive
    - Southbound average queue extends beyond channelized turn lanes
    - Eastbound through maximum queue extends beyond channelized left turn lane
  - Poplar Street-West Mankato High School at Riverfront Drive
    - Westbound through maximum queue extends beyond channelized left turn lane
    - Eastbound through maximum queue extends beyond channelized left turn lane
  - Stoltzman Road at Riverfront Drive
    - Eastbound through maximum queue extends beyond channelized right turn lane
    - Westbound through maximum queue extends beyond channelized turn lanes
    - Northbound average queue extends beyond channelized left turn lane
    - Southbound maximum queue extends beyond channelized turn lanes

Tables C1 and C2 in Appendix C show the existing delay and queue lengths for each movement at all of the intersections in Segment 1.

### ***Segment 2 –Sibley Parkway to Veterans Memorial Bridge***

#### **Existing Conditions**

The intersections along Riverfront Drive in Segment 2 that were analyzed include Sibley Parkway, Poplar Street/Warren Street, Minnesota Street/Cherry Street, and Main Street. Riverfront Drive is a four lane divided roadway from the Sibley Parkway to Veterans Memorial Bridge. All intersections with Riverfront Drive are signalized with dedicated left turn lanes along Riverfront Drive. Along Riverfront Drive there are dedicated right turn lanes for northbound traffic at Main Street, southbound traffic at Minnesota Street, and southbound traffic at Sibley Parkway.

The speed limit along Riverfront Drive and all side streets is 30 MPH. Riverfront Drive, Main Street, Cherry Street and Warren Street are classified as Minor Arterials. Poplar Street is classified as a Major Collector. Minnesota Street and Sibley Parkway are classified as Local roadways.

#### **Safety Analysis**

Table 6 shows the critical index at each intersection analyzed in Segment 2.

**Table 6. Intersection Crash Indices**

<b>Intersection</b>	<b>Total Crash Critical Index</b>	<b>Fatal &amp; Serious Injury Crash Critical Index</b>
Sibley Parkway at Riverfront Drive	0.04	0
Poplar Street/Warren Street at Riverfront Drive	0.83	0
Minnesota Street/Cherry Street at Riverfront Drive	0.51	0
Main Street at Riverfront Drive	0.21	0

All intersections have a critical index less than one showing that they are operating within the normal range.

Table 7 summarizes the crashes reported at the intersection of Poplar Street/Warren Street at Riverfront Drive from 2010 to 2014.





**Table 7. Crash Type and Severity at Poplar Street/Warren Street at Riverfront Drive**

Crash Type	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Rear End	2	3	11	16
Right Angle	-	2	4	6
Left Turn	-	2	3	5
Sideswipe Passing	1	-	3	4
Right Turn	1	-	1	2
Pedestrian	1	-	-	1
Sideswipe Opposing	-	-	1	1

There were a total of 35 crashes reported at the intersection of Poplar Street/Warren Street at Riverfront Drive with rear end crashes being the most common type of crash at this intersection. Two of the rear end crashes were non-incapacitating injury crashes, three were possible injury crashes and eleven were property damage only crashes. Right angle crashes were the second most common crash at the intersection. There was one non-incapacitating injury pedestrian crashes reported between 2010 and 2014.

**Table 8** summarizes the crashes reported at the intersection of Minnesota Street/Cherry Street at Riverfront Drive from 2010 to 2014.

**Table 8. Crash Type and Severity at Minnesota Street/Cherry Street at Riverfront Drive**

Crash Type	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Rear End	2	2	3	7
Right Angle	-	-	5	5
Left Turn	-	1	3	4
Pedestrian	-	2	-	2
Head On	-	-	2	2
Sideswipe Opposing	-	1	-	1
Sideswipe Passing	-	-	1	1

There were a total of 22 crashes reported at the intersection of Minnesota Street/Cherry Street at Riverfront Drive. **Table 8** shows that rear end crashes are the most common type of crash at this intersection. Two of the rear end crashes were non-incapacitating injury crashes, two were possible injury crashes and three were property damage only crashes. Right angle crashes were the second most common crash at the intersection. There were two possible injury pedestrian crashes reported between 2010 and 2014.

At the intersection of Riverfront Drive at Sibley Parkway there was one right angle possible injury crash reported between 2010 and 2014. At the intersection of Riverfront Drive at Main Street there were nine reported crashes. Five of the crashes were rear ends with one being a non-incapacitating injury crash and four property damage only crashes. The other four crashes were property damage only crashes. The intersection crash rate worksheets are included in **Appendix B**.

### Segment Crashes

Between 2010 and 2014 there was only one reported non-intersection related crash along Segment 2. It was a property damage only crash from a vehicle that ran off the road.





## Existing Operational Analysis

**Table 9** includes the results of the existing traffic analysis for Segment 2.

**Table 9 - Existing (2016) Traffic Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay- LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Sibley Parkway at Riverfront Dr <i>Signalized Intersection</i>	AM	2	A	27	C	SBL	WBT	5	56
	PM	4	A	39	D	EBL	WBT	40	128
Warren St-Poplar St at Riverfront Dr <i>Signalized Intersection</i>	AM	9	A	29	C	WBL	NBT/R	72	166
	PM	15	B	45	D	WBL	SBT/R	91	243
Cherry St-Minnesota St at Riverfront Dr <i>Signalized Intersection</i>	AM	8	A	28	C	WBT	NBT/R	66	199
	PM	15	B	35	D	WBT	WBL/T	148	281
Main St at Riverfront Dr <i>Signalized Intersection</i>	AM	8	A	41	D	NBT	WBL/T	54	123
	PM	12	B	31	C	NBT	NBT	87	205

\*Delay in seconds per vehicle

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

\*\*\*Limiting Movement is the highest delay approach.

### AM Peak Hour

- Intersection delay is acceptable with LOS A for all of the intersections.
- The limiting movement operates with LOS D or better for all intersections.
- Queue Lengths
  - Cherry Street/Minnesota Street at Riverfront Drive
    - Northbound maximum queue extends beyond channelized left turn lane

### PM Peak Hour

- Intersection delay is acceptable with LOS B or better for all of the intersections.
- The limiting movement operates with LOS D or better for all intersections.
- Queue Lengths
  - Warren Street/Poplar Street at Riverfront Drive
    - Southbound maximum queue extends beyond channelized left turn lane
  - Cherry Street/Minnesota Street at Riverfront Drive
    - Northbound maximum queue extends beyond channelized left turn lane
    - Southbound maximum queue extends beyond channelized turn lanes
  - Main Street at Riverfront Drive
    - Northbound maximum queue extends beyond channelized right turn lane

**Tables C3 and C4 in Appendix C** show the existing delay and queue lengths for each movement at all of the intersections in Segment 2.

## Segment 3 –Veterans Memorial Bridge to Madison Avenue

### Existing Conditions

The intersections along Riverfront Drive in Segment 3 that were analyzed include Plum Street, Elm Street, and Madison Avenue. All three intersections with Riverfront Drive are signalized. Between Madison Avenue and Plum Street Riverfront Drive is a four lane undivided roadway.





The speed limit along Riverfront Drive and all side streets is 30 MPH. Riverfront Drive and Madison Avenue are classified as Minor Arterials. Elm Street and Plum Street are classified as Local roadways.

### Safety Analysis

**Table 10** shows the critical index at each intersection analyzed in Segment 3.

**Table 10. Intersection Crash Indices**

Intersection	Critical Index	Fatal & Serious Injury Crash Critical Index
Plum Street at Riverfront Drive	0.08	0
Elm Street at Riverfront Drive	0.22	0
Madison Avenue at Riverfront Drive	0.68	0

All intersections have a critical index less than one showing that they are operating within the normal range.

**Table 11** below summarizes the crashes reported at the intersection of Elm Street at Riverfront Drive from 2010 to 2014.

**Table 11. Crash Type and Severity at Elm Street at Riverfront Drive**

Crash Type	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Rear End	-	3	1	4
Right Angle	-	2	-	2
Left Turn	1	-	-	1
Pedestrian	-	1	-	1
Sideswipe Passing	-	-	1	1

There were a total of 9 crashes reported at the intersection of Elm Street at Riverfront Drive. **Table 11** shows that rear end crashes are the most common type of crash at this intersection. There was one non-incapacitating injury left turning crashes and one possible injury pedestrian crash reported between 2010 and 2014.

**Table 12** summarizes the crashes reported at the intersection of Madison Avenue at Riverfront Drive from 2010 to 2014.

**Table 12. Crash Type and Severity at Madison Avenue at Riverfront Drive**

Crash Type	Non-Incapacitating Injury	Possible Injury	Property Damage	Total
Left Turn	1	5	16	22
Rear End	2	1	2	5
Right Angle	-	-	3	3
Pedestrian	-	1	-	1
Right Turn	-	-	1	1
Sideswipe Opposing	-	1	-	1





There were a total of 33 crashes reported at the intersection of Madison Avenue at Riverfront Drive. **Table 12** shows that left turning crashes are the most common type of crash at this intersection. 20 of the 22 left turning crashes were caused by traffic along Riverfront Drive. There was one possible injury pedestrian crash reported between 2010 and 2014.

At the intersection of Plum Street at Riverfront Drive there were two left turn crashes and one sideswipe passing crash. All three crashes were property damage only. The intersection crash rate worksheets are included in **Appendix B**.

### Segment Crashes

**Table 13** below shows the types and severity of crashes along Segment 3. Rear end crashes were the most common with two resulting in possible injury crashes and one property damage only crash. There were also two pedestrian possible injury crashes, one ran off road property damage only crash and one sideswipe passing crashes that resulted in a non-incapacitating injury. Both of the pedestrian crashes were located near Rock Street.

**Table 13. Crash Type and Severity of Segment 3 Corridor Crashes**

Crash Type	Non-Incapacitating Injury	Possible Injury	Property Damage
Rear End	-	2	1
Pedestrian	-	2	-
Ran off Road	-	-	1
Sideswipe Passing	1	-	-

### Existing Operational Analysis

**Table 14** includes the results of the existing traffic analysis for Segment 3.

**Table 14 - Existing (2016) Traffic Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay- LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Plum St at Riverfront Dr <i>Signalized Intersection</i>	AM	3	A	16	B	WBL	NBT	27	102
	PM	5	A	25	C	WBL	NBT	60	167
Elm St at Riverfront Dr <i>Signalized Intersection</i>	AM	3	A	10	A	NBL	NBL/T	26	156
	PM	5	A	19	B	SBL	NBL	41	138
Madison Ave at Riverfront Dr <i>Signalized Intersection</i>	AM	10	A	31	C	NBT	NBT/R	73	264
	PM	14	B	36	D	NBT	NBT/R	115	303

\*Delay in seconds per vehicle

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

\*\*\*Limiting Movement is the highest delay approach.

#### AM Peak Hour

- Intersection delay is acceptable with LOS A for all of the intersections.
- The limiting movement operates with LOS C or better for all intersections.
- Queue Lengths
  - Madison Avenue at Riverfront Drive





- Northbound average queue extends beyond channelized right turn lane
- Southbound maximum queue extends beyond channelized left turn lane

#### *PM Peak Hour*

- Intersection delay is acceptable with LOS B or better for all of the intersections.
- The limiting movement operates with LOS D or better for all intersections.
- Queue Lengths
  - Madison Avenue at Riverfront Drive
    - Northbound average queue extends beyond channelized right turn lane
    - Southbound maximum queue extends beyond channelized left turn lane

**Tables C5 and C6 in Appendix C** show the existing delay and queue lengths for each movement at all of the intersections in Segment 3.

#### ***Segment 4 –Madison Avenue to TH 14***

##### **Existing Conditions**

The intersections along Riverfront Drive in Segment 4 that were analyzed include Lafayette Street, May Street, and both TH 14 Ramps. 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 are side-street stop controlled with Riverfront Drive having the right of way.

The speed limit along Riverfront Drive is 45 MPH from north of the TH 14 Westbound Ramp to Good Counsel Drive. From Good Counsel Drive to Ann Street the speed limit is 35 MPH and from Ann Street on the speed limit is 30 MPH. The speed limit along the side streets intersection Riverfront Drive is 30 MPH. TH 14 is classified as a Principal Arterial Freeway Expressway. Riverfront Drive is classified as a Minor Arterial. May Street and Lafayette Street are classified as Local roadways.

##### **Safety Analysis**

**Table 15** shows the critical index at each intersection analyzed in Segment 3.

**Table 15. Intersection Crash Indices**

Intersection	Total Crash Critical Index	Fatal & Serious Injury Crash Critical Index
Lafayette Street at Riverfront Drive	1.04	0
May Street at Riverfront Drive	0.32	0
TH 14 EB Ramp at Riverfront Drive	0.47	0
TH 14 WB Ramp at Riverfront Drive	0.58	0

The critical index for the intersection of Lafayette Street at Riverfront Drive was found to be 1.04 which shows that this intersection is experiencing a higher than usual number of crashes compared to similar intersections statewide. All other intersections have a critical index less than one showing that they are operating within the normal range.

**Table 16** below summarizes the crashes reported at the intersection of Lafayette Street at Riverfront Drive from 2010 to 2014.





**Table 16. Crash Type and Severity at Lafayette Street at Riverfront Drive**

Crash Type	Possible Injury	Property Damage	Total
Right Angle	2	3	5
Rear End	1	3	4
Ran off Road	1	3	4
Left Turn	1	-	1
Sideswipe Passing	-	1	1

There were a total of 15 crashes reported at the intersection of Lafayette Street at Riverfront Drive. **Table 16** shows that right angle crashes are the most common type of crash at this intersection.

At the intersection of the May Street at Riverfront Drive there were four reported crashes between 2010 and 2014. Two of the crashes were vehicles who ran off the road and resulted in a possible injury crash. One was a possible injury rear end crash and one was a right angle crash that was property damage only. At the intersection of the TH 14 EB Ramp at Riverfront Drive there were six reported crashes between 2010 and 2014. Of the six crashes, five were rear end crashes and one was a right angle crash. At the intersection of the TH 14 WB Ramp at Riverfront Drive there were also six reported crashes between 2010 and 2014. Of the six crashes, four were rear end crashes, one was a right angle crash, and one was a sideswipe passing crash. The intersection crash rate worksheets are included in **Appendix B**.

### Segment Crashes

**Table 17** below shows the types and severity of crashes along Segment 4. There were three rear end crashes with one resulting in a possible injury crash and two property damage only crashes. There were also three sideswipe passing crashes that were all property damage only crashes.

**Table 17. Crash Type and Severity of Segment 4 Corridor Crashes**

Crash Type	Possible Injury	Property Damage
Rear End	1	2
Sideswipe Passing	-	3

### Existing Operational Analysis

**Table 18** includes the results of the existing traffic analysis for Segment 4.





**Table 18 - Existing (2016) Traffic Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay- LOS**		Limiting Movement***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft)
Lafayette St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	3	A	24	C	EBL	NBL	41	145
	PM	4	A	41	E	EBL	EBR	60	151
May St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	1	A	11	B	WBL	WBL/R	20	49
	PM	2	A	13	B	WBL	WBL/R	29	71
TH 14 S Ramp at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	3	A	13	B	EBL	EBR	62	161
	PM	3	A	15	C	EBL	EBL	59	144
TH 14 N Ramp at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	6	A	36	E	WBL	WBL/T	71	194
	PM	8	A	56	F	WBL	WBL/T	107	296

\*Delay in seconds per vehicle

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

\*\*\*Limiting Movement is the highest delay approach.

#### AM Peak Hour

- Intersection delay is acceptable with LOS A for all of the intersections.
- The limiting movement operates with LOS E at the intersection of TH 14 N Ramps at Riverfront Drive and LOS C or better the other intersections in Segment 4.

#### PM Peak Hour

- Intersection delay is acceptable with LOS A for all of the intersections.
- The limiting movement operates with LOS E at the intersection of Lafayette St at Riverfront Drive, LOS F at the intersection of TH 14 N Ramps at Riverfront Drive and LOS C or better the other intersections.
- Queue Lengths
  - TH 14 N Ramps at Riverfront Drive
    - Westbound shared left-thru maximum queue blocks the right turn lane.

**Tables C7 and C8 in Appendix C** show the existing delay and queue lengths for each movement at all of the intersections in Segment 4.

### Summary

A summary of the major crash and operational issues along each segment are summarized below.

#### Segment 1

The intersection of Riverfront Drive at Stoltzman Road is experiencing a higher than usual number of crashes compared to similar intersection statewide. There were a total of 56 reported crashes over the five year period analyzed with 23 of the crashes rear end crashes. Most of the rear end crashes were likely caused by confusion with the protected-permitted shared thru-left turn lane. The limiting movements at the intersections of TH 169 N Ramp and Poplar Street/West Mankato High School at Riverfront Drive have failing LOS during the AM peak hour. The limiting movement at the intersection of Stoltzman Road at Riverfront Drive has failing LOS during the PM peak hour. The intersections of TH 169 S Ramp/Owatonna Street, TH 169 N Ramp, Poplar Street/West Mankato High School and Stoltzman Road with Riverfront Drive have queues that extend beyond channelized turn lanes during both peak hours.





### **Segment 2**

All intersections in Segment 2 are operating within the normal range when compared to similar intersections statewide for the five year period analyzed. Operations are acceptable during both peak hours at the intersections in Segment 2.

### **Segment 3**

All intersections in Segment 3 are operating within the normal range when compared to similar intersections statewide for the five year period analyzed. Delay is acceptable during both peak hours at the intersections in Segment 3. The intersection of Madison Avenue at Riverfront Drive has queues that extend beyond the channelized turn lanes during both peak hours.

### **Segment 4**

The intersection of Riverfront Drive at Lafayette Street is experiencing a higher than usual number of crashes compared to similar intersection statewide. There were a total of 15 reported crashes over the five year period analyzed with right angle crashes being the most common. The limiting movement at the intersection of TH 14 N Ramp at Riverfront Drive has failing LOS during the PM peak hour. Queues extend beyond the channelized right turn lane during the PM peak hour at the intersection of TH 14 N Ramp at Riverfront Drive.





## Appendix A – Turning Movement Counts



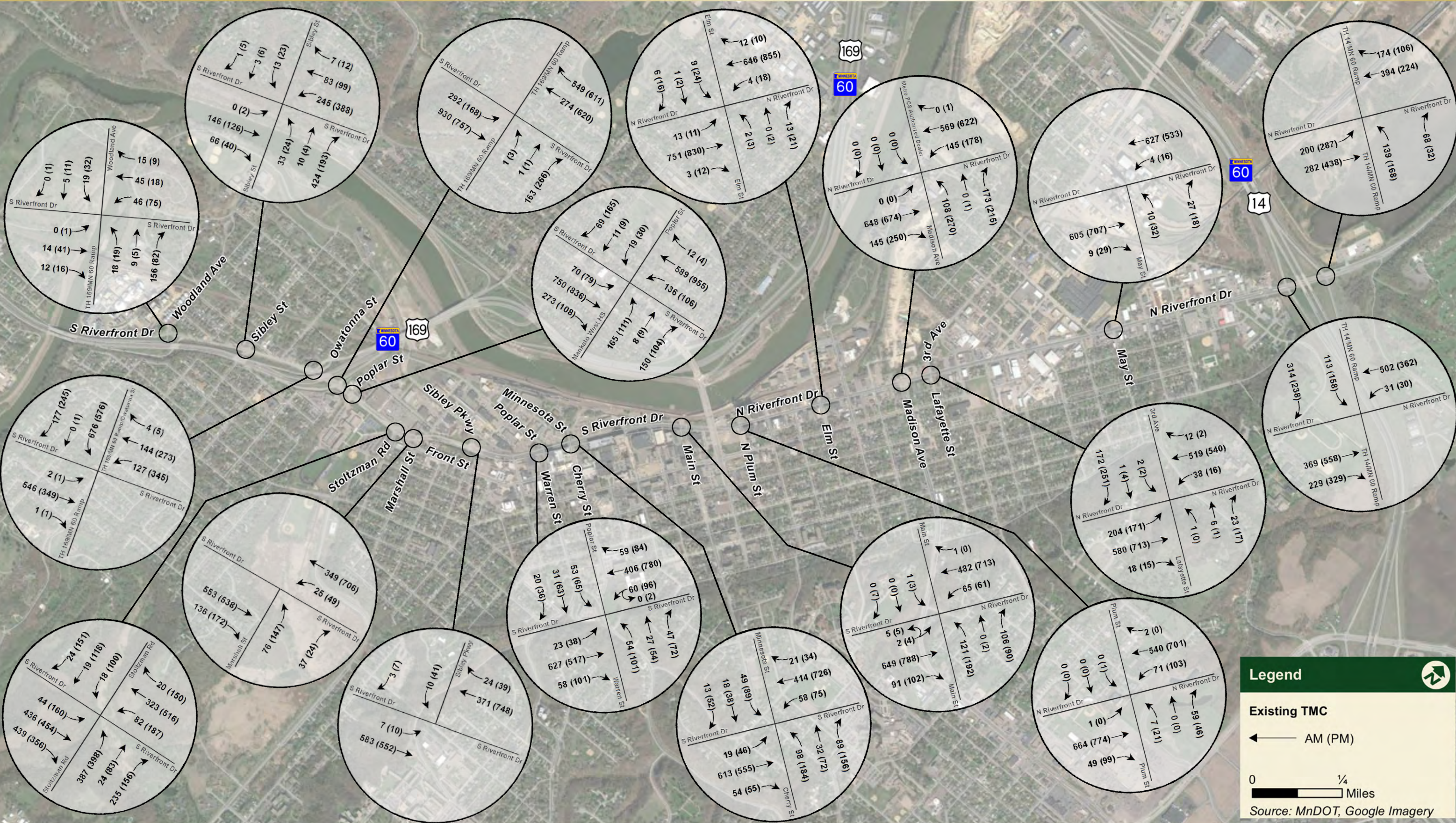


# Riverfront Drive Corridor Study

Mankato/North Mankato Area Planning Organization

# Figure 1: Existing Turning Movement Counts

August 2016







## Appendix B – Intersection Crash Rate Worksheets



# Intersection Safety Screening

Intersection: Riverfront Drive at Sibley Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	3
Property Damage	3
Total Crashes	6

Intersection Characteristics	
Entering Volume	9,300
Traffic Control	Thru / stop
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$53,040

## Statewide Comparison

Urban Thru / Stop

Total Crash Rate	
Observed	0.35
Critical Rate	0.48
<b>Critical Index</b>	<b>0.72</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	4.98
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.35 per MEV; this is 28% below the critical rate. Based on similar statewide intersections, an additional 3 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at Southbound TH 60/169 Ramp Terminal



*Crash Data, 2010-2014*

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	3
Property Damage	12
Total Crashes	15

Intersection Characteristics	
Entering Volume	16,900
Traffic Control	Signals
Environment	Urban
Speed Limit	30 mph

*Annual crash cost = \$66,360*

## Statewide Comparison

*Signals: low volume, low speed*

Total Crash Rate	
Observed	0.49
Critical Rate	0.91
<b>Critical Index</b>	<b>0.54</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.86
<b>Critical Index</b>	<b>0.00</b>

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

*The observed total crash rate for this period is 0.49 per MEV; this is 46% below the critical rate. Based on similar statewide intersections, an additional 13 crashes over the five years would indicate this intersection operates outside the normal range.*

*The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.*



# Intersection Safety Screening

Intersection: Riverfront Drive at Poplar Street/Mankato West High School Entrance



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	1
Property Damage	5
Total Crashes	6

Intersection Characteristics	
Entering Volume	24,100
Traffic Control	Signals
Environment	Urban
Speed Limit	30 mph

Annual crash cost = \$23,600

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.14
Critical Rate	1.02
<b>Critical Index</b>	<b>0.14</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.47
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.14 per MEV; this is 86% below the critical rate. Based on similar statewide intersections, an additional 39 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at Stoltzman Road



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	1
Non-incapacitating Injury	1
Possible Injury	13
Property Damage	41
Total Crashes	56

Intersection Characteristics	
Entering Volume	27,000
Traffic Control	Signals
Environment	Urban
Speed Limit	30 mph

Annual crash cost = \$413,280

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	1.14
Critical Rate	1.00
<b>Critical Index</b>	<b>1.14</b>

Fatal & Serious Injury Crash Rate	
Observed	2.03
Critical Rate	3.26
<b>Critical Index</b>	<b>0.62</b>

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

The observed total crash rate for this period is 1.14 per MEV; this is 1.1 times the critical rate. If crashes were reduced by 6 over five years, this intersection would perform within normal range.

The observed fatal and serious injury crash rate for this period is 2.03 per 100 MEV; this is 38% below the critical rate. The intersection operates within the normal range.

# Intersection Safety Screening

Intersection: Riverfront Drive at Marshall Street



Crash Data, 2012-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	1
Property Damage	4
Total Crashes	5

Intersection Characteristics	
Entering Volume	16,300
Traffic Control	Signals
Environment	Urban
Speed Limit	30 mph

Annual crash cost = \$36,867

## Statewide Comparison

Signals: low volume, low speed

Total Crash Rate	
Observed	0.28
Critical Rate	1.02
<b>Critical Index</b>	<b>0.27</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	5.26
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.28 per MEV; this is 73% below the critical rate. Based on similar statewide intersections, an additional 14 crashes over the three years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at Sibley Parkway



Crash Data, 2010-2014

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

Intersection Characteristics	
Entering Volume	14,300
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$1,480

## Statewide Comparison

Signals: low volume, low speed

Total Crash Rate	
Observed	0.04
Critical Rate	0.94
<b>Critical Index</b>	<b>0.04</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	4.30
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.04 per MEV; this is 96% below the critical rate. Based on similar statewide intersections, an additional 24 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

# Intersection Safety Screening

Intersection: Riverfront Drive at Poplar Street/Warren Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	5
Possible Injury	7
Property Damage	23
Total Crashes	35

Intersection Characteristics	
Entering Volume	22,400
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$307,440

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.86
Critical Rate	1.04
<b>Critical Index</b>	<b>0.83</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.62
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.86 per MEV; this is 17% below the critical rate. Based on similar statewide intersections, an additional 8 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at Cherry Street/Minnesota Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	2
Possible Injury	6
Property Damage	14
Total Crashes	22

Intersection Characteristics	
Entering Volume	23,300
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$181,920

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.52
Critical Rate	1.03
<b>Critical Index</b>	<b>0.51</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.54
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.52 per MEV; this is 49% below the critical rate. Based on similar statewide intersections, an additional 22 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

# Intersection Safety Screening

Intersection: Riverfront Drive at Main Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	1
Possible Injury	0
Property Damage	8
Total Crashes	9

Intersection Characteristics	
Entering Volume	22,400
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$43,840

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.22
Critical Rate	1.04
<b>Critical Index</b>	<b>0.21</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.62
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.22 per MEV; this is 79% below the critical rate. Based on similar statewide intersections, an additional 34 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at Plum Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	0
Property Damage	3
Total Crashes	3

Intersection Characteristics	
Entering Volume	20,800
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$4,440

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.08
Critical Rate	1.05
<b>Critical Index</b>	<b>0.08</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.78
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.08 per MEV; this is 92% below the critical rate. Based on similar statewide intersections, an additional 37 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

# Intersection Safety Screening

Intersection: Riverfront Drive at Elm Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	1
Possible Injury	6
Property Damage	2
Total Crashes	9

Intersection Characteristics	
Entering Volume	21,400
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$132,160

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.23
Critical Rate	1.04
<b>Critical Index</b>	<b>0.22</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.72
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.23 per MEV; this is 78% below the critical rate. Based on similar statewide intersections, an additional 32 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at Madison Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	3
Possible Injury	8
Property Damage	22
Total Crashes	33

Intersection Characteristics	
Entering Volume	26,200
Traffic Control	Signals
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$258,160

## Statewide Comparison

Signals: high volume, low speed

Total Crash Rate	
Observed	0.69
Critical Rate	1.01
<b>Critical Index</b>	<b>0.68</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.32
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.69 per MEV; this is 32% below the critical rate. Based on similar statewide intersections, an additional 16 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

# Intersection Safety Screening

Intersection: Riverfront Drive at Lafayette Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	5
Property Damage	10
Total Crashes	15

Intersection Characteristics	
Entering Volume	21,200
Traffic Control	Thru / stop
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$95,800

## Statewide Comparison

Urban Thru / Stop

Total Crash Rate	
Observed	0.39
Critical Rate	0.38
<b>Critical Index</b>	<b>1.04</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	2.74
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.39 per MEV; this is 1.0 times the critical rate. If crashes were reduced by 0 over five years, this intersection would perform within normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at May Street



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	3
Property Damage	1
Total Crashes	4

Intersection Characteristics	
Entering Volume	16,600
Traffic Control	Thru / stop
Environment	Suburban
Speed Limit	30 mph

Annual crash cost = \$50,080

## Statewide Comparison

Urban Thru / Stop

Total Crash Rate	
Observed	0.13
Critical Rate	0.40
<b>Critical Index</b>	<b>0.32</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.25
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.13 per MEV; this is 68% below the critical rate. Based on similar statewide intersections, an additional 9 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.

# Intersection Safety Screening

Intersection: Riverfront Drive at TH 14 South Ramp



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	2
Property Damage	4
Total Crashes	6

Intersection Characteristics	
Entering Volume	16,900
Traffic Control	Thru / stop
Environment	Urban
Speed Limit	45 mph

Annual crash cost = \$38,320

## Statewide Comparison

Urban Thru / Stop

Total Crash Rate	
Observed	0.19
Critical Rate	0.40
<b>Critical Index</b>	<b>0.47</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.21
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.19 per MEV; this is 53% below the critical rate. Based on similar statewide intersections, an additional 7 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



# Intersection Safety Screening

Intersection: Riverfront Drive at TH 14 North Ramp



Crash Data, 2010-2014

Crashes by Crash Severity	
Fatal	0
Incapacitating Injury	0
Non-incapacitating Injury	0
Possible Injury	1
Property Damage	5
Total Crashes	6

Intersection Characteristics	
Entering Volume	13,100
Traffic Control	Thru / stop
Environment	Urban
Speed Limit	45 mph

Annual crash cost = \$23,600

## Statewide Comparison

Urban Thru / Stop

Total Crash Rate	
Observed	0.25
Critical Rate	0.43
<b>Critical Index</b>	<b>0.58</b>

Fatal & Serious Injury Crash Rate	
Observed	0.00
Critical Rate	3.85
<b>Critical Index</b>	<b>0.00</b>

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

The observed total crash rate for this period is 0.25 per MEV; this is 42% below the critical rate. Based on similar statewide intersections, an additional 5 crashes over the five years would indicate this intersection operates outside the normal range.

The observed fatal and serious injury crash rate for this period is 0.00 per 100 MEV; this is 100% below the critical rate. The intersection operates within the normal range.



## Appendix C – Existing Traffic Operations



**Table C1. 2016 Traffic Operational Analysis - Segment 1 Existing Geometry**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Movement Delay (sec/veh)																							
				EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
Woodland Ave at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	2	A	0	A	0	A	0	A	2	A	1	A	1	A	5	A	7	A	2	A	5	A	6	A	0	A
	PM	2	A	1	A	0	A	0	A	2	A	1	A	1	A	5	A	8	A	2	A	6	A	7	A	3	A
Sibley St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	4	A	0	A	4	A	3	A	7	A	2	A	1	A	15	C	17	C	3	A	8	A	7	A	3	A
	PM	6	A	7	A	4	A	4	A	7	A	2	A	1	A	20	C	24	C	2	A	17	C	16	C	3	A
TH 169 S Ramps-Owatonna St at Riverfront Dr <i>Signalized Intersection</i>	AM	29	C	9	A	28	C	0	A	23	C	15	B	2	A	-	-	-	-	38	D	0	A	11	B		
	PM	25	C	0	A	27	C	0	A	22	C	12	B	2	A	-	-	-	-	39	D	0	A	9	A		
TH 169 N Ramps at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	19	C	6	A	7	A	-	-	-	-	12	B	18	C	37	E	22	C	130	F	-	-	-	-		
	PM	7	A	11	B	3	A	-	-	-	-	3	A	7	A	0	A	17	C	22	C	-	-	-	-		
Poplar St-West Mankato H.S. at Riverfront Dr <i>Signalized Intersection</i>	AM	45	D	12	B	17	B	18	B	62	E	54	D	62	E	154	F	150	F	89	F	52	D	69	E	55	D
	PM	22	C	20	C	13	B	10	B	53	D	22	C	20	B	55	D	46	D	16	B	48	D	47	D	31	C
Stoltzman Rd at Riverfront Dr <i>Signalized Intersection</i>	AM	24	C	14	B	15	B	9	A	15	B	15	B	4	A	66	E	71	E	10	A	37	D	57	E	12	B
	PM	28	C	29	C	24	C	9	A	25	C	24	C	6	A	65	E	86	F	8	A	28	C	36	D	11	B
Marshall St at Riverfront Dr <i>Signalized Intersection</i>	AM	4	A	-	-	3	A	2	A	8	A	2	A	-	-	25	C	-	-	1	A	-	-	-	-	-	
	PM	7	A	-	-	4	A	3	A	11	B	5	A	-	-	36	D	-	-	1	A	-	-	-	-	-	

\*Delay in seconds per vehicle

**Table C2. 2016 Peak Hour Queues by Movement - Segment 1 Existing Geometry**

Traffic Control Scenario	Peak Hour	Queue Lengths																							
		EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Woodland Ave at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	-	-	0	5	-	-	-	-	2	27	-	-	-	-	2	7	-	-	-	-	7	35	-	-
	PM	-	-	0	0	-	-	-	-	5	48	-	-	-	-	7	18	-	-	-	-	24	45	-	-
Sibley St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	-	-	4	28	-	-	35	116	35	116	0	11	18	53	18	53	0	0	-	-	10	29	-	-
	PM	-	-	3	36	-	-	55	207	55	207	0	10	13	46	13	46	0	0	-	-	15	61	-	-
TH 169 S Ramps-Owatonna St at Riverfront Dr <i>Signalized Intersection</i>	AM	0	7	138	304	138	304	56	143	36	102	16	76	-	-	-	-	-	-	233	588	233	588	61	272
	PM	0	0	89	182	89	182	147	280	64	156	29	113	-	-	-	-	-	-	191	382	191	382	57	222
TH 169 N Ramps at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	47	127	94	289	-	-	-	-	160	272	141	205	22	205	22	205	172	419	-	-	-	-	-	-
	PM	49	125	17	105	-	-	-	-	100	263	109	205	2	22	2	22	91	249	-	-	-	-	-	-
Poplar St-West Mankato H.S. at Riverfront Dr <i>Signalized Intersection</i>	AM	33	130	196	245	196	245	90	222	308	759	308	759	269	507	269	507	87	150	-	-	73	240	-	-
	PM	47	138	166	234	166	234	75	197	220	547	220	547	94	337	94	337	58	150	-	-	105	257	-	-
Stoltzman Rd at Riverfront Dr <i>Signalized Intersection</i>	AM	22	100	72	184	69	187	29	126	60	215	8	122	249	458	249	458	77	359	10	56	15	101	10	60
	PM	76	174	97	208	71	173	87	200	135	263	49	194	289	445	289	445	87	294	49	114	72	222	48	120
Marshall St at Riverfront Dr <i>Signalized Intersection</i>	AM	-	-	34	128	15	52	12	43	13	60	-	-	36	98	-	-	0	0	-	-	-	-	-	-
	PM	-	-	35	125	24	116	20	67	49	143	-	-	82	167	-	-	0	0	-	-	-	-	-	-

**Table C3. 2016 Traffic Operational Analysis - Segment 2 Existing Geometry**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Movement Delay (sec/veh)																							
				EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
Sibley Parkway at Riverfront Dr <i>Signalized Intersection</i>	AM	2	A	23	C	2	A	-	-	2	A	2	A	-	-	-	-	-	-	27	C	-	-	5	A		
	PM	4	A	39	D	3	A	-	-	4	A	4	A	-	-	-	-	-	-	25	C	-	-	7	A		
Warren St-Poplar St at Riverfront Dr <i>Signalized Intersection</i>	AM	9	A	25	C	29	C	10	A	29	C	27	C	8	A	7	A	7	A	5	A	11	B	6	A	4	A
	PM	15	B	45	D	40	D	27	C	42	D	37	D	17	B	16	B	11	B	9	A	14	B	14	B	9	A
Cherry St-Minnesota St at Riverfront Dr <i>Signalized Intersection</i>	AM	8	A	25	C	26	C	6	A	28	C	28	C	2	A	8	A	7	A	6	A	16	B	5	A	3	A
	PM	15	B	30	C	27	C	11	B	34	C	35	D	2	A	18	B	11	B	8	A	22	C	13	B	6	A
Main St at Riverfront Dr <i>Signalized Intersection</i>	AM	8	A	41	D	0	A	0	A	33	C	0	A	6	A	14	B	7	A	6	A	9	A	5	A	0	A
	PM	12	B	11	B	0	A	0	A	31	C	0	A	8	A	11	B	11	B	7	A	12	B	7	A	0	A

\*Delay in seconds per vehicle

**Table C4. 2016 Peak Hour Queues by Movement - Segment 2 Existing Geometry**

Traffic Control Scenario	Peak Hour	Queue Lengths																							
		EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Sibley Parkway at Riverfront Dr <i>Signalized Intersection</i>	AM	5	27	5	40	-	-	-	-	5	56	2	28	-	-	-	-	-	-	8	40	-	-	4	28
	PM	11	47	18	74	-	-	-	-	40	128	7	75	-	-	-	-	-	-	28	79	-	-	6	28
Warren St-Poplar St at Riverfront Dr <i>Signalized Intersection</i>	AM	-	-	56	129	-	-	-	-	35	106	-	-	11	48	72	166	72	166	25	65	48	140	48	140
	PM	-	-	109	214	-	-	-	-	68	155	-	-	20	76	85	232	85	232	43	160	91	243	91	243
Cherry St-Minnesota St at Riverfront Dr <i>Signalized Intersection</i>	AM	25	74	12	43	12	43	71	188	71	188	3	44	10	35	66	199	66	199	26	77	33	109	4	34
	PM	48	123	38	145	38	145	148	281	148	281	9	68	25	78	90	194	90	194	38	117	107	243	10	89
Main St at Riverfront Dr <i>Signalized Intersection</i>	AM	-	-	1	27	-	-	54	123	54	123	34	80	4	32	42	122	14	59	21	69	26	108	23	105
	PM	-	-	2	29	-	-	80	168	80	168	38	101	4	32	87	205	21	68	21	54	56	140	50	147



**Table C5. 2016 Traffic Operational Analysis - Segment 3 Existing Geometry**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Movement Delay (sec/veh)																							
				EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
Plum St at Riverfront Dr <i>Signalized Intersection</i>	AM	3	A	0	A	0	A	0	A	16	B	0	A	7	A	2	A	4	A	3	A	6	A	2	A	1	A
	PM	5	A	0	A	0	A	0	A	25	C	0	A	7	A	0	A	6	A	4	A	8	A	3	A	0	A
Elm St at Riverfront Dr <i>Signalized Intersection</i>	AM	3	A	9	A	7	A	4	A	9	A	0	A	5	A	9	A	3	A	4	A	10	A	3	A	2	A
	PM	5	A	15	B	19	B	6	A	13	B	0	A	5	A	11	B	5	A	4	A	11	B	5	A	4	A
Madison Ave at Riverfront Dr <i>Signalized Intersection</i>	AM	10	A	0	A	0	A	0	A	31	C	0	A	10	B	0	A	11	B	7	A	12	B	4	A	0	A
	PM	14	B	0	A	0	A	0	A	36	D	0	A	10	B	0	A	16	B	8	A	15	B	6	A	0	A

\*Delay in seconds per vehicle

**Table C6. 2016 Peak Hour Queues by Movement - Segment 3 Existing Geometry**

Traffic Control Scenario	Peak Hour	Queue Lengths																							
		EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Plum St at Riverfront Dr <i>Signalized Intersection</i>	AM	-		0	0	-		5	29	5	29	28	69	0	5	27	102	0	0	16	54	8	60	10	73
	PM	-		0	0	-		16	55	16	55	25	63	0	0	60	167	2	38	24	71	20	80	20	80
Elm St at Riverfront Dr <i>Signalized Intersection</i>	AM	-		13	31	-		-		11	38	-		26	156	26	156	23	144	20	84	16	84	16	84
	PM	-		22	70	-		-		18	36	-		41	138	45	130	45	130	47	127	47	127	37	95
Madison Ave at Riverfront Dr <i>Signalized Intersection</i>	AM	-		0	0	-		52	107	19	120	55	155	0	0	73	264	73	264	44	112	34	114	34	114
	PM	-		0	0	-		113	192	75	172	63	150	0	0	115	303	115	303	57	138	59	157	59	157

**Table C7. 2016 Traffic Operational Analysis - Segment 4 Existing Geometry**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Movement Delay (sec/veh)																							
				EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
Lafayette St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	3	A	12	B	0	A	8	A	0	A	24	C	5	A	7	A	2	A	2	A	7	A	2	A	1	A
	PM	4	A	33	D	41	E	8	A	0	A	7	A	6	A	7	A	2	A	2	A	6	A	2	A	1	A
May St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	1	A	-	-	-	-	-	-	11	B	-	-	4	A	-	-	2	A	2	A	1	A	0	A	-	-
	PM	2	A	-	-	-	-	-	-	13	B	-	-	5	A	-	-	2	A	2	A	4	A	0	A	-	-
TH 14 S Ramps at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	3	A	13	B	0	A	7	A	-	-	-	-	-	-	-	-	1	A	1	A	0	A	1	A	-	-
	PM	3	A	15	C	0	A	5	A	-	-	-	-	-	-	-	-	1	A	2	A	0	A	1	A	-	-
TH 14 N Ramps at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	6	A	-	-	-	-	-	-	36	E	0	A	5	A	7	A	1	A	-	-	-	-	1	A	1	A
	PM	8	A	-	-	-	-	-	-	56	F	0	A	5	A	4	A	1	A	-	-	-	-	1	A	1	A

\*Delay in seconds per vehicle

**Table C8. 2016 Peak Hour Queues by Movement - Segment 4 Existing Geometry**

Traffic Control Scenario	Peak Hour	Queue Lengths																							
		EBL		EBT		EBR		WBL		WBT		WBR		NBL		NBT		NBR		SBL		SBT		SBR	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Lafayette St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	2	24	2	24	50	142	-	-	19	49	-	-	41	145	1	8	1	8	12	41	0	14	0	14
	PM	6	47	6	47	60	151	-	-	14	45	-	-	36	104	0	4	0	4	4	27	0	0	0	0
May St at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	-	-	-	-	-	-	20	49	-	-	20	49	-	-	0	0	0	0	1	15	0	0	-	-
	PM	-	-	-	-	-	-	29	71	-	-	29	71	-	-	0	0	0	0	6	29	0	0	-	-
TH 14 S Ramps at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	47	104	0	0	62	161	-	-	-	-	-	-	-	-	0	0	0	4	0	0	0	0	-	-
	PM	59	144	0	0	47	95	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	-	-
TH 14 N Ramps at Riverfront Dr <i>Side-Street Stop Controlled</i>	AM	-	-	-	-	-	-	71	194	71	194	25	68	34	135	0	0	-	-	-	-	0	1	0	6
	PM	-	-	-	-	-	-	107	296	107	296	23	107	30	92	0	0	-	-	-	-	0	0	0	4



## Appendix F: Environmental Screening

## Environmental Screening Riverfront Drive Corridor Study

Social, Economic or Environmental Topic	Considerations	Existing Conditions
<b>Water Resources</b>	Effects to water resources. Wetlands that may be impacted by partial or complete filling, excavation or drainage, or severance of water supply	<ul style="list-style-type: none"> <li>The study area falls within the Mankato Watershed of the Minnesota River Basin. The Minnesota and Blue Earth Rivers are identified as impaired streams near the study area.</li> <li>The study area falls within the Mankato Watershed of the Minnesota River Basin. The Minnesota and Blue Earth Rivers are identified as Public Waters Inventory (PWI) watercourses near the study area over which the MnDNR Waters has regulatory jurisdiction.</li> <li>Other than the Minnesota River, only two small wetlands are located near the northeastern terminus of the study area near the Highway 14 interchange (see Figure 1).</li> </ul>
<b>Floodplains</b>	Development encroachments on the 100-year floodplain	<ul style="list-style-type: none"> <li>The Corridor falls within the 500-year floodplain of the Minnesota River in the section between the junctions of Washington St. and Riverfront as well as Stoltzman Rd. and Riverfront.</li> <li>A small section of roadway surrounding the junction of Stoltzman and Riverfront falls within the 500-year floodplain. (See Figure 1).</li> <li>A small section of roadway between TH 169/60 and Woodland Avenue is located in a 500-year floodplain.</li> </ul>
<b>Surface Water Drainage/Water Quality</b>	Effects of drainage modifications. Run-off effects to protected lakes and watercourses	Drainage infrastructure alterations and impervious surface additions may affect the bodies of water. To be considered in future environmental review.*
<b>Wildlife, Threatened and Endangered Species</b>	<ul style="list-style-type: none"> <li>Unique habitats</li> <li>Widened section</li> <li>Federal and state listed threatened and endangered species</li> </ul>	<ul style="list-style-type: none"> <li>MnDNR Natural Heritage Information System (NHIS) data suggests threatened, endangered, and rare species do not exist within the immediate study area. However, species have been identified within close proximity along the shore of the Minnesota River near the Veteran's Memorial Bridge. These locations are separated from the study area by a concrete levee wall and roughly 200 feet of land and the species are aquatic. It is unlikely that roadway alternatives could effect these species.</li> <li>GIS Data delineating MNDNR, Division of Wildlife Management Areas (WMA) show that WMA's are non-existent within the study area.</li> </ul>
<b>Fisheries</b>	<ul style="list-style-type: none"> <li>Trout streams</li> <li>Fish migrations</li> <li>Spawning runs</li> <li>Unique habitats</li> </ul>	There are no designated trout streams within the study area.
<b>Vegetation</b>	<ul style="list-style-type: none"> <li>Native plant communities</li> <li>Landscape vegetation</li> <li>Functional vegetation</li> <li>High value vegetation</li> <li>Hazard trees</li> </ul>	<ul style="list-style-type: none"> <li>The study area is dominated by developed industrial and commercial uses with altered vegetation.</li> <li>To be considered in future environmental review.*</li> </ul>



## Environmental Screening Riverfront Drive Corridor Study

Social, Economic or Environmental Topic	Considerations	Existing Conditions
<b>Contaminated Properties</b>	Disturbance of contaminated properties may increase project cost	<ul style="list-style-type: none"> <li>Known history of contamination in the study area. MPCA "What's in My Neighborhood?" sites that are located within 150 feet of the corridor were selected as relevant and can be seen in Figure 2.</li> <li>More detailed investigations may be recommended for properties with existing/past land uses that may have used hazardous/chemical waste. To be considered in a future environmental review.*</li> </ul>
<b>Parks and Recreation Areas (Section 4f/6f Resources)</b>	<ul style="list-style-type: none"> <li>Parks and recreation areas</li> <li>Land and Water Conservation (LAWCON) funds</li> <li>Wildlife &amp; waterfowl refuges</li> <li>Historic sites</li> <li>Landscapes</li> <li>Highways</li> <li>Bridges</li> <li>Buildings &amp; districts</li> <li>Wildlife management areas</li> <li>School playgrounds</li> <li>Fairgrounds</li> <li>Public multiple-use land holdings</li> <li>Public golf courses</li> <li>Archaeological sites</li> <li>Wild &amp; scenic rivers</li> <li>Recreational bikeways and trails</li> </ul>	<ul style="list-style-type: none"> <li>The following properties may qualify as Section 4f and are adjacent to the corridor: <ul style="list-style-type: none"> <li>-Parks <ul style="list-style-type: none"> <li>Liberty Place</li> <li>Reconciliation Park</li> <li>Zonta Gardens</li> </ul> </li> <li>-Schools <ul style="list-style-type: none"> <li>Mankato West High School located at the junction of Stoltzman Rd. and Riverfront Dr.</li> </ul> </li> </ul> </li> <li>The following are LAWCON (Section 6f) properties and are adjacent to the corridor: <ul style="list-style-type: none"> <li>- Trails <ul style="list-style-type: none"> <li>The Minnesota River Trail</li> <li>The Sakatah Singing Hills Trail</li> <li>The Red Jacket Acquisition (Trail)</li> <li>The West Mankato Trail</li> </ul> </li> </ul> </li> <li>Any impacts to parks and recreational areas to be considered in a future environmental review*</li> </ul>
<b>Social and Community</b>	<ul style="list-style-type: none"> <li>Hospitals</li> <li>Schools</li> <li>Libraries</li> <li>Churches</li> <li>Government buildings</li> <li>Post offices</li> </ul>	<ul style="list-style-type: none"> <li>The Blue Earth County Library is located at the intersection of Riverfront Drive and Main Street on the northeast quadrant.</li> <li>The Mankato West High School is located at the intersection of Riverfront Drive and Stoltzman Road in the southwest quadrant.</li> <li>The Mankato Department of Public Safety is located on the southeast quadrant of the intersection of Riverfront Drive and Liberty Street.</li> </ul>

## Environmental Screening Riverfront Drive Corridor Study

Social, Economic or Environmental Topic	Considerations	Existing Conditions
<b>Cultural Resources</b>	Buildings that exceed 50 years in age, archaeological sites, and Traditional Cultural Properties.	<ul style="list-style-type: none"> <li>• Old Town Mankato is located along Riverfront Drive and contains several buildings that exceed 50 years and were inventoried by the State Historic Preservation Office (SHPO).</li> <li>• The entire east side of the block between Washington Street and Spring Street is designated as a historic district.</li> <li>• The Stahl House is on the National Register of Historic Places. This is located at the southwest quadrant of the junction of Washington Street and N. Riverfront Drive.</li> <li>• The Mankato Union Depot building located on Riverfront Drive at the junction of Main Street. This building was built in 1896 and is on the National Register of Historic Places.</li> <li>• The William Irving House is located at the junction of Highway 169/60 and Riverfront Drive and is on the National Registry of Historic Places.</li> <li>• Reconciliation Park is located at the junction of Riverfront Drive and Main Street and is a memorial for the 38 Dakota Sioux Native Americans that were hanged publicly.</li> <li>• Liberty Place is a small park featuring art and seating at the junction of Riverfront Dr. and Marshall Street.</li> <li>• Known Historic properties that will require consideration are located within and near the study area. Depending upon the nature of future improvements, coordination with the State Historic Preservation Office or other agencies may be necessary to determine the presence of other properties and the appropriate treatment for sites that are currently listed on the National Register of Historic Places.</li> </ul>
<b>Pedestrian &amp; Bicycle Facilities</b>	Bicycle and pedestrian safety	<ul style="list-style-type: none"> <li>• Sidewalks currently exist along both sides of Riverfront Dr. for most of the study area.</li> <li>• Only one area lacks sidewalks and is located in front of the City Center Parking Ramp at the junction of Cherry St. and Riverfront Dr.</li> <li>• To be considered in future environmental review.*</li> </ul>



## Environmental Screening Riverfront Drive Corridor Study

Social, Economic or Environmental Topic	Considerations	Existing Conditions
Environmental Justice	Disproportionate effects to low-income or minority populations	<ul style="list-style-type: none"> <li>• Populations surrounding US 14/N Riverfront Drive exhibit 8.1 - 12% nonwhite with 14.1 - 25 % below the poverty line.</li> <li>• Populations surrounding S. Riverfront Drive at Sibley Street and TH 169 exhibit 8.1 - 12% nonwhite with 9.1 - 14% below the poverty line.</li> <li>• Populations within the segment from the Veteran's Memorial Bridge to TH 169 exhibit 8.1 - 12% nonwhite with 25.1% to 40% below the poverty line.</li> <li>• From TH 14 to Vine Street and on the northwest from Vine Street to Main Street, 17.64% of the population is over 60 years old.</li> <li>• From Vine Street to the Veteran's Memorial Bridge (Southeast side of Riverfront), 9.11% of the population is over 60 years old.</li> <li>• From Main Street to TH 169, 13.63% of the population is over 60 years old.</li> <li>• From TH 169 through the rest of the study area, 19.68% of the population is over 60 years old.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Impacts to air quality</li> <li>• Mobile source air toxins</li> </ul>	The need for an air quality analysis, conformity determination, or Mobile Source Air Toxics analysis will be determined once individual improvement projects are identified.*
Traffic Noise	<ul style="list-style-type: none"> <li>• Comply with federal noise criteria and Minnesota Noise Standards</li> <li>• Identify sensitive noise receptors</li> </ul>	The need for a noise analysis will be determined once individual improvement projects are identified.*
Construction Noise	<ul style="list-style-type: none"> <li>• Comply with federal noise criteria and Minnesota Noise Standards</li> <li>• Identify sensitive noise receptors</li> </ul>	Construction noise will be further considered in a future environmental review as projects are implemented.* City ordinances can regulate the daytime hours of construction activities in order to minimize potential impacts to adjacent areas.
Utilities	Impacts to utilities may incur additional project costs.	<ul style="list-style-type: none"> <li>• Improvements along Riverfront Dr. may require minor utility relocations as well as create temporary service disruptions at time of construction.</li> <li>• To be considered in future environmental review.*</li> </ul>
Erosion	<ul style="list-style-type: none"> <li>• Erosional effects</li> <li>• Water pollution</li> </ul>	To be considered in a future environmental review.*
Right of Way and Relocation	Effects of right of way acquisition	Additional right-of-way may need to be acquired for future improvement projects. Temporary easements and changes to local roadway and property access points are also likely. Any impacts resulting from right-of-way acquisition, relocation or access changes will be identified in a future environmental review.*
Visual Quality	<ul style="list-style-type: none"> <li>• Scenic intrusion</li> <li>• Bridges</li> <li>• Lighting</li> <li>• Railings</li> <li>• Grading, Trails</li> <li>• Walls</li> <li>• Fencing</li> <li>• Vegetation Modifications</li> </ul>	The proposed project is not anticipated to result in adverse visual impacts.
Farmland and Soils	<ul style="list-style-type: none"> <li>• Minimization of effects to agricultural land</li> <li>• Properties of soils</li> <li>• Suitability for roadway construction</li> </ul>	<ul style="list-style-type: none"> <li>• Soil suitability of farmland impacts will be addressed in a future environmental review.*</li> </ul>

\*Additional study considerations will be pursued when improvements are identified.





# Riverfront Drive Corridor Study

Mankato/North Mankato Area Planning Organization

## Figure 1: Water Resources

July, 2016

