Riverfront Drive Intersection Improvements Study Report

Mankato/North Mankato Area Planning Organization (MAPO)

November 7, 2023

Submitted by:
Bolton & Menk, Inc.
1960 Premier Drive
Mankato, MN 56001-5900
P: (507) 625-4171
F: (507) 625-4177

BOLTON & MENK

Real People. Real Solutions.

Table of Contents

Figures

Tables

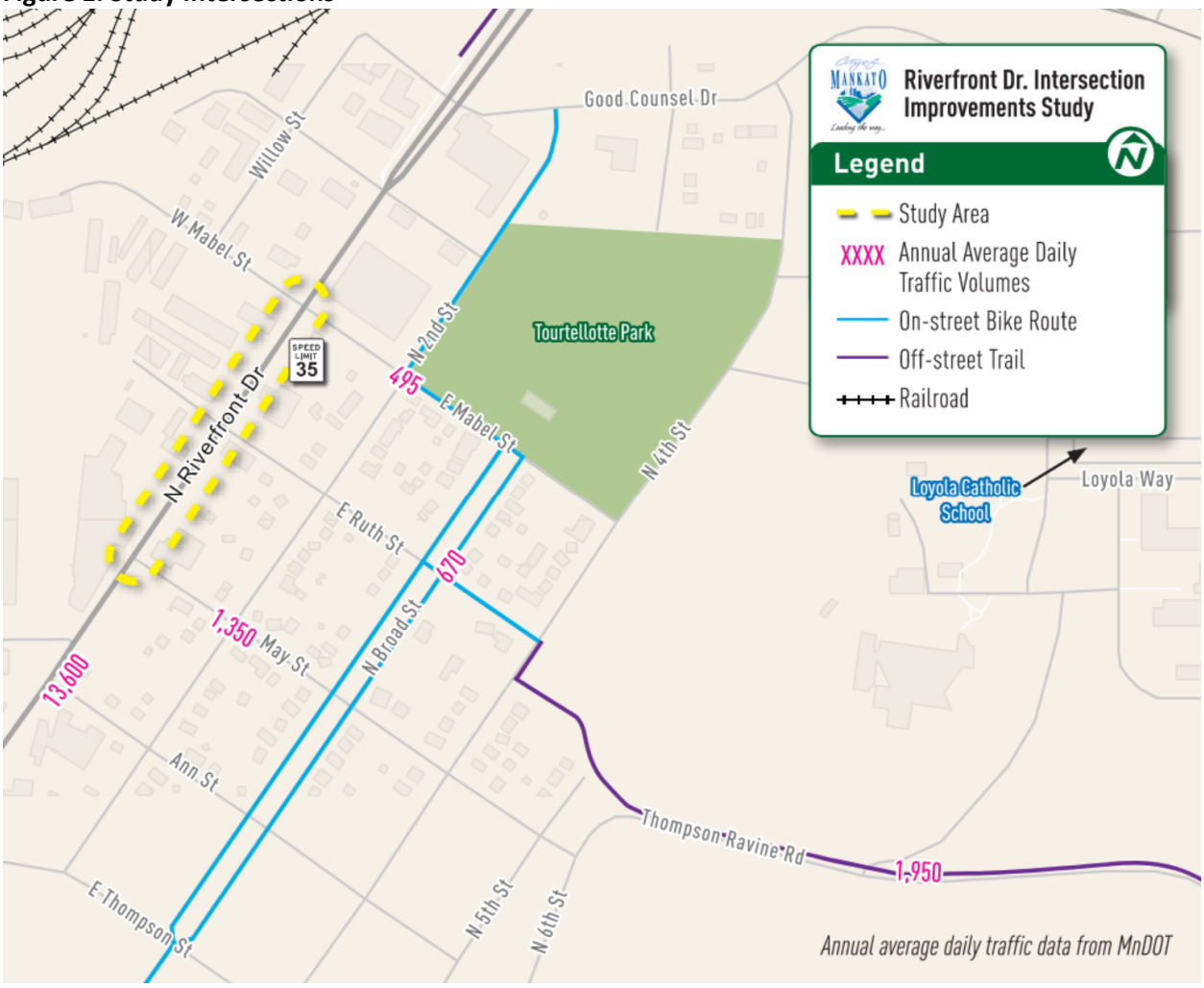
Exhibits

Appendix

I. Introduction

This report summarizes the analysis completed and recommendations determined as a part of the Riverfront Drive Intersections Improvements project. The project area consists of three intersections; Riverfront Dr at Mabel St, Riverfront Dr at Ruth St, and Riverfront Dr at Mabel St. The three study intersections are shown in **Figure 1**, below along with the existing annual average daily traffic volumes (AADT) and existing multi-modal facilities.

Figure 1. Study Intersections



II. Existing Condition

Riverfront Drive provides access to downtown Mankato as well as U.S. Highway 14 and U.S. Highway 169. The road serves a variety of land uses including industrial, commercial, residential, and institutional as well as the Central Business District of the community.

The section of Riverfront Drive between May and Mabel streets features business and industrial uses—particularly on the west side of the road—and a residential neighborhood on the east side.

Riverfront Dr is classified as a Principal Arterial, May St is classified as a Minor Collector, and Ruth St and Mabel St are all local streets. The average daily traffic (ADT) on Riverfront Dr is 13,600, per a 2019 count

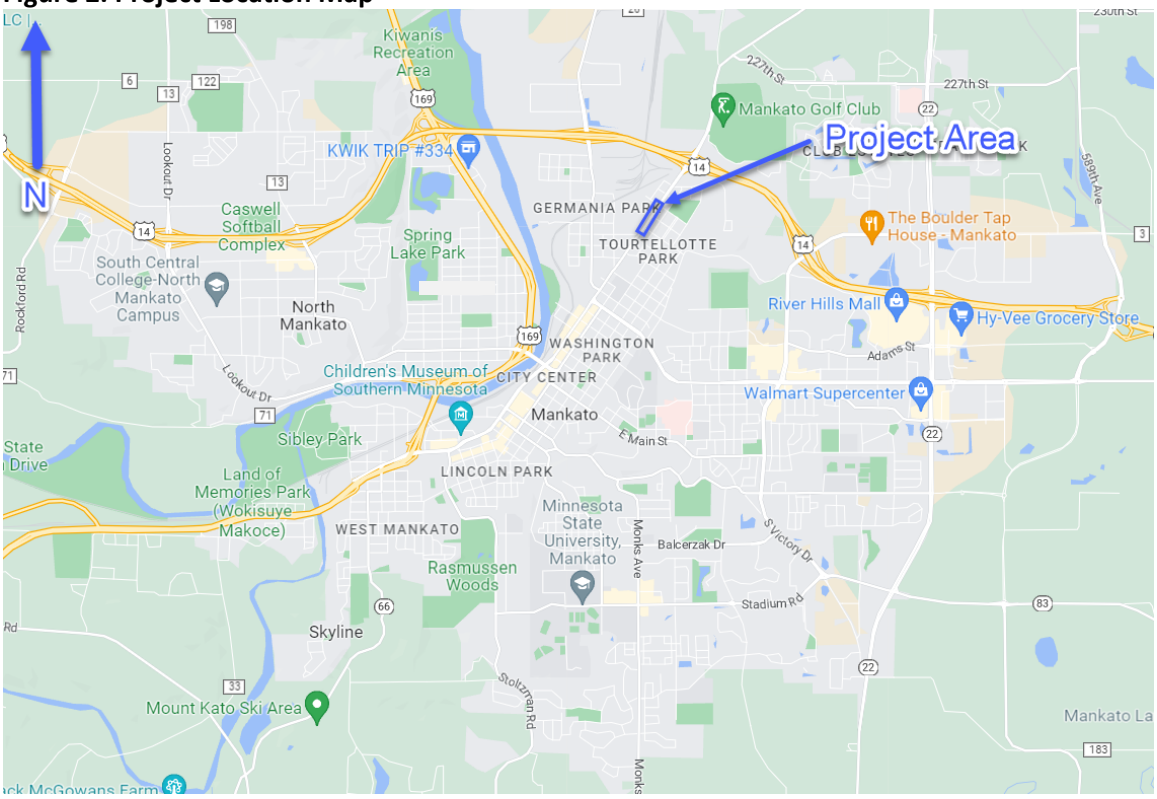
on the MnDOT Traffic Mapping Application. According to a 2018 MnDOT count, May St has an ADT 1,350 and Mabel St has an ADT of 495. There is no ADT listed for Ruth St.

Riverfront Dr has a posted speed limit of 35 mph, and each cross street has a speed limit of 30 mph. Riverfront Dr is a four-lane roadway that includes a center two-way left-turn lane between Ruth St and May St. None of the side streets have turn lanes at their respective intersection with Riverfront Dr.

Riverfront Dr runs northwest – southeast in this portion of Mankato. For the purposes of this report, Riverfront Dr is considered to run north-south, while May St, Ruth St, and Mabel St are considered to run east-west.

The location of the project area within Mankato can be seen in **Figure 2**, below.

Figure 2. Project Location Map



This area of Riverfront Drive was studied in 2017 when MAPO partnered with the City of Mankato, Blue Earth County, and MnDOT on the Riverfront Drive Corridor Study to identify a long-term vision for multimodal improvements on Riverfront Drive between Woodland Avenue and Highway 14. The 2017 study noted issues with speed and multimodal crossings. The study identified improvement options that modify access to Riverfront Dr in the project area, but no recommended single alternative was determined, rather, it was recommended that alternatives be revisited when reconstruction of Riverfront Dr is more imminent. A Literature Summary documenting previous planning studies, demographics and trends, and study area/transportation characteristics is included in **Appendix A**. Additionally, an Environmental Justice screening is also included in **Appendix A**.

III. Safety Analysis

A. Crash Analysis

Crash data was collected for the study area using MnCMAT2. Ten years (2013-2022) of crash data was reviewed for fatal and serious injury crashes along with crashes that involved a pedestrian or bicyclist. There was one serious injury crash which occurred in 2016. It was a head on crash involving a northbound through and southbound through vehicle along Riverfront Dr near Ruth St. A medical issue was listed as a contributing factor. There were no fatal crashes in the last ten years and no crashes that involved a pedestrian or bicyclist.

All crash data from the last five years (2018-2022) was also reviewed in the study area. There were three crashes reported in the last five years. All three crashes occurred at the intersection of Riverfront Dr at May St and all three involved a vehicle turning left onto Riverfront Dr from May St. Two of them collided with a vehicle traveling northbound on Riverfront Dr, and one collided with a vehicle traveling southbound. All three crashes resulted in property damage only.

Additionally, data from the last five years (2018-2022) was provided by the Mankato Department of Public Safety and compared to the data from MnCMAT2. In addition to the crashes already reported in MnCMAT2 the following additional crashes were noted:

- Two rear end crashes at the intersection of Mabel St and Riverfront Dr.
- A rear end crash at the intersection of Ruth St and Riverfront Dr. However, the report mentioned there was no evidence of damage.
- One additional crash at May St, however, no additional information on the crash was recorded.

A comparison of the crash rate and the critical rate was completed to determine if 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 indicates that the intersection is operating within the normal range. The latest available statewide average crash rates are from 2020 and were used for comparison purposes. The crashes provided by the Mankato Department of Public Safety were assumed to be property damage only crashes since no detailed crash severity data was provided.

The total observed crash rate at the intersection of Riverfront Dr and May St was found to be 0.153 which is slightly above the average for similar intersections statewide (0.128). The total crash critical index of 0.46 shows that with three crashes in the last five years, the intersection overall is operating below the normal range compared to similar intersections. With only one or two crashes reported at Ruth St and Mabel St, the critical indices were also found to be less than one indicating the intersections are operating within the normal range. The crash worksheets can be found in **Appendix B**.

B. Sightline Review

A sightline review was completed at the intersection of May St and Riverfront Dr where the three right angle crashes were reported. It was noted that vehicles sitting at the stop sign along the westbound approach would not be able to see the full distance necessary to the north because of the location of the stop sign in relation to the building on the northeast corner. Vehicles can however creep out to see an appropriate distance, but this could be uncomfortable as there is no shoulder along the roadway to provide a buffer between oncoming traffic. **Exhibit 1** below shows the sightline issue.

Exhibit 1. Sightline at May St and Riverfront Dr (Looking North)

Other sightline concerns were also noted by residents and business owners during the public engagement process. **Exhibit 2** below shows how also along May St looking to the south sightlines are blocked while approaching the intersection due to the parked vehicles in the southeast corner of the intersection.

Exhibit 2. Sightline at May St and Riverfront Dr (Looking South)

Exhibit 3 shows how vehicles can see an appropriate distance once they are closer to the intersection.

Exhibit 3. Sightline at May St and Riverfront Dr (Looking South)

Residents and business owners also noted sightline concerns along the eastbound approach of Mabel St looking north because of the signage in the northwest corner of the intersection. This is shown in **Exhibit 4**. Similar to the other locations, vehicles can creep out to see an appropriate distance, but this could be uncomfortable as there is no shoulder along the roadway to provide a buffer between oncoming traffic.

Exhibit 4. Sightline at Mabel St and Riverfront Dr (Looking North)

IV. Data Collection

A. Traffic Counts

12-hour turning movement count data was collected on March 15th, 2023 at May St and Mabel St. The peak hours were found to be 7:15–8:15 AM and 3:45-4:45 PM. Peak hour counts were completed at Ruth St. The detailed count data is included in **Appendix C**.

B. Speed Data

Speed data was collected for the traffic along Riverfront Dr near Mabel St. The radar unit was mounted to collect data without any sort of display of speeds to the driver. The posted speed limit is 35 miles per hour (MPH) in both directions. Data was collected for a single weekday (Wednesday, March 15th, 2023).

The 85th percentile speed is the speed that 85% of drivers drive at or below on a particular stretch of roadway. The 10 MPH pace metric is the range of speed at which most cars are recorded traveling. **Table 1** summarizes the radar-collected data.

Table 1. Existing Speed Data

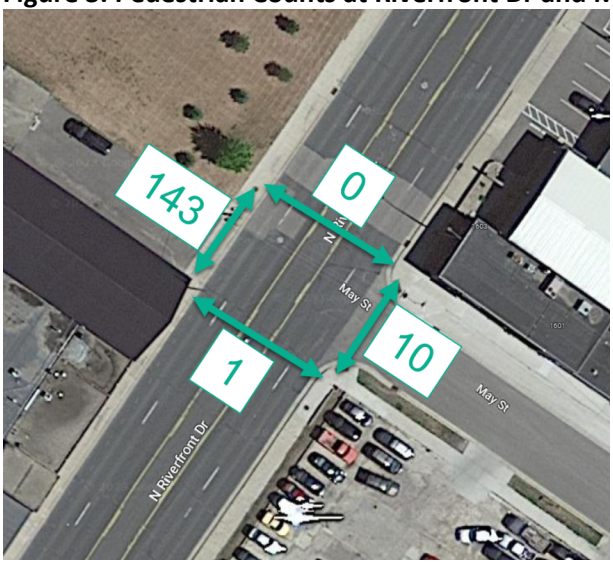
Location	Average Speed (MPH)	85th Percentile Speed (MPH)	10 MPH Pace	Existing Speed Limit (MPH)	Percent of Vehicles driving over the Speed Limit
Southbound Riverfront Dr	37	41	32-42	35	68%
Northbound Riverfront Dr	37	41	33-43	35	69%

Table 1 shows that 85% of drivers recorded were traveling at or below 41 mph along both directions of Riverfront Dr. The majority of drivers were travelling between 32 mph and 42 mph along southbound Riverfront Drive and between 33 MPH and 43 MPH along northbound Riverfront Dr. The average speed along both directions was found to be 37 mph. This concludes that most vehicles are traveling above the posted speed limit of 35 mph.

C. Pedestrian Count Data

Since the turning movement count data was collected in March before nicer weather, previous count data and StreetLight were used to analyze pedestrian patterns. A count at the intersection of Riverfront Dr and May St was completed for a previous project on May 17, 2016. This was a 13-hour count from 6:00 AM – 7:00 PM. **Figure 3** below shows the total number of pedestrians crossing each leg of the intersection during the 13-hour count.

Figure 3. Pedestrian Counts at Riverfront Dr and May St



In StreetLight a Zone Activity Analysis was completed to see which intersection of Mabel St, Ruth St, and May St has the most pedestrian activity. 2019 and 2021 volumes were analyzed for a typical weekday

(Tuesday – Thursday) between April and October. Both years showed May St having the most pedestrian. The volumes per day at the intersection overall (crossing any of the four legs of the intersection) are listed below.

- Mabel St: 271 pedestrians per day
- Rush St: 250 pedestrians per day
- May St: 296 pedestrians per day

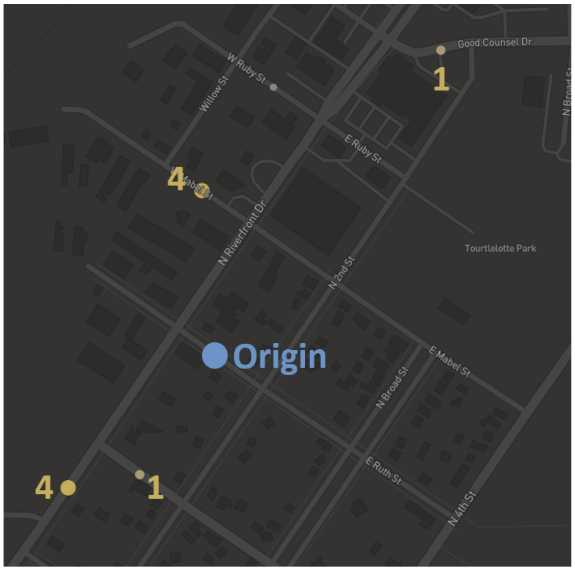
An origin-destination analysis was also completed in StreetLight. The zones analyzed are shown in **Figure 4**.

Figure 4. Origin-Destination Analysis Zones

Pedestrian origin-destination patterns were analyzed for a typical weekday (Tuesday – Thursday) between April and October in 2019. Pedestrians originating along May St, Ruth St, and Mabel St were analyzed. Of the pedestrians originating along May St, Ruth St, and Mabel St west of Riverfront Dr, most were destined for Riverfront Dr south of May St. Of the pedestrian traffic originating along Mabel St east of Riverfront Dr, most were destined for Mabel St west of Riverfront Dr. The snapshots below show origin-destination analysis.

Origin: May St east of Riverfront Dr

Origin: Ruth St east of Riverfront Dr



Origin: Mabel St west of Riverfront Dr

Origin: Mabel St east of Riverfront Dr

V. Warrant Analysis

A warrant analysis was completed analyzing the existing 2023 traffic volumes for the intersections of Riverfront Dr at May St and Riverfront Dr at Mabel St.

Traffic Control Signal Warrant Analysis

The MnMUTCD (chapter 4C) states that the investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the following traffic signal warrants:

- Warrant 1: Eight-Hour Vehicular Volume
- Warrant 2: Four-Hour Vehicular Volume
- Warrant 3: Peak Hour
- Warrant 4: Pedestrian Volume
- Warrant 5: School Crossing
- Warrant 6: Coordinated Signal System
- Warrant 7: Crash Experience
- Warrant 8: Roadway Network
- Warrant 9: Intersection Near a Grade Crossing

Minor street right turning traffic was included for the volume warrant analyses (warrants 1-3) as there are no minor street right turn lanes and the approach width is narrow so right turning vehicles may get stuck behind left or through vehicles. The results of the warrant analysis are detailed below.

- Mabel St:
  - Warrant 1: Eight-Hour Vehicular Volume – Not Met
    - No hours are met (eight required)
  - Warrant 2: Four-Hour Vehicular Volume – Not Met
    - No hours are met (four required)
  - Warrant 3: Peak Hour – Not Met
  - Warrant 4: Pedestrian Volume – Not Met
  - Warrant 5: School Crossing – Not Applicable
  - Warrant 6: Coordinated Signal System – Not Applicable
  - Warrant 7: Crash Experience – Not Met
  - Warrant 8: Roadway Network – Not Applicable
  - Warrant 9: Intersection Near a Grade Crossing – Not Applicable

- May St:
  - Warrant 1: Eight-Hour Vehicular Volume – Not Met
    - No hours are met (eight required)
  - Warrant 2: Four-Hour Vehicular Volume – Not Met
    - No hours are met (four required)
  - Warrant 3: Peak Hour – Not Met
  - Warrant 4: Pedestrian Volume – Not Met
  - Warrant 5: School Crossing – Not Applicable
  - Warrant 6: Coordinated Signal System – Not Applicable
  - Warrant 7: Crash Experience – Not Met
  - Warrant 8: Roadway Network – Not Met
  - Warrant 9: Intersection Near a Grade Crossing – Not Applicable

The traffic control signal warrant analysis concluded a signalized intersection is not warranted at either intersection with existing volumes. Additionally, an analysis was completed to see if warrants are met at

May St if Ruth St and Mabel St are restricted to right-in right-out movements, and therefore more volume would shifted to May St. The results are summarized below.

- May St (Right-In/Right-Out configuration at Ruth St and Mabel St):
    - No hours are met for warrant 1A, one hour is met for warrant 1B (eight required)
    - No hours are met for warrant 2 (four required)
    - No hours are met for warrant 3 (one required)

With a right-in right-out configuration at Ruth St and Mabel St there is still not enough volume to justify a signal at May St.

All-Way Stop Control Warrant Analysis

All-way stop control can be useful as a safety measure at intersections if safety concerns exist because of high traffic volumes in multiple directions or if there is an insufficient sight distance available to see conflicting traffic on an approach to an intersection. The MnMUTCD states that the need for an all-way stop control shall be considered if one of the following conditions is met:

- Criteria A: Where traffic control signals are justified, an all-way stop can be installed as an interim measure.
- Criteria B: Five or more crashes are reported in a 12-month period that are susceptible to correction by an all-way stop installation.
- Criteria C: Where:
    1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; and
    2. Where the combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour. but,
    3. If the 85th-percentile approach speed of the major street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.
- Criteria D: Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

Criteria A is not met with existing volumes for either intersection. Criteria B is not met; there have been three reported right angle crashes in a five-year period at the intersection of Riverfront Dr and May St. Criteria C is also not met with existing volumes at either intersection, including the reconfigured right-in right-out scenario with adjusted volumes at May St.

With existing traffic volumes, neither an all-way stop control or a signal is justified at the intersections of Riverfront Dr and Mabel St or Riverfront Dr and May St.

The detailed warrant analysis can be found in **Appendix D.**

VI. Traffic Operations

An operations analysis was completed for the AM and PM peak hours using the existing roadway conditions and 2023 volumes. The operational analysis results are described as a Level of Service (LOS) ranging from A to F. These letters serve to describe a range of operating conditions for different types of facilities. Levels of Service are calculated based on the Highway Capacity Manual 6th Edition, which base the level of service on control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. The control delay is modeled within the analysis software, Trafficware Synchro and SimTraffic. LOS D is commonly taken as an acceptable design year LOS.

The level of service and its associated intersection delay for a signalized and unsignalized intersection is presented below. The delay threshold for unsignalized intersections is lower compared to signalized intersections, which accounts for the fact that people expect a higher level of service when at a stop-controlled intersection. **Table 2** details the control delay thresholds for signalized and unsignalized intersections.

Table 2. Level of Service Criteria

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

Table 3 details the movement, approach, and intersection delay and LOS for each peak hour.

Table 3. Existing Conditions Operational Results

		AM Peak Hour					PM Peak Hour				
		Traffic Delay (sec/veh)					Traffic Delay (sec/veh)				
Intersection	Approach	Movement (Delay - LOS)			Approach (Delay - LOS)	Intersection (Delay - LOS)	Movement (Delay - LOS)			Approach (Delay - LOS)	Intersection (Delay - LOS)
		L	T	R			L	T	R		
Riverfront Dr & May St *Side Street Stop Controlled*	WB	16 - C	-	5 - A	9 - A	1 - A	19 - C	-	8 - A	15 - C	1 - A
	NB	-	0 - A	0 - A	0 - A		-	0 - A	0 - A	0 - A	
	SB	5 - A	0 - A	-	1 - A		5 - A	0 - A	-	1 - A	
Riverfront Dr & Ruth St *Side Street Stop Controlled*	EB	16 - C	-	4 - A	6 - A	1 - A	24 - C	-	3 - A	10 - B	0 - A
	WB	21 - C	-	4 - A	17 - C		24 - C	-	4 - A	18 - C	
	NB	5 - A	0 - A	-	1 - A		4 - A	0 - A	-	1 - A	
	SB	3 - A	0 - A	0 - A	1 - A		6 - A	0 - A	0 - A	1 - A	
Riverfront Dr & Mabel St *Side Street Stop Controlled*	EB	21 - C	-	3 - A	9 - A	1 - A	16 - C	-	3 - A	8 - A	1 - A
	WB	31 - D	-	12 - B	27 - D		17 - C	18 - C	5 - A	11 - B	
	NB	6 - A	0 - A	0 - A	1 - A		6 - A	0 - A	0 - A	1 - A	
	SB	5 - A	1 - A	0 - A	2 - A		6 - A	0 - A	0 - A	1 - A	

Table 3 shows that for each intersection, the overall intersection operates with LOS A during both peak hours with side street stop traffic control. The westbound left at Mabel St was found to operate with 31 seconds of delay on average per vehicle or LOS D during the AM peak hour. All other eastbound and westbound lefts were found to operate with LOS C during the peak hours. Video footage of the intersection was reviewed to calibrate the traffic modeling and confirm accurate operations. The video

footage confirmed the average wait time at Mabel St and Riverfront Dr of 31 seconds during the AM peak hour. The longest delay observed from the video footage was nearly 3 minutes, so while the average delay is considered acceptable, some vehicles may wait much longer.

An operational summary including modeled volumes and queues can be found in **Appendix E**.

VII. Public Engagement

The Mankato/North Mankato Planning Organization (MAPO) and City of Mankato held a business meeting/public open house on May 31, 2023 at Franklin Elementary School to gather community feedback on a quarter-mile section of Riverfront Drive between May Street and Mabel Street. Project representatives provided a formal presentation to area businesses and answered questions from the public as they reviewed large displays highlighting the history and existing conditions in the study area. Attendees made notes and comments on the study area map and comment cards. MAPO and the city promoted the event via Facebook, Twitter, Instagram, news release, and door-to-door delivery of flyers and door hangers.

There were a total of 27 attendees that signed in at the event. Most attendees live within a quarter mile of the study area. A total of 22 comments were received from participants.

The common themes and takeaways from the open house feedback and online comments are shown in **Exhibit 5**.

Exhibit 5. Public Feedback Common Themes and Takeaways

PEDESTRIAN AND BICYCLE SAFETY
Desire to add improved pedestrian and bicycle crossings, including medians on Riverfront Drive.

TURNS
Difficult to make a left turn at any of the intersections onto Riverfront Drive.

PARKING
Desire to add more street parking or adjust parking regulations.

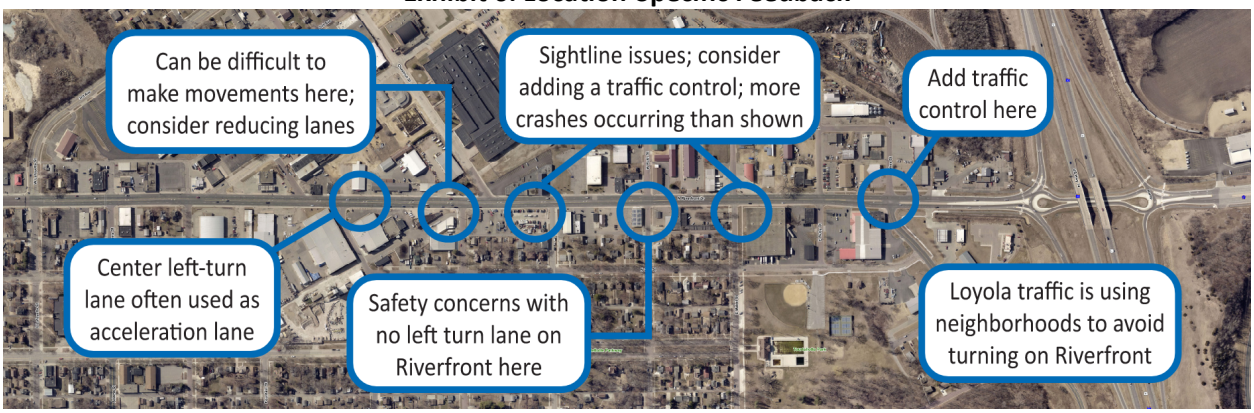
SIGHTLINE ISSUES
Sightline issues at multiple intersections along Riverfront Drive.

CRASHES
Consider introducing a lane reduction and reduce access points to help with speeding and crash issues.

EXPAND STUDY AREA
Consider Riverfront Drive lane reduction, traffic calming, on-street parking, shoulders and pedestrian crossing enhancements.

Some location specific feedback received is shown in **Exhibit 6** below.

Exhibit 6. Location-Specific Feedback



Overall, people were concerned with making left turns from the side streets onto Riverfront Dr and making a left from Riverfront Dr without a turn lane, sightline issues at May St and Mabel St, and pedestrian and bicycle safety – specifically crossing Riverfront Dr. Several attendees mentioned they use alternative routes to get to Riverfront Dr as they do not feel comfortable making a left turn onto Riverfront Dr. A one-pager is included in **Appendix F** summarizing the feedback and providing an overview of the open house.

VIII. Sensitivity Analysis

A sensitivity analysis was completed to determine how much of a volume increase would be needed to justify a signal at May St or Mabel St along Riverfront Dr. First, the recently completed traffic impact study for the proposed residential development at the School Sisters of Notre Dame parcel was reviewed. The proposed development is composed of the following housing types:

- 18 Senior Adult Housing units
- 10 Single-Family Detached Housing units
- 250 Multifamily Housing (Mid-Rise) units

The proposed development is estimated to generate 118 trips in the AM peak with 28 entering and 90 exiting the development, 121 trips in the PM peak with 74 entering and 47 exiting, and 1,378 daily trips. The peak hour trips added with the proposed redevelopment that are anticipated to use Mabel St and May St are summarized in **Table 4**.

Table 4. Peak Hour Trips Added from Proposed Redevelopment

Peak Hour	Mabel St		May St	
	Entering	Exiting	Entering	Exiting
AM	3	9	1	4
PM	9	5	3	2

Next, since several attendees mentioned they use alternative routes to get to Riverfront Dr as they do not feel comfortable making a left turn onto Riverfront Dr, StreetLight was used to analyze the number of vehicles using alternative routes. An origin-destination analysis with middle filter was completed analyzing weekday (Tuesday – Thursday) data throughout all of 2019. The analysis showed that of the traffic passing through the area east of Riverfront Dr near Mabel St and May St destined for Riverfront Dr south of Madison Ave, 81% use May St, 11% use Broad St to Madison Ave, 4% use Ruth St, and 4% use Mabel St. This equates to approximately 35 lefts per weekday that use Broad St a day according to the StreetLight data.

A top routes analysis was completed to confirm traffic patterns found for the origin-destination analysis. **Exhibit 7** summarizes the findings. The blue zone was the origin zone that people were analyzed passing through and the most common routes exiting the origin zone are shown in yellow. The darker and wider yellow paths show the more popular routes, and the lighter and narrower yellow paths show the less popular routes. This analysis confirms of the traffic destined for southbound Riverfront Dr, most vehicles passing through the area east of the study limits use May St. The analysis was completed analyzing weekday (Tuesday – Thursday) data throughout all of 2019.

Exhibit 7. Top Routes Analysis

A warrant analysis was completed to see if a signal would be justified at May St adding the additional trips from the proposed residential development that are anticipated to use May St and Mabel St along with the 35 vehicles per day that were found to use Broad St today to get to southbound Riverfront Dr that would likely divert if a signal were installed. The peak hour trips from the proposed redevelopment were converted into hourly trips throughout the day based on the existing hourly breakdown of vehicles at the intersection for the warrant analysis. Additionally, Ruth St and Mabel St were assumed to be restricted to right-in right-out accesses as this would result in more traffic using May St.

The warrant analysis showed with the added trips none of the volume warrants are met. No hours are met for warrant 1A, 2, or 3. Three hours are met for warrant 1B (eight required). The detailed warrant analysis is included in **Appendix D**.

A detailed analysis was also completed to determine how many additional trips are needed to meet Warrant 1A or Warrant 1B. The results are shown in **Table 5**.

Table 5. Additional Volume Needed to Justify a Traffic Signal

Hour	Major Street Traffic Needed	Minor Street Traffic Needed	Major Street Traffic Needed	Minor Street Traffic Needed
	Warrant 1A		Warrant 1B	
6:00 - 7:00	199	128	499	53
7:00 - 8:00	meets threshold	66	meets threshold	meets threshold
8:00 - 9:00	meets threshold	103	47	28
9:00 - 10:00	meets threshold	108	283	33
10:00 - 11:00	meets threshold	106	226	31
11:00 - 12:00	meets threshold	83	54	8
12:00 - 13:00	meets threshold	85	34	10
13:00 - 14:00	meets threshold	90	106	15
14:00 - 15:00	meets threshold	83	meets threshold	8
15:00 - 16:00	meets threshold	62	meets threshold	meets threshold
16:00 - 17:00	meets threshold	50	meets threshold	meets threshold
17:00 - 18:00	meets threshold	94	meets threshold	19

For warrant 1A or 1B to be met, volume thresholds for both the major and minor street traffic need to met for at least eight hours. The same hours must be met for both the major and minor street traffic. **Table 5** indicates that the major street volumes meet the volume threshold for Warrant 1A for 11 of the 12 hours analyzed, however none of the minor street volumes meet the volume threshold and an additional 60+ vehicle are needed per hour to satisfy Warrant 1A.

Table 5 also shows how minor street volumes meet the volume threshold for three of the required eight hours for Warrant 1B and are between 8-19 vehicles an hour away from meeting the volume threshold for five additional hours, however 34-106 more mainline vehicles are also needed to justify a signal with the existing roadway lane configuration.

IX. Riverfront Drive at Good Counsel Drive Analysis

Crash and warrant analyses were also conducted for the intersection of Riverfront Drive at Good Counsel Drive north of the project area.

A. Crash Analysis

Crash data was collected for the study area using MnCMAT2 and provided by the Mankato Department of Public Safety at the intersection of Riverfront Dr and Good Counsel Dr. A five-year analysis was completed analyzing traffic from 2017 through 2022. 2021 crashes were omitted because TH 14 at Riverfront Dr just north of Good Counsel Dr was under construction throughout 2021. MnCMAT2 crash data shows four crashes during the five years analyzed. The Mankato Department of Public Safety records show ten other crashes not reported in MnCMAT2, bringing the total number of crashes in a five-year period to 14.

The most common crash type was right-angle accounting for 9 of the 14 crashes. A crash rate calculation was completed. The total observed crash rate at the intersection of Riverfront Dr and Good Counsel Dr was found to be 0.479 which is over three times higher than the average for similar intersections statewide (0.128). The total crash critical index of 1.5 shows that with 14 crashes over five years, the intersection overall is operating outside the normal range compared to similar intersections. The crash worksheet can be found in **Appendix B**. For the crashes provided by the Mankato Department of Public Safety the crash severity was either listed as non-injury or personal injury. The non-injury crashes were included in the property damage only crash totals and the personal injury crashes were assumed to be possible injury crashes since the exact injury severity is unknown.

B. Signal Warrant Analysis

A signal warrant analysis was completed to determine if existing volumes or traffic volumes anticipated with the proposed residential redevelopment at the School Sisters of Notre Dame parcel justify a traffic signal. Existing volumes collected at the intersection in April 2023 as a part of the traffic impact study for the proposed residential development were analyzed. The analysis is summarized below by warrant.

- Warrant 1: Eight-Hour Vehicular Volume – Not Met
  - No hours are met for Warrant 1A
  - Only two of the eight required hours are met for Warrant 1B
- Warrant 2: Four-Hour Vehicular Volume – Not Met
  - Only two of the four required hours are met
- Warrant 3: Peak Hour – Not Met
- Warrant 4: Pedestrian Volume – Not Met
- Warrant 5: School Crossing – Not Applicable
- Warrant 6: Coordinated Signal System – Not Applicable
- Warrant 7: Crash Experience – Not Met
  - There have been at most four crashes correctable by a signal in a 12 month period. Five crashes are required for this warrant to be met.
- Warrant 8: Roadway Network – Not Applicable
- Warrant 9: Intersection Near a Grade Crossing – Not Applicable

The warrant analysis with existing volumes shows that a traffic signal is not currently justified at the intersection. For warrants 1-3 minor street right turning traffic was omitted as the westbound approach has a right turn lane and the eastbound approach is wide enough that a right turning vehicle can get around a vehicle waiting to go left or through. An analysis was also completed with the eastbound right turning vehicles included, but since volumes are low, signal warrants were still not found to be met.

The volume warrants (1-3) were also analyzed with the additional traffic from the proposed redevelopment. The peak hour trips anticipated to be added at Riverfront Dr and Good Counsel Dr are summarized in **Table 6**.

Table 6. Peak Hour Trips Added at Riverfront Dr/Good Counsel Dr

Peak Hour	Southbound Left	Westbound Left	Westbound Right	Northbound Right
AM	6	6	20	2
PM	15	3	9	5

The peak hour trips from the proposed redevelopment were estimated into hourly trips throughout the day based on the existing hourly breakdown of vehicles at the intersection for the warrant analysis. The warrant analysis with added traffic from the redevelopment indicated that a signal is still not justified. One of the required eight hours was found to be met for Warrant 1A and four of the required eight hours were found to be met for Warrant 1B. No additional hours were found to be met for Warrants 2 or 3. The detailed warrant analysis is included in **Appendix D**.

Additionally, a detailed analysis was also completed to determine how many additional trips are needed to meet Warrant 1A or Warrant 1B. The results are shown in **Table 7** below.

Table 7. Additional Volume Needed to Justify a Traffic Signal at Riverfront Dr/Good Counsel Dr

Hour	Major Street Traffic Needed	Minor Street Traffic Needed	Major Street Traffic Needed	Minor Street Traffic Needed
	Warrant 1A		Warrant 1B	
6:00 - 7:00	74	139	374	64
7:00 - 8:00	meets threshold	140	meets threshold	65
8:00 - 9:00	meets threshold	120	meets threshold	45
9:00 - 10:00	meets threshold	136	185	61
10:00 - 11:00	meets threshold	131	167	56
11:00 - 12:00	meets threshold	74	meets threshold	meets threshold
12:00 - 13:00	meets threshold	93	meets threshold	18
13:00 - 14:00	meets threshold	83	21	8
14:00 - 15:00	meets threshold	57	meets threshold	meets threshold
15:00 - 16:00	meets threshold	meets threshold	meets threshold	meets threshold
16:00 - 17:00	meets threshold	2	meets threshold	meets threshold
17:00 - 18:00	meets threshold	111	meets threshold	36

Table 7 indicates that the major street volumes meet the Warrant 1A volume threshold with 11 hours met of the 12 hours analyzed, however only one of the minor street volumes meet the volume threshold and an additional 2-120 vehicles are needed per hour to satisfy Warrant 1A. **Table 7** also shows how the major street volumes meet the Warrant 1B volume threshold with 8 hours met of the 12 hours analyzed, however only four of the minor street volumes meet the volume threshold and an additional 18-65 vehicle are needed per hour to satisfy Warrant 1B.

C. All-Way Stop Control Warrant Analysis

An all-way stop warrant analysis was also completed for the intersection of Riverfront Dr at Good Counsel Dr. Criteria A is not met as a traffic signal is not justified. Criteria B is not met; there have been four reported right angle crashes in a 12-month period at the intersection, but the criteria requires five or more crashes susceptible to correction by an all-way stop installation. Criteria C is not met with existing or proposed volumes at the intersection. Criteria D is also not met with existing or proposed volumes at the intersection.

X. Recommendations

The Riverfront Drive Intersections Improvements study analyzed the issues and challenges of the intersections along Riverfront Dr between Mabel St and May St. The challenges are summarized below along with the findings from the study on each issue. This information is also summarized into a Purpose and Need Memorandum in **Appendix A**.

- **Side Street Delays** – Traffic operations indicate that the side street delays on average are acceptable during the peak hours, however, vehicles at times can wait for a few minutes for a gap and several attendees of the open house expressed that they don't feel comfortable making a left turn onto Riverfront Dr as it can be hard to find a gap in traffic.
- **Safety** – A crash analysis indicates that all three intersections in the project area operate within the normal range compared to similar intersections statewide, but three right angle crashes were reported at the intersection of May St and Riverfront Dr in the last three years. The additional crash analysis completed at the intersection of Good Counsel Dr and Riverfront Dr indicates a crash issue is present at this location with the majority of crashes being right-angle crashes.

- **Speeding on Riverfront Dr** – Speed data was collected along Riverfront Dr in a location within the study limits where the speed limit is 35 MPH. The average vehicle speed was found to be 37 MPH in both directions. The 85th percentile speed, or the speed at which 85% of vehicles are driving at or below was found to be 41 MPH in both directions. This indicates that 15% of vehicles are driving above 41 MPH. This confirms vehicle speed is a concern along the corridor.
- **4 to 5-lane Undivided Roadway** – The wide, multi-lane roadway makes it difficult for pedestrians, bicycles, and motorists to cross. The pedestrian count analysis indicates very few pedestrians are crossing the roadway in the project area, likely due to how challenging it would be to find a safe gap in traffic to cross all four or five lanes at once.

A warrant analysis indicates that neither a signal or all-way stop is justified at any intersection in the study area or at Riverfront Dr and Good Counsel Dr. Since the speeding issue noted along Riverfront Dr and the 4 to 5-lane cross section extends beyond the study area a future study is recommended extending from Madison Ave to Good Counsel Dr. Studying a larger area would allow corridor level improvements to be recommended to address these issues while also addressing the crash issue noted at the intersection of Riverfront Dr and Good Counsel Dr. The study is recommended when reconstruction of Riverfront Dr is more imminent.

Appendix A: Memorandums

BOLTON & MENK
Real People. Real Solutions.

111 Washington Avenue S
Suite 650
Minneapolis, MN 55401

Ph: (612) 416-0220
Fax: (612) 416-0222
Bolton-Menk.com

MEMORANDUM

Date: August 8, 2023

To: Chris Talamantez, MAPO Transportation Planner

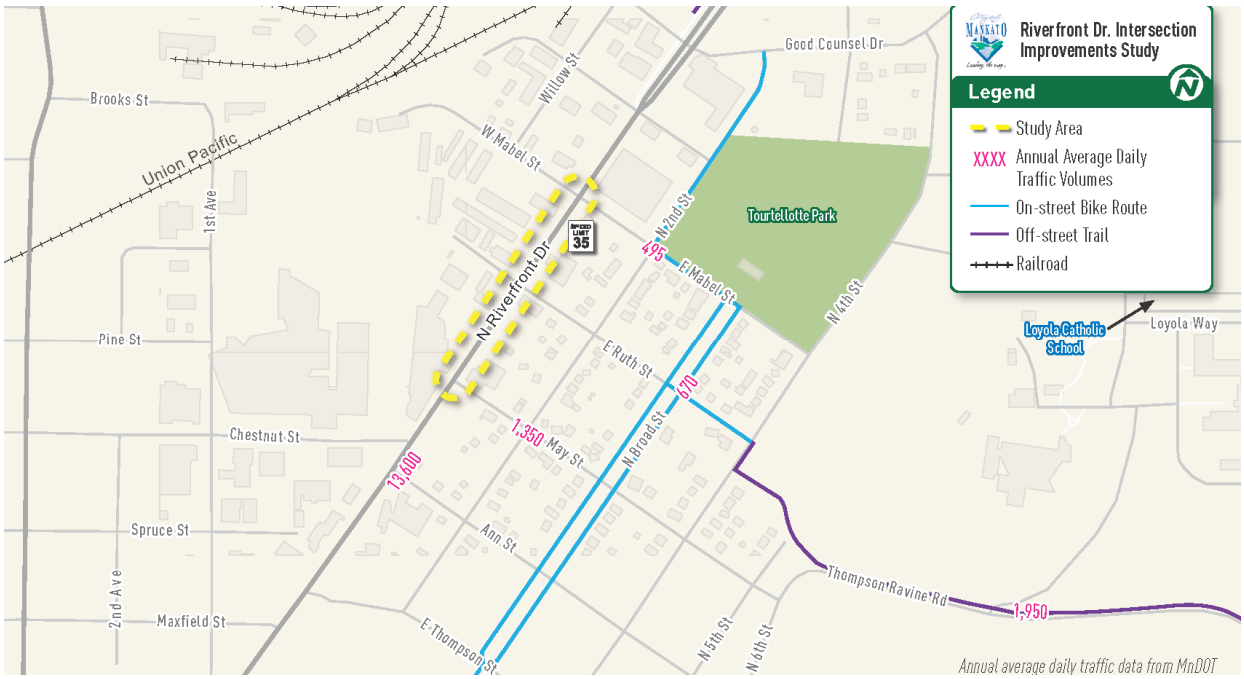
From: Angie Bersaw, AICP

Subject: Riverfront Drive Intersection Improvements – Existing Literature Summary
Mankato/North Mankato Area Planning Organization
BMI Project No.: 0T6.129266

I. Introduction

The Mankato/North Mankato Area Planning Organization, in cooperation with the City of Mankato, has requested an intersection improvement analysis for the Riverfront Drive intersections with May Street and Mabel Street. The project study area is detailed in **Figure 1**.

Figure 1: Project Study Area



The study will evaluate appropriate intersection controls at the intersections list above. This study was undertaken in response to communications from residents and other corridor stakeholders regarding the need for improvements to increase safety and access between the corridor and adjacent neighborhoods.

This memorandum provides a summary of the existing literature that will form a baseline to understand the planning context and needs of the corridor.

II. Previous Studies Overview

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

A. MAPO 2045 Long Range Transportation Plan Update (2020)

The last update to the MAPO 2045 Long Range Transportation Plan (LRTP) was published in November 2020. It provides the following analysis and planning guidance on Riverfront Drive and the study area intersections:

- Roadway functional classification defines the existing function and role of roadways within the hierarchy of the MAPO planning area. Presently, Riverfront Drive is identified as a minor arterial roadway, and May Street is a minor collector. Mabel Street is a local road.
- The future functional classification for Riverfront Drive is principal arterial. No changes to the other roadways that are the focus of this study.
- None of the segments in the project study area are anticipated to have a level of service (LOS) below acceptable parameters by 2045. The study area was identified for both a major road rehabilitation project and an intersection improvement. The road improvement project was determined to be a long-term (2036-2045) need for a Three- or Four-Lane Urban Reconstruct and Multimodal Improvements.
- The 2020 LRTP Update provides preliminary recommendations for corridor, Intersection Control Evalutaion (ICE), and MAPO planning area studies. These are preliminary recommendations that require further analysis to assess feasibility, need, and potential impacts of the study. The LRTP Update analysis and member jurisdiction feedback identified the intersection of Riverfront Drive and May Street as an area of potential need, and recommended that an ICE study be scheduled in the Mid 1 term (2026-2030).

B. ADA Transition Plan & Inventory for Public Rights of Way (2019)

The last update to the MAPO area ADA transition plan was published in May 2019. It provides an inventory of infrastructure, practices, and policies for each MAPO partner agency. It provides the following guidance on Riverfront Drive and the study area:

- Sidewalks on the east side of Riverfront Drive in the project study area were identified as non-compliant between May and Mabel Street. West side sidewalks are compliant.
- The are multiple non-compliant pedestrian ramps at the intersection of Riverfront Drive and Ruth Street, and a single non-compliant pedestrian ramp at the intersection of Riverfront Drive and Mabel Street.

C. Mankato Safe Routes to School (SRTS) Plan (2020)

The latest update the Mankato SRTS plan was published in 2020. It provides an assessment of routes, barriers, and opportunities to increase the number of children walking, biking, and rolling to Mankato

schools. The project study area is directly north of Franklin Elementary School, and directly south of the Good Counsel Drive, the only public access to Loyola Catholic School.

- No recommendations that directly apply to the project study area
- Plan recommended the Installation of Rectangular Rapid Flash Beacons (RRFB) to existing crosswalk at Riverfront Drive and Adams Street.

D. MAPO Riverfront Drive Corridor Study (2017)

The Riverfront Drive Corridor study examined operations and conditions along Riverfront Drive between Woodland Avenue and Highway 14. Owing to the length of the corridor and the variety of conditions, the study was broken up into five segments. The Riverfront Drive Intersection Improvements Study Area coincides with the Corridor Study's analysis and recommendations for Segment 4, which covered Riverfront Drive between Madison Avenue and Good Counsel Drive. The Riverfront Drive Corridor Study produced the following findings and recommendations for this project's study area:

- The city is anticipating a major rehabilitation/reconstruction of Riverfront Drive in the 2021-2030 timeframe.
- The city should consider changes to the street, such as number of lanes, access to Riverfront Drive, and the location of primary intersections as part of the roadway's forthcoming reconstruction.
- The study produced three opportunity/development driven concept alternatives that would apply to Segment 4, which contains the project study area. Some of these would impact Riverfront Drive through the project study area.
    - Option 4-1 would realign 3rd Avenue and Adams Street, extending Adams Street to provide access to both 3rd Avenue and a future extension of Madison Avenue through the existing Coughlan Quarry area. The alignment did not show direct changes to this project's study area.
    - Option 4-2 would convert Lafayette Street/3rd Avenue, Lime Street, and May Street to right-in-right-out (RIRO) operations through the installation of a 9-foot-wide concrete median. The secondary intersections of Ann and Chestnut Street would be consolidated into a single primary intersection with a thru-right, thru, and left turn lane on major approaches, and left-thru and dedicated right turn lanes on minor approaches.
    - Option 4-3 would extend Madison Avenue through the Coughlan Quarry, and connect it to 3rd Avenue, removing the segment of Lafayette Street between Riverfront Drive and the new connection. It would also convert Lime Street to RIRO on both sides of Riverfront Drive, and consolidate the 1st Avenue and Maxfield intersections along the north side of Riverfront Drive. The option would install a 9-foot-wide median at Ann Street and Chestnut, converting both to RIRO. Finally, it would change the curb radius at May Street, and strip the intersection for thru-left and a dedicated right turn lane.

E. Preliminary ICE Traffic Analysis Report: Highway 14 at Riverfront Drive (2015)

This Intersection Control Evaluation (ICE) Analysis was published in 2015, in part due to frequent congestion and other operational issues at the Highway 14 and Riverfront Drive interchange.

- The study recommended single-lane roundabouts at both ramp intersections to alleviate delays caused by limited gaps in traffic during peak hours.
- Construction of roundabouts at each ramp termini was completed in 2021.

F. Complete Streets Plan (2015)

The City of Mankato Complete Streets Plan and Policy was published in 2015 and is intended ensure the Mankato streets and sidewalks that are designed and constructed to serve everyone – pedestrians, bicyclists, and drivers – and they take into account the transportation needs of all people, including children, older adults, and people with disabilities or impaired mobility. The following recommendations and findings from the Complete Streets Plan applies to the project study area:

- Public comments from the plan engagement highlighted the difficulty pedestrians face when crossing Riverfront Drive, citing the distance between safe crossing locations.
- The plan outlined one bicycle facility planned along Riverfront Drive, which would complete a connection of the Sakatah Singing Hills State Trail under the Highway 14 interchange and across Riverfront to Good Counsel Drive. Otherwise, the plan recommended directing bicycle traffic to Broad Street. Bike lanes and trail connection have been installed since the plan was published.

III. Demographics and Trends

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

A. Population

The Mankato/North Mankato area has seen rapid growth. In 2010, the metropolitan statistical area (MSA) population was 96,740 with an urbanized population of 58,265. The 2010 population estimate represents a 12.9% change from the year 2000 for the MSA. ***Table 1*** illustrates historic population figures referenced from the Mankato/North Mankato Metropolitan Planning Organization's (MAPO) 2045 Long Range Transportation Plan.

Table 1: 1990 - 2020 Historic Population

	1990 Census	*2000 Census*	*2010 Census*	*% Change 2000-2010*	*2020 Census*	*% Change 2010-2020*
Mankato	31,447	32,427	39,309	21.2%	44,488	13.2%
MSA	82,120	85,712	96,740	12.9%	103,566	7.1%

Source: US Census Bureau; Minnesota State Demographer, MAPO 2045 Long Range Transportation Plan Update (2020)

A large portion of the rapid growth occurred in Mankato alone, exhibiting 21.2% change within the first decade of the new millennium. More recent estimates indicate that growth has slowed to a more

moderate rate. Trends implied the MAPO area added 450 to 535 people annually at the time the 2045 plan was developed.

B. Age

The population's age distribution is important as it impacts transportation usage. This existing literature summary used American Community Survey (ACS) data to estimate changes in age demographics for the MSA. Due to the differences between how data is collected between the ACS and Decennial Censuses, there are slight discrepancies between the age and total population analysis samples. In the period from 2010 to 2020, those of retirement age or nearing retirement age saw the highest increases in populations indicating increased commuters and dial-a-ride transit users, as did the combined cohort of people between the ages of 25 and 45. Retirees exhibited the greatest increase in population while 10–19-year-olds represented the largest demographic group. With a large group of school aged children, the area may see a higher demand for pedestrian and bicycle amenities.

Table 2: Population by Age

	Metropolitan Statistical Area		
Age	**2010 Estimate**	**2020 Estimate**	**Change**
Under 9	11,028	11,653	625
10 to 19	14,125	14,464	339
20 to 24	14,434	13,690	(744)
25 to 35	12,535	13,562	1,027
35 to 44	10,422	11,506	1,084
45 to 54	12,044	10,346	(1,698)
55 to 64	9,540	11,651	2,111
65 to 74	5,198	8,294	3,096
74+	5,663	6,378	715
Total	**94,990**	**101,544**	**6,554**

Source: U.S. Census Bureau, 2006-2010 American Community Survey Table S0101
U.S. Census Bureau, 2016-2020 American Community Survey Table S0101

C. Employment

Most household trips include travel to and from places of employment. Mankato and North Mankato are the major employment centers for the region with a labor shed spanning 16 counties. There is a net inflow of primary jobs in the MAPO market area meaning there are more jobs in the market than people living in the market area. Almost 71 percent of the labor force living in the MSA lived and worked in their county of residence.

IV. Transportation System Characteristics

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

A. Functional Class

The functional classification system is used to create a roadway network that efficiently collects and distributes traffic from neighborhoods to the state highway system. A successful system coordinates and

manages mobility, roadway design, and route alignment as well as seeks to match current and future access and land use with the adjacent roadway's purpose, speeds, and spacing. The functional classification system is comprised of principal arterials, minor arterials, major and minor collectors, and local roadways.

Riverfront Drive serves as a minor arterial roadway running the entire length of Mankato. It serves a diverse mix of personal vehicle, freight, transit, bicycle, and pedestrian traffic. From a regional perspective, mobility on Riverfront Drive is important, with vital interchange connections to Highways 14 and 169/60, the two principal arterial highways running through Mankato. Riverfront Drive provides connections to the following minor arterial roadways: Sibley Street (MN Highway 66), Stoltzman Road (CSAH 16), Warren Street, Cherry Street, Main Street, Veteran's Memorial Bridge, Madison Avenue, 3rd Avenue (CSAH 5) and North Riverfront Drive (CSAH 57). Riverfront Drive also provides a cross community function for local and regional trips. All of this creates a challenge in balancing mobility and access along the roadway.

B. Existing Traffic Speeds

The posted speed limit is 35 miles per hour for the entire project study area. Speed data was collected for the traffic along Riverfront Drive near Mabel Street for a single weekday, Wednesday, March 15th, 2023. Speed data collected shows that a majority of drivers using the corridor are driving above the posted speed limit of 35 mph. The average speed and 85th percentile speed were 37 and 41 miles per hour respectively. More analysis on traffic speed is provided in the Traffic Operations Report.

C. Existing Number of Lanes and Parking Accommodations

Riverfront Drive is a four-lane undivided roadway with a two-way left turn lane in the project study area. All intersections in this area are side-street stop controlled with Riverfront Drive having the right of way.

V. Study Area Characteristics

The study area is comprised of Riverfront Drive between May Street and Mabel Street. Riverfront Drive in this area is a four-lane roadway divided by a two way left turn lane. All intersections in the study area are minor approach stop-control intersections.

A. Land Use

Land uses along the segment of Riverfront Drive adjacent to the project study area include commercial and light industrial with some residential, institutional, and park uses. Two schools, Franklin Elementary School at Lafayette and Adams Street, and Loyola School via Good Counsel Drive, serve as major traffic generators for parents and school buses access during peak traffic hours in area. The corridor hosts a large number of warehouse and distribution uses, including businesses like Ferguson Plumbing Supplies, SPS Plumbing Supply, Graybar, and Rooms and Rest Distribution Center among others. Just north of the project area is the Highway 14 interchange, a key trip generator which filters regional traffic through the area.

B. Traffic Operations

The segment of Riverfront Drive through the study area carries approximately 13,600 vehicles per day and provides access to the Highway 14 interchange. All intersections in the project study area operate an acceptable Level of Service (LOS) grade. More details on traffic operations are provided in the Traffic Operations Report.

C. Crash History

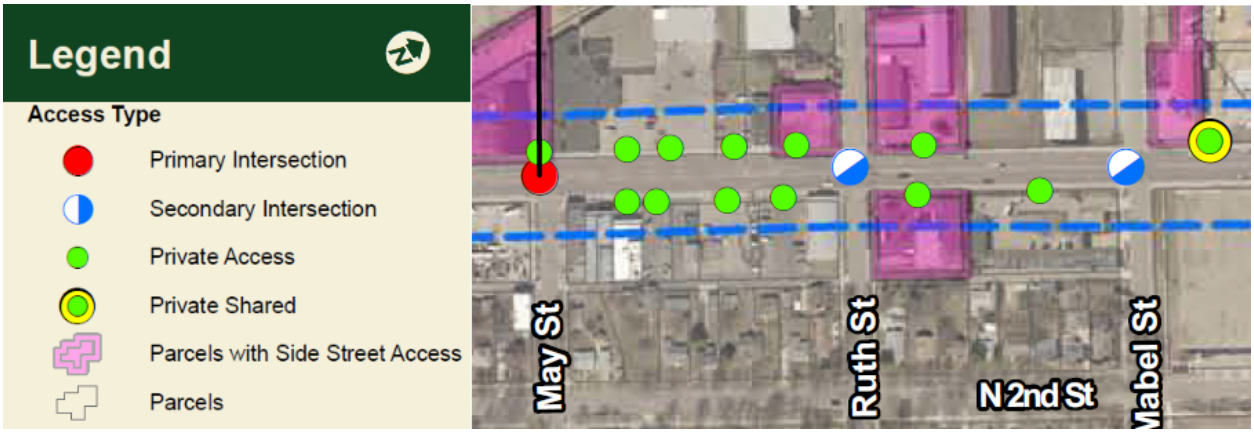
Crash data for the last five years (2018-2022) was collected for the study area using MnCMAT2. There were three crashes in the study area reported between 2018-2022, all involving vehicles turning off May Street onto Riverfront Drive. There were two angle crashes, and one rear end crash and severity was reported as property damage only for all reported crashes. This intersection has a critical index of 0.35, indicating that the intersection has a lower-than-expected number of crashes compared to similar intersections statewide. Common contributing factors for the reported crashes are gap acceptance and sight distance for turning vehicles. Crash data for the last ten years was analyzed to catch any bicycle or pedestrian-involved crashes. There were no reported bicycle or pedestrian crashes reported between 2013 and 2022.

More details on crashes and trends in the project study area are provided in the Traffic Operations Report.

D. Access Inventory

Access was mapped during the 2017 Riverside Drive Corridor Study. It is assumed that access has not changed within the Riverfront Drive Intersection Improvement Study Area. Study area access is detailed in ***Figure 2*** below. Within the confines of this project's study area, the analysis identified one primary access in this project study area (May Street), two secondary intersections (Ruth and Mabel Streets), and 13 private access points.

Figure 2: Project Study Area Access Inventory



Several of the properties associated with private access points have side street access, and thus might be candidates for access closures along Riverfront Drive.

E. Pedestrian and Bicycle Connections

Sidewalks are present along both sides of the entire extent of the project study area. There is an off-street bicycle facility along Riverfront Drive north of Mabel Street, which links up to Sakatah Singing Hills trail running along the north side of Riverfront Drive starting at Good Counsel Road. This also provides access to the Minnesota River Trail north of the Highway 14 interchange. East of the project study area are on-street bike lanes along N. 2nd Street, Mabel Street, North Broad Street, and Ruth Street. These bike lanes connect to the Thompson Ravine Road Trail, an off-street trail that provides multimodal access to the eastern Mankato metropolitan area.

BOLTON & MENK
Real People. Real Solutions.

1960 Premier Drive
Mankato, MN 56001-5900

Ph: (507) 625-4171
Fax: (507) 625-4177
Bolton-Menk.com

MEMORANDUM

Date: Tuesday, August 8, 2023

To: Chris Talamantez, MAPO Transportation Planner

From: Angie Bersaw, AICP

Subject: Riverfront Drive Intersection Improvements – Demographic & Environmental Justice Summary

Mankato/North Mankato Area Planning Organization

BMI Project No.: 0T6.129266

I. Introduction

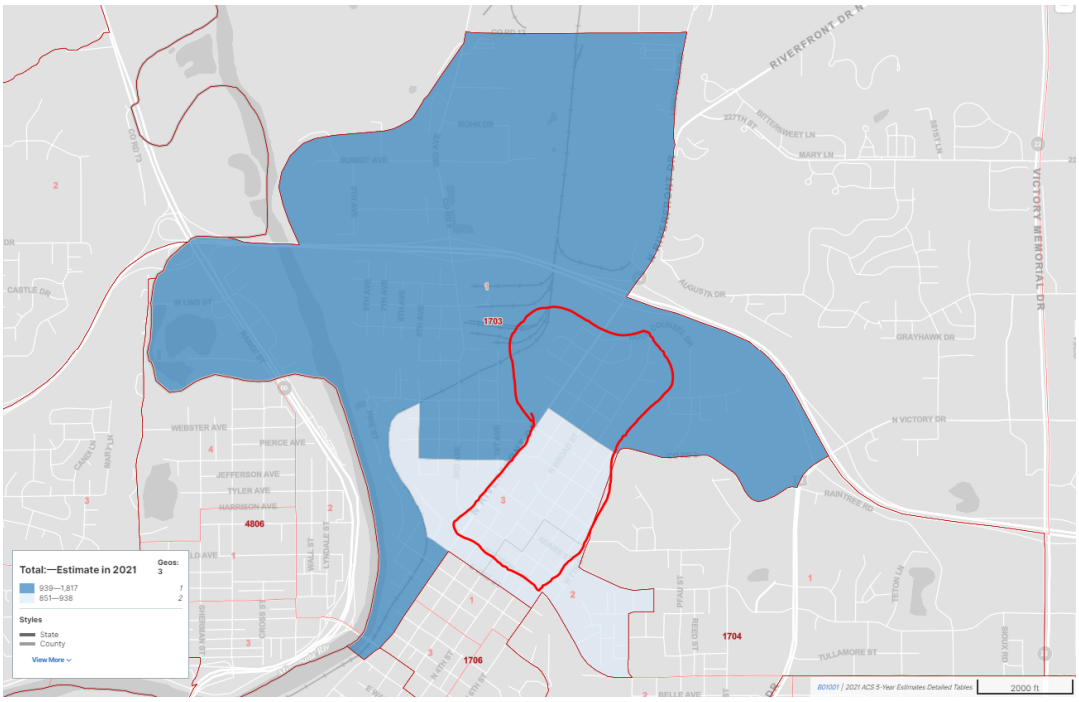
This demographic analysis examines the demographic data for the study area and compares to city demographic trends. This analysis will function as an environmental justice screen for the Riverfront Drive Intersection Improvement Study "critical area", defined as census tract 1703, which contains the entirety of the study area. **Figure 1** illustrates the critical area for the EJ analysis, which contains the study area and adjacent neighborhoods roughly bound by Madison Avenue, Riverfront Drive, North Seventh Street, North Sixth Street, Good Counsel Drive, West Ruby Street, and the area between U.S. 14 and CSAH 26 (Industrial Road).

The purpose of an environmental justice screen is to identify minority, limited English proficiency (LEP), and low-income populations, also known as "environmental justice (EJ) populations" that could be disproportionately impacted by construction and any long-term changes to Riverfront Drive that might recommended by the Riverfront Drive Intersection Improvement Study.

This analysis uses U.S. Census Bureau data from the 2017-2021 American Community Survey data and 2020 Decennial Census. These datasets were used to identify potential EJ populations and are paired with a discussion of any disproportionately high and adverse effects that would be predominately borne by these populations for any future projects along Riverfront Drive.

This analysis indicates that while the study area includes low-income, minority, and Spanish-speaking populations, none of these groups are large enough to warrant specific mitigation measures or dedicated outreach efforts beyond the normal efforts undertaken by MAPO as part of any roadway project. MAPO should reexamine the study area to after alternatives are developed and potential impacts of the project area are better defined.

Figure 1. Riverfront Drive Corridor Study Critical Area



II. Demographic Analysis

Riverfront Drive is a major north-south commuter corridor the region. Permanent impacts along the corridor were not considered, since the project is intended to improve corridor operations for all users. However, construction activities could disproportionately impact EJ populations. The data used for demographic analysis are summarized in **Table 1**.

.

Table 1. Demographics for Riverfront Drive Study Area

		Riverfront Dr. Project Area		City of Mankato, MN	
		Count	Percent	Count	Percent
Race and Ethnicity	**Population (2020 Decennial Census)**	3,040		44,488	
	White	2,513	82.7%	35,156	79.0%
	Minority Population	527	17.3%	9,332	21.0%
	Black or African American	141	4.6%	3,744	8.4%
	Asian or Pacific Islander	45	1.5%	1,732	3.9%
	American Indian or Alaska Native	17	0.6%	238	0.5%
	Some other race alone	88	2.9%	1,044	2.3%
	Two or more races	236	7.8%	2,574	5.8%
	Hispanic or Latino	229	7.5%	2,589	5.8%
Income	**Population for whom poverty status is determined**	3040		45,140	
	In poverty	686	22.6%	10,066	22.3%
Education	**25 years and older**	2,127		45,140	
	Less than a high school education	271	12.7%	2,843.82	6.3%
Language	**5 years and older**	3,227	89.5%	41,701	94.9%
	Speak English less than "very well"*	56	1.7%	1360	3.3%
	Speak Spanish*	117	3.6%	1185	2.8%
	Speak another language*	216	6.7%	1559	3.7%
	Speak an Asian language*	42	1.3%	870	2.1%
	Speak an Indo-European language*	0	0.0%	609	1.5%
Age	**Population**	3,606		45,140	
	Under 5 years	379	10.5%	2,303	5.1%
	65 years and older	430	11.9%	5,553	12.3%
Housing	**Households**	1,353		17,196	
	Average household size	2.6		2.4	
	Owner occupied households	825	61.0%	8,999	52.3%
	Renter occupied households	528	39.0%	8,197	47.7%
Disability	**Populations for whom a disability status is determined**	3,606		43,566	
	Population with a disability	409	11.3%	4,534	10.4%
Vehicles	**Households**	1,353		17,196	
	1 vehicle available	354	26.2%	5,576	32.4%
	No vehicle households*	49	3.6%	1,410	8.2%

Source: 2020 Decennial Census, ACS 5-year data 2017-2021
*Indicates a high degree of uncertainty in 5-year ACS data. Data was considered unreliable if the margins of error for the demographic was greater than 70% of the reported value.

The analysis summarized in **Table 1** suggests that the demographics of the Riverfront Drive Intersection Improvement Study critical area does not differ substantially from demographic trends seen at the city level. However, this broad analysis can obscure smaller caches of environmental justice groups or other groups that require special considerations. The following sections focus on specific demographic groups that could require special consideration for project outreach, communications, and considerations during construction, or would stand to benefit substantially from specific roadway treatments or infrastructure investments.

A. Minority Population

Minority populations includes individuals who identify as Hispanic or Latino, Black or African American, Asian American or Pacific Islander, Native American, some other race, or two or more races, as defined by the U.S. Census Bureau. For this analysis, a minority population is considered an environmental justice population if the critical area contains a 10 percent higher concentration of minorities than the city average. The critical area has a below average share of minority population when compared to the city of Mankato, though the Hispanic and Latino population is above citywide trends.

B. Low-income Populations

Low-income is approximated by census reporting of individuals with income below 150 percent of the federal poverty level, or people with income below $19,140 in 2020. The rate of poverty in the critical area more or less matches the citywide rates.

C. Age

While the proportion of the population in the study area above 65 did not greatly deviate from the citywide trends, the study area has a much higher share of population under the age of 5. The presence of Franklin Elementary School south of the study area should be considered both in planning and in the development of alternatives. As the volume of traffic along the corridor increases, so too will the need for facilities that allow for safe walking and biking trips for people of all ages and abilities.

D. Population

The 2020 Decennial Census reports that Tract 1703 is home to 3,040 people. South of US 14, the critical area is a nearly fully built out residential community with commercial and industrial uses along the Riverfront Drive corridor. While the City of Mankato has seen steady growth for the past decade, growing by 13.2 percent between decennial censuses, the critical area population has largely remained static, growing by 1.7 percent. People living in the study area travel along and across Riverfront Drive both in cars, on foot, and via bicycles.

E. Homeownership

Housing in the area is nearly uniform in it zoning for low-density residential development. The critical area has much slightly lower rates of renting when compared to the city, with 37 percent of housing in the critical area being rental housing (compared to about 50 percent of all housing in Mankato being rental housing). Rates of renter cost burdened households was about comparable between the critical area and Mankato, with around half of renter households in both areas spending 30 percent or more of their income on housing.

F. Language

About 11.6 percent of the population living in the study area speaks a language other than English, and 1.7 percent speaks English less than “very well” compared to 3.3 percent city-wide.

G. Disability

Although not an EJ population, it is important to be aware of the people with disabilities in the project area. About 11.3 percent of the population for whom disability status is determined has a disability in the project area compared to 10.4 percent city-wide. The

H. Household Without a Vehicle

Although not an EJ population, it is also important to be aware of the number of households in the project area without a vehicle, as this significantly impacts transportation choices. Generally, the critical area has higher rates of automobile ownership than when compared to the city of Mankato on a whole, with only 3.6 percent of households in the critical area not having access to a vehicle and 26.2 percent of households have access to only one vehicle.

III. Conclusion

This high level analysis suggests that the critical area for the Riverfront Drive Intersection Improvement Study does not have any EJ populations large enough to warrant specific mitigation. However, the city and MAPO should continue to be sensitive to the possibility of significant stakeholder groups who might require specific care during project engagement and in alternatives design and selection.

BOLTON & MENK
Real People. Real Solutions.

1960 Premier Drive
Mankato, MN 56001-5900

Ph: (507) 625-4171
Fax: (507) 625-4177
Bolton-Menk.com

MEMORANDUM

Date: Tuesday, August 8, 2023

To: Chris Talamantez, MAPO Transportation Planner

From: Angie Bersaw, AICP

Subject: Riverfront Drive Intersection Improvements – Purpose and Need
Mankato/North Mankato Area Planning Organization
BMI Project No.: 0T6.129266

I. Purpose

The Mankato/North Mankato Area Planning Organization (MAPO) is conducting a feasibility study for intersection improvements along Riverfront Drive between May Street and Mabel Street. Riverfront Drive serves an important function for local and regional mobility, connecting downtown Mankato, U.S. Highway 14 (U.S. 14) and U.S. Highway 169 (U.S. 169). These intersection improvements would address mobility and safety issues for both mainline traffic along Riverfront Drive, as well as vehicle, cyclist, and pedestrian traffic coming from neighborhoods behind Riverfront Drive to the east and west.

This feasibility study will be used to identify needs and potential intersection improvements for Riverfront Drive by:

- Determining an overall vision for the segment to improve multimodal traffic connectivity and operations across Riverfront Drive
- Improving traffic safety within the segment.
- Providing improved crossing opportunities across Riverfront Drive
- Conducting Intersection Control Evaluation (ICE) analyses for the intersections of Riverfront Drive with May Street and Mabel Street.

The need for this feasibility study arose from:

- Public concerns about Riverfront Drive as a barrier to pedestrian and cyclist mobility
- Safety issues stemming from four-lane undivided roadway configuration, high traffic volumes and speeding along Riverfront Drive.
- Public perception in the difficulty finding gaps to make left turns from May Street and Mabel Street.

II. Riverfront Drive Intersection Improvements Needs

Study partners seek to address the following needs for Riverfront Drive between May Street and Mabel Street.

A. Consistency with State and Local Plans

Previous planning efforts for the study area emphasized the importance of Riverfront Drive and the surrounding streets for local transportation, and the need to make improvements to address existing deficiencies and prepare for reconstruction. These studies are summarized in the Literature Summary:

- MAPO 2045 Long Range Transportation Plan Update (2020)
- MAPO ADA Transition Plan (2019)
- Mankato Safe Routes to School (SRTS) Plan (2020)
- MAPO Riverfront Drive Corridor Study (2017)
- Preliminary ICE Traffic Analysis Report: Highway 14 at Riverfront Drive (2015)
- Complete Streets Plan (2015)

Proposed improvements identified through these studies include roadway reconstruction, multimodal improvements and ADA infrastructure investment near or within the study area.

Key Finding: Previous planning efforts identified corridor deficiencies and the need for pavement reconstruction by 2030. Within the study area, the Riverfront Drive Corridor Study (2017) identified three opportunity/development driven concept alternatives for consideration. These improvement alternatives included changes to the number of lanes, access to Riverfront Drive, pedestrian/bicycle crossings, and the location of primary intersections. The 2017 study recommended these corridor alternatives be revisited when corridor reconstruction is more imminent. The current feasibility study is a follow-up to the 2017 corridor study to consider the intersection needs on Riverfront Drive between May Street and Mabel Street to see if additional traffic control changes are needed.

B. Crash History and Traffic Safety

Previous project engagement from the MAPO Riverfront Drive Corridor Study indicated that Mankato residents believe the corridor is unsafe, and has issues with speeding and poor visibility when turning from minor approaches. Especially notable is the concern about delay drivers face when making left-hand turns from May Street and Mabel Street onto Riverfront Drive.

Key Finding: The traffic and safety analysis conducted as part of this feasibility study found the needs for intersection improvements alone in the May Street to Mabel Street section of Riverfront Drive is inconclusive, as follows:

- **Side Street Delays** – Traffic operations indicate that the side street delays on average are acceptable during the peak hours, however, vehicles at times can wait for a few minutes for a gap and several attendees of the open house expressed that they don't feel comfortable making a left turn onto Riverfront Dr as it can be hard to find a gap in traffic.

- **Safety** – A crash analysis indicates that all three intersections in the project area operate within the normal range compared to similar intersections statewide, but three right angle crashes were reported at the intersection of May St and Riverfront Dr in the last three years.
- **Speeding on Riverfront Dr** – Speed data was collected along Riverfront Dr in a location within the study limits where the speed limit is 35 MPH. The average vehicle speed was found to be 37 MPH in both directions. The 85th percentile speed, or the speed at which 85% of vehicles are driving at or below was found to be 41 MPH in both directions. This indicates that 15% of vehicles are driving above 41 MPH. This confirms vehicle speed is a concern along the corridor.
- **Warrant Analysis** - A warrant analysis indicates that a signal is not justified at any intersection in the study area. Since the speeding issue noted along Riverfront Dr and the 4 to 5-lane cross section extends beyond the study area a future study is recommended to include Madison Ave to Good Counsel Dr. A study of the larger area would be able to recommend corridor level improvements to address these issues. The study is recommended when reconstruction of Riverfront Dr is more imminent.

C. Pedestrian and Bicycle

Riverfront Drive is a four-lane urban road with a two-way left turn lane, sidewalks on both sides of the roadway, and no on-street bicycle facilities. The corridor is fronted by commercial and industrial uses, with the areas beyond the corridor being mostly low-density residential development. There are several businesses that could generate bicycle and pedestrian trips to the north and south of the study area. There are no dedicated pedestrian crossings in the study area, with the nearest marked crosswalk located at Riverfront Drive and Adams Street or the US 14 roundabout. Project engagement indicated that residents near Riverfront Drive see it as a barrier to biking and walking trips and would like safer crossings.

Key Finding: The wide, multi-lane roadway makes it difficult for pedestrians, bicycles, and motorists to cross. The pedestrian count analysis indicates very few pedestrians are crossing the roadway in the project area, likely due to how challenging it would be to find a safe gap in traffic to cross all four or five lanes at once. Future consideration of the entire section of Riverfront Drive between Madison Avenue and US 14 is needed to determine the best roadway cross section to serve existing and future needs and most beneficial pedestrian and bicycle crossing locations and enhancements.

D. Environmental Considerations

There is little potential for Social, Economic, and Environmental (SEE) concerns in proximity to the study area. There are some contaminated locations along Riverfront Drive associated with industrial and commercial land uses in the area. There is some potential environmental justice populations, with the rate of Hispanic/Latino in the study area being nearly double that of the Mankato average. The environmental justice portion of the study explores if these concerns warrant special considerations and mitigation.

Key Finding: Potential SEE resources including contaminated locations and environmental justice populations will need to be considered in future improvement recommendations.

III. HOW THIS FRAMEWORK IS USED

Relevant portions of this text may be reported in the purpose and need section(s) of future NEPA and Minnesota Environmental Policy Act (MEPA) documentation potentially required for implementation of recommendations resulting from the Riverfront Drive Intersection Improvement study process. Based on MnDOT guidance which reflects FHWA requirements, need statements in NEPA documents are to focus on existing documented deficiencies.

Appendix B: Crash Worksheet

Intersection Safety Screening

Intersection: Riverfront Dr at Mabel St

Statewide Averages based on 2016-2020 crashes

Crashes by Crash Severity	
Fatal (K)	0
Serious Injury (A)	0
Minor Injury (B)	0
Possible Injury (C)	0
Property Damage (PDO)	2
Total Crashes	2

Intersection Characteristics	
Entering Volume	13,883
Environment	Urban
Lighting	Lit
Traffic Control	Thru-Stop

Annual crash cost = $5,200

Statewide comparison = Urban, Thru/STOP

Total Crash Rate	
Observed	0.079
Statewide Average	0.128
Critical Rate	0.330
Critical Index	**0.24**

Fatal & Serious Injury Crash Rate	
Observed	0.000
Statewide Average	0.311
Critical Rate	3.700
Critical Index	**0.00**

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 (i.e. observed crash rate ÷ critical crash rate).

The observed total crash rate for this period is 0.08 per MEV; this is 76% 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 Dr at Ruth St

Statewide Averages based on 2016-2020 crashes

Crashes by Crash Severity	
Fatal (K)	0
Serious Injury (A)	0
Minor Injury (B)	0
Possible Injury (C)	0
Property Damage (PDO)	1
Total Crashes	1

Intersection Characteristics	
Entering Volume	13,690
Environment	Urban
Lighting	Lit
Traffic Control	Thru-Stop

Annual crash cost = $2,600

Statewide comparison = Urban, Thru/STOP

Total Crash Rate	
Observed	0.040
Statewide Average	0.128
Critical Rate	0.330
Critical Index	**0.12**

Fatal & Serious Injury Crash Rate	
Observed	0.000
Statewide Average	0.311
Critical Rate	3.740
Critical Index	**0.00**

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 (i.e. observed crash rate ÷ critical crash rate).

The observed total crash rate for this period is 0.04 per MEV; this is 88% 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 Dr at May St

Statewide Averages based on 2016-2020 crashes

Crashes by Crash Severity	
Fatal (K)	0
Serious Injury (A)	0
Minor Injury (B)	0
Possible Injury (C)	0
Property Damage (PDO)	4
Total Crashes	4

Intersection Characteristics	
Entering Volume	14,275
Environment	Urban
Lighting	Lit
Traffic Control	Thru-Stop

Annual crash cost = $10,400

Statewide comparison = Urban, Thru/STOP

Total Crash Rate	
Observed	0.153
Statewide Average	0.128
Critical Rate	0.330
Critical Index	**0.46**

Fatal & Serious Injury Crash Rate	
Observed	0.000
Statewide Average	0.311
Critical Rate	3.630
Critical Index	**0.00**

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 (i.e. observed crash rate ÷ critical crash rate).

The observed total crash rate for this period is 0.15 per MEV; this is 54% 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.

Intersection Safety Screening

Intersection: Riverfront Dr at Good Counsel Dr (2017-2022 Crashes, 2021 Crashes Omitted - Construction)

Statewide Averages based on 2016-2020 crashes

Crashes by Crash Severity	
Fatal (K)	0
Serious Injury (A)	0
Minor Injury (B)	1
Possible Injury (C)	3
Property Damage (PDO)	10
Total Crashes	14

Intersection Characteristics	
Entering Volume	16,000
Environment	Urban
Lighting	Lit
Traffic Control	Thru-Stop

Annual crash cost = $144,000

Statewide comparison = Urban, Thru/STOP

Total Crash Rate	
Observed	0.479
Statewide Average	0.128
Critical Rate	0.320
Critical Index	**1.50**

Fatal & Serious Injury Crash Rate	
Observed	0.000
Statewide Average	0.311
Critical Rate	3.340
Critical Index	**0.00**

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 (i.e. observed crash rate ÷ critical crash rate).

The observed total crash rate for this period is 0.48 per MEV; this is 1.5 times the critical rate. If crashes were reduced by 5 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.

Appendix C: Traffic Count Data

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 1

Riverfront Dr at Mabel St
Mankato, Minnesota

Groups Printed- Cars + - Trucks

	Riverfront Dr Southbound					Mabel St Westbound					Riverfront Dr Northbound					Mabel St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	0	34	0	0	34	0	0	0	0	0	0	22	0	0	22	2	0	1	0	3	59
06:15 AM	0	31	1	0	32	0	0	0	0	0	0	34	1	0	35	0	0	0	0	0	67
06:30 AM	2	58	1	0	61	1	0	1	0	2	0	69	0	0	69	0	0	0	0	0	132
06:45 AM	2	91	0	0	93	1	0	0	0	1	1	67	0	0	68	0	1	0	0	1	163
Total	4	214	2	0	220	2	0	1	0	3	1	192	1	0	194	2	1	1	0	4	421
07:00 AM	0	86	1	0	87	1	0	0	0	1	0	64	3	0	67	1	0	0	0	1	156
07:15 AM	3	121	1	0	125	2	0	0	0	2	0	84	2	0	86	2	0	1	0	3	216
07:30 AM	4	186	4	0	194	2	0	4	0	6	0	134	1	0	135	0	0	1	0	1	336
07:45 AM	3	201	2	0	206	3	0	8	0	11	2	182	4	0	188	1	0	0	1	2	407
Total	10	594	8	0	612	8	0	12	0	20	2	464	10	0	476	4	0	2	1	7	1115
08:00 AM	2	148	2	0	152	1	0	7	0	8	1	114	1	0	116	1	0	2	0	3	279
08:15 AM	0	129	2	0	131	3	0	1	0	4	1	70	2	0	73	1	0	0	0	1	209
08:30 AM	0	95	2	0	97	2	0	0	0	2	0	101	0	0	101	1	0	1	0	2	202
08:45 AM	2	91	0	0	93	1	0	1	0	2	2	65	0	0	67	1	0	1	0	2	164
Total	4	463	6	0	473	7	0	9	0	16	4	350	3	0	357	4	0	4	0	8	854
09:00 AM	1	69	0	0	70	1	0	1	0	2	1	77	1	0	79	1	0	2	0	3	154
09:15 AM	1	79	0	0	80	0	0	2	0	2	0	77	1	0	78	3	0	1	0	4	164
09:30 AM	0	78	2	0	80	2	1	1	0	4	1	66	0	0	67	5	0	0	0	5	156
09:45 AM	2	84	2	0	88	2	0	0	1	3	0	55	2	0	57	1	0	1	0	2	150
Total	4	310	4	0	318	5	1	4	1	11	2	275	4	0	281	10	0	4	0	14	624
10:00 AM	4	73	1	1	79	5	0	0	0	5	1	83	0	0	84	1	0	2	1	4	172
10:15 AM	1	70	2	0	73	0	0	0	0	0	2	70	3	0	75	0	0	3	0	3	151
10:30 AM	1	73	0	0	74	2	0	2	0	4	0	83	0	0	83	1	0	2	0	3	164
10:45 AM	0	90	1	0	91	1	0	0	0	1	0	70	1	0	71	2	0	4	0	6	169
Total	6	306	4	1	317	8	0	2	0	10	3	306	4	0	313	4	0	11	1	16	656
11:00 AM	2	80	0	0	82	1	0	0	0	1	0	96	1	0	97	1	0	0	0	1	181
11:15 AM	0	93	0	0	93	2	0	2	0	4	0	121	3	0	124	3	0	0	0	3	224
11:30 AM	1	92	1	0	94	1	0	3	0	4	0	99	3	0	102	2	0	1	0	3	203
11:45 AM	2	96	1	0	99	3	0	3	0	6	2	125	1	0	128	0	0	2	0	2	235
Total	5	361	2	0	368	7	0	8	0	15	2	441	8	0	451	6	0	3	0	9	843
12:00 PM	0	85	1	0	86	2	0	1	0	3	2	130	2	0	134	2	0	2	0	4	227
12:15 PM	0	116	1	0	117	5	0	2	0	7	0	113	1	0	114	1	0	2	0	3	241
12:30 PM	0	87	0	0	87	4	0	1	0	5	1	112	2	0	115	0	0	1	0	1	208

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 2

Riverfront Dr at Mabel St
Mankato, Minnesota

Groups Printed- Cars + - Trucks

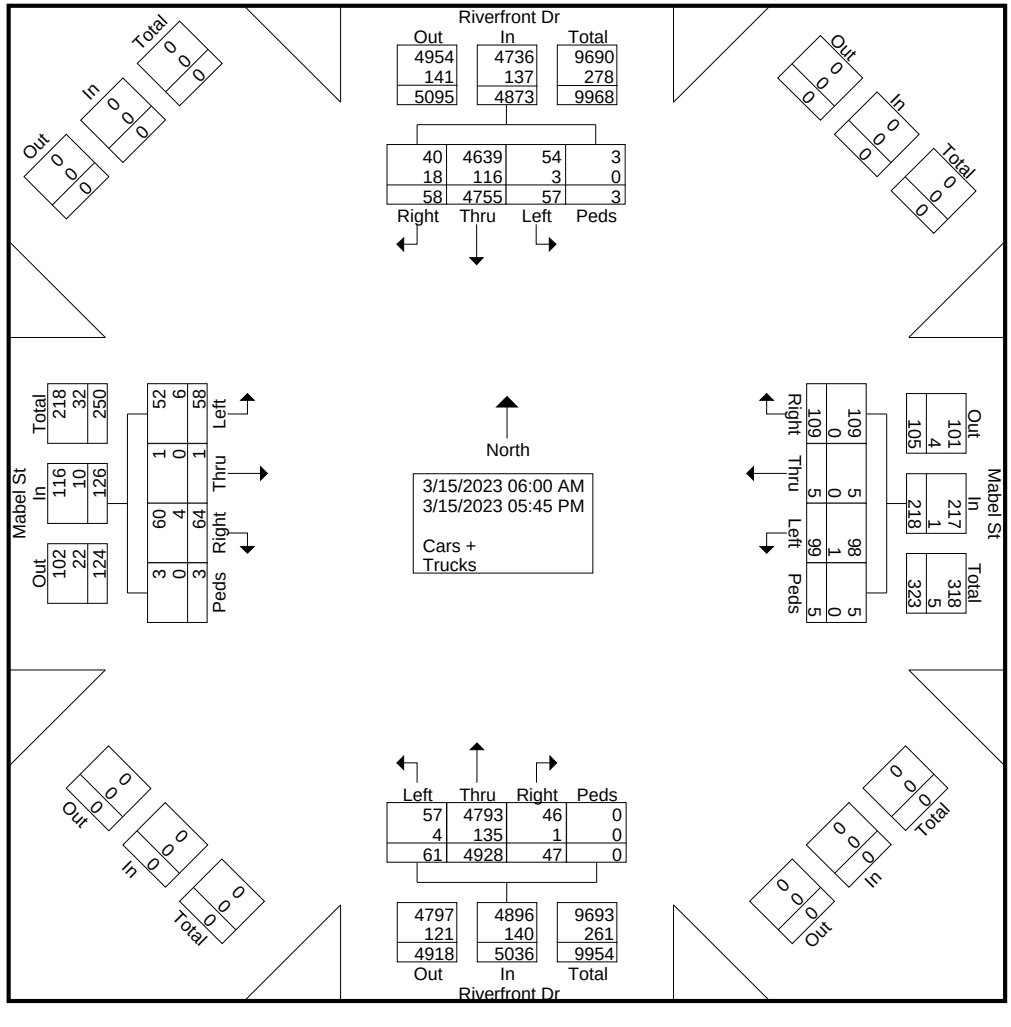
	Riverfront Dr Southbound					Mabel St Westbound					Riverfront Dr Northbound					Mabel St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:45 PM	1	105	0	0	106	1	0	2	0	3	2	84	0	0	86	1	0	1	0	2	197
Total	1	393	2	0	396	12	0	6	0	18	5	439	5	0	449	4	0	6	0	10	873
01:00 PM	2	95	1	0	98	2	0	1	0	3	2	110	0	0	112	1	0	0	0	1	214
01:15 PM	0	104	1	0	105	1	0	3	0	4	2	89	1	0	92	1	0	2	0	3	204
01:30 PM	1	86	1	0	88	3	0	0	0	3	0	79	1	0	80	2	0	0	0	2	173
01:45 PM	1	81	2	0	84	2	1	3	0	6	1	86	1	0	88	0	0	4	0	4	182
Total	4	366	5	0	375	8	1	7	0	16	5	364	3	0	372	4	0	6	0	10	773
02:00 PM	1	101	2	0	104	3	1	0	0	4	1	113	2	0	116	1	0	1	0	2	226
02:15 PM	0	97	1	0	98	6	0	1	0	7	1	94	1	0	96	3	0	2	0	5	206
02:30 PM	0	99	1	0	100	0	0	0	0	0	1	144	1	0	146	1	0	3	0	4	250
02:45 PM	1	97	0	0	98	3	0	9	0	12	2	143	1	0	146	1	0	0	0	1	257
Total	2	394	4	0	400	12	1	10	0	23	5	494	5	0	504	6	0	6	0	12	939
03:00 PM	1	107	2	0	110	0	0	8	0	8	3	124	1	0	128	1	0	1	0	2	248
03:15 PM	1	94	3	0	98	0	0	8	0	8	0	129	2	0	131	1	0	1	0	2	239
03:30 PM	2	114	1	0	117	4	0	1	0	5	1	141	2	0	144	1	0	1	0	2	268
03:45 PM	1	138	2	1	142	2	0	3	0	5	1	132	1	0	134	0	0	0	1	1	282
Total	5	453	8	1	467	6	0	20	0	26	5	526	6	0	537	3	0	3	1	7	1037
04:00 PM	2	135	0	0	137	7	0	2	4	13	5	130	0	0	135	2	0	2	0	4	289
04:15 PM	1	113	1	1	116	7	0	2	0	9	2	143	3	0	148	3	0	3	0	6	279
04:30 PM	2	125	0	0	127	4	1	9	0	14	1	184	1	0	186	3	0	2	0	5	332
04:45 PM	5	111	1	0	117	5	1	3	0	9	0	146	3	0	149	2	0	1	0	3	278
Total	10	484	2	1	497	23	2	16	4	45	8	603	7	0	618	10	0	8	0	18	1178
05:00 PM	1	119	3	0	123	2	0	1	0	3	0	165	2	0	167	5	0	2	0	7	300
05:15 PM	1	107	0	0	108	3	0	2	0	5	2	132	0	0	134	2	0	1	0	3	250
05:30 PM	0	104	6	0	110	3	0	1	0	4	3	94	1	0	98	0	0	1	0	1	213
05:45 PM	1	87	1	0	89	3	0	0	0	3	0	83	2	0	85	0	0	0	0	0	177
Total	3	417	10	0	430	11	0	4	0	15	5	474	5	0	484	7	0	4	0	11	940
Grand Total	58	4755	57	3	4873	109	5	99	5	218	47	4928	61	0	5036	64	1	58	3	126	10253
Apprch %	1.2	97.6	1.2	0.1		50	2.3	45.4	2.3		0.9	97.9	1.2	0		50.8	0.8	46	2.4		
Total %	0.6	46.4	0.6	0	47.5	1.1	0	1	0	2.1	0.5	48.1	0.6	0	49.1	0.6	0	0.6	0	1.2	
Cars +	40	4639	54	3	4736	109	5	98	5	217	46	4793	57	0	4896	60	1	52	3	116	9965
% Cars +	69	97.6	94.7	100	97.2	100	100	99	100	99.5	97.9	97.3	93.4	0	97.2	93.8	100	89.7	100	92.1	97.2
Trucks	18	116	3	0	137	0	0	1	0	1	1	135	4	0	140	4	0	6	0	10	288
% Trucks	31	2.4	5.3	0	2.8	0	0	1	0	0.5	2.1	2.7	6.6	0	2.8	6.2	0	10.3	0	7.9	2.8

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 3

Riverfront Dr at Mabel St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 4

Riverfront Dr at Mabel St
Mankato, Minnesota

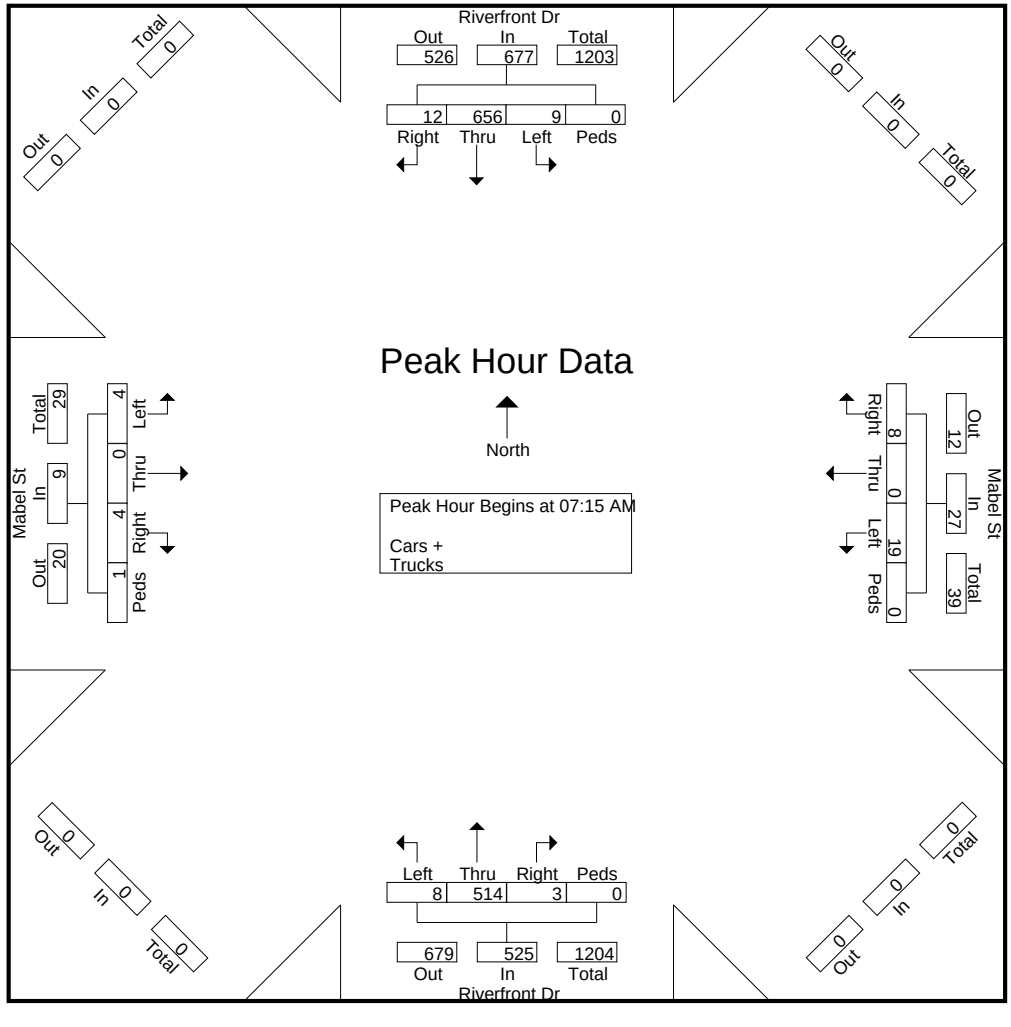
	Riverfront Dr Southbound					Mabel St Westbound					Riverfront Dr Northbound					Mabel St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 12:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	3	121	1	0	125	2	0	0	0	2	0	84	2	0	86	**2**	0	1	0	**3**	216
07:30 AM	**4**	186	**4**	0	194	2	0	4	0	6	0	134	1	0	135	0	0	1	0	1	336
07:45 AM	3	**201**	2	0	**206**	**3**	0	**8**	0	**11**	**2**	**182**	**4**	0	**188**	1	0	0	**1**	2	**407**
08:00 AM	2	148	2	0	152	1	0	7	0	8	1	114	1	0	116	1	0	**2**	0	3	279
Total Volume	12	656	9	0	677	8	0	19	0	27	3	514	8	0	525	4	0	4	1	9	1238
% App. Total	1.8	96.9	1.3	0		29.6	0	70.4	0		0.6	97.9	1.5	0		44.4	0	44.4	11.1		
PHF	.750	.816	.563	.000	.822	.667	.000	.594	.000	.614	.375	.706	.500	.000	.698	.500	.000	.500	.250	.750	.760

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 5

Riverfront Dr at Mabel St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 6

Riverfront Dr at Mabel St
Mankato, Minnesota

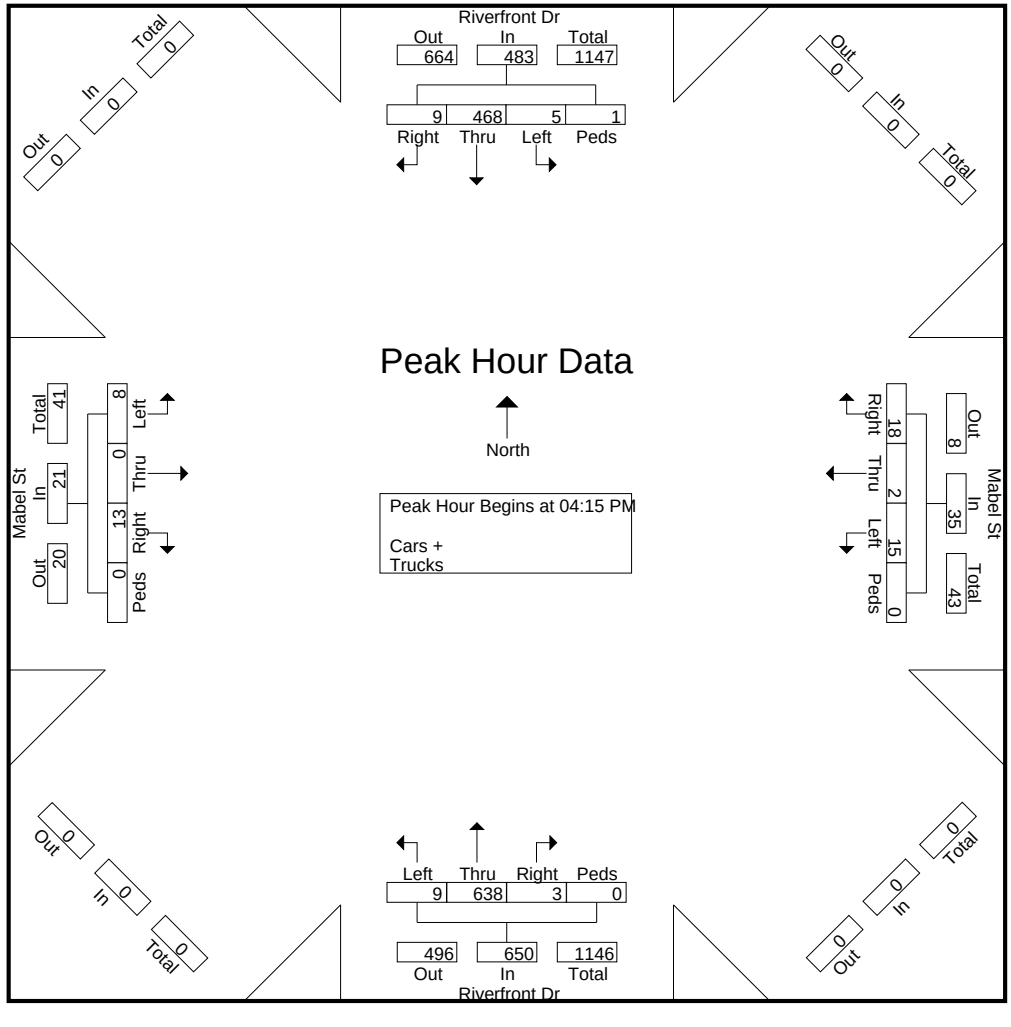
	Riverfront Dr Southbound					Mabel St Westbound					Riverfront Dr Northbound					Mabel St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:15 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	1	113	1	**1**	116	**7**	0	2	0	9	**2**	143	**3**	0	148	3	0	**3**	0	6	279
04:30 PM	2	**125**	0	0	**127**	4	**1**	**9**	0	**14**	1	**184**	1	0	**186**	3	0	2	0	5	**332**
04:45 PM	**5**	111	1	0	117	5	1	3	0	9	0	146	3	0	149	2	0	1	0	3	278
05:00 PM	1	119	**3**	0	123	2	0	1	0	3	0	165	2	0	167	**5**	0	2	0	**7**	300
Total Volume	9	468	5	1	483	18	2	15	0	35	3	638	9	0	650	13	0	8	0	21	1189
% App. Total	1.9	96.9	1	0.2		51.4	5.7	42.9	0		0.5	98.2	1.4	0		61.9	0	38.1	0		
PHF	.450	.936	.417	.250	.951	.643	.500	.417	.000	.625	.375	.867	.750	.000	.874	.650	.000	.667	.000	.750	.895

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Mabel St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 7

Riverfront Dr at Mabel St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 1

Riverfront Dr at May St
Mankato, Minnesota

Groups Printed- Cars + - Trucks

	Riverfront Dr Southbound					May St Westbound					Riverfront Dr Northbound					May St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
06:00 AM	0	34	1	0	35	1	0	0	0	1	2	21	0	0	23	0	0	0	0	0	59
06:15 AM	0	31	1	0	32	0	0	1	0	1	0	33	0	0	33	0	0	0	0	0	66
06:30 AM	0	56	0	0	56	1	0	7	0	8	1	65	0	0	66	0	0	0	0	0	130
06:45 AM	0	87	2	0	89	3	0	2	0	5	2	55	0	0	57	0	0	0	0	0	151
Total	0	208	4	0	212	5	0	10	0	15	5	174	0	0	179	0	0	0	0	0	406
07:00 AM	0	82	0	0	82	5	0	3	0	8	4	56	0	0	60	0	0	0	0	0	150
07:15 AM	0	117	0	0	117	6	0	4	0	10	2	81	0	0	83	0	0	0	0	0	210
07:30 AM	0	185	4	0	189	10	0	3	0	13	4	131	0	0	135	0	0	0	0	0	337
07:45 AM	0	204	3	0	207	7	0	6	0	13	1	179	0	0	180	0	0	0	0	0	400
Total	0	588	7	0	595	28	0	16	0	44	11	447	0	0	458	0	0	0	0	0	1097
08:00 AM	0	149	3	0	152	4	0	4	0	8	2	116	0	0	118	0	0	0	0	0	278
08:15 AM	0	124	0	0	124	3	0	1	0	4	4	75	0	0	79	0	0	0	0	0	207
08:30 AM	0	95	3	0	98	2	0	1	0	3	0	91	0	0	91	0	0	0	0	0	192
08:45 AM	0	94	1	0	95	4	0	1	0	5	3	69	0	0	72	0	0	0	0	0	172
Total	0	462	7	0	469	13	0	7	0	20	9	351	0	0	360	0	0	0	0	0	849
09:00 AM	0	67	1	0	68	4	0	0	0	4	2	72	0	0	74	0	0	0	0	0	146
09:15 AM	0	86	2	0	88	3	0	2	0	5	2	74	0	0	76	0	0	0	0	0	169
09:30 AM	0	78	2	0	80	3	0	2	0	5	0	70	0	0	70	0	0	0	0	0	155
09:45 AM	0	74	3	0	77	6	0	5	0	11	3	62	0	0	65	0	0	0	0	0	153
Total	0	305	8	0	313	16	0	9	0	25	7	278	0	0	285	0	0	0	0	0	623
10:00 AM	0	76	2	0	78	3	0	3	0	6	1	80	0	0	81	0	0	0	0	0	165
10:15 AM	0	71	2	0	73	4	0	3	0	7	3	69	0	0	72	0	0	0	0	0	152
10:30 AM	0	80	1	0	81	6	0	6	0	12	2	83	0	0	85	0	0	0	0	0	178
10:45 AM	0	94	1	0	95	1	0	5	0	6	5	70	0	0	75	0	0	0	0	0	176
Total	0	321	6	0	327	14	0	17	0	31	11	302	0	0	313	0	0	0	0	0	671
11:00 AM	0	85	1	0	86	5	0	7	0	12	4	85	0	0	89	0	0	0	0	0	187
11:15 AM	0	100	0	0	100	6	0	3	0	9	4	121	0	0	125	0	0	0	0	0	234
11:30 AM	0	101	2	0	103	6	0	6	0	12	6	92	0	0	98	0	0	0	0	0	213
11:45 AM	0	99	2	0	101	1	0	4	0	5	0	129	0	0	129	0	0	0	0	0	235
Total	0	385	5	0	390	18	0	20	0	38	14	427	0	0	441	0	0	0	0	0	869
12:00 PM	0	93	1	0	94	5	0	2	0	7	7	116	0	0	123	0	0	0	0	0	224
12:15 PM	0	112	4	0	116	2	0	9	0	11	1	108	0	0	109	0	0	0	0	0	236
12:30 PM	0	85	2	0	87	4	0	7	0	11	6	115	0	0	121	0	0	0	0	0	219

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 2

Riverfront Dr at May St
Mankato, Minnesota

Groups Printed- Cars + - Trucks

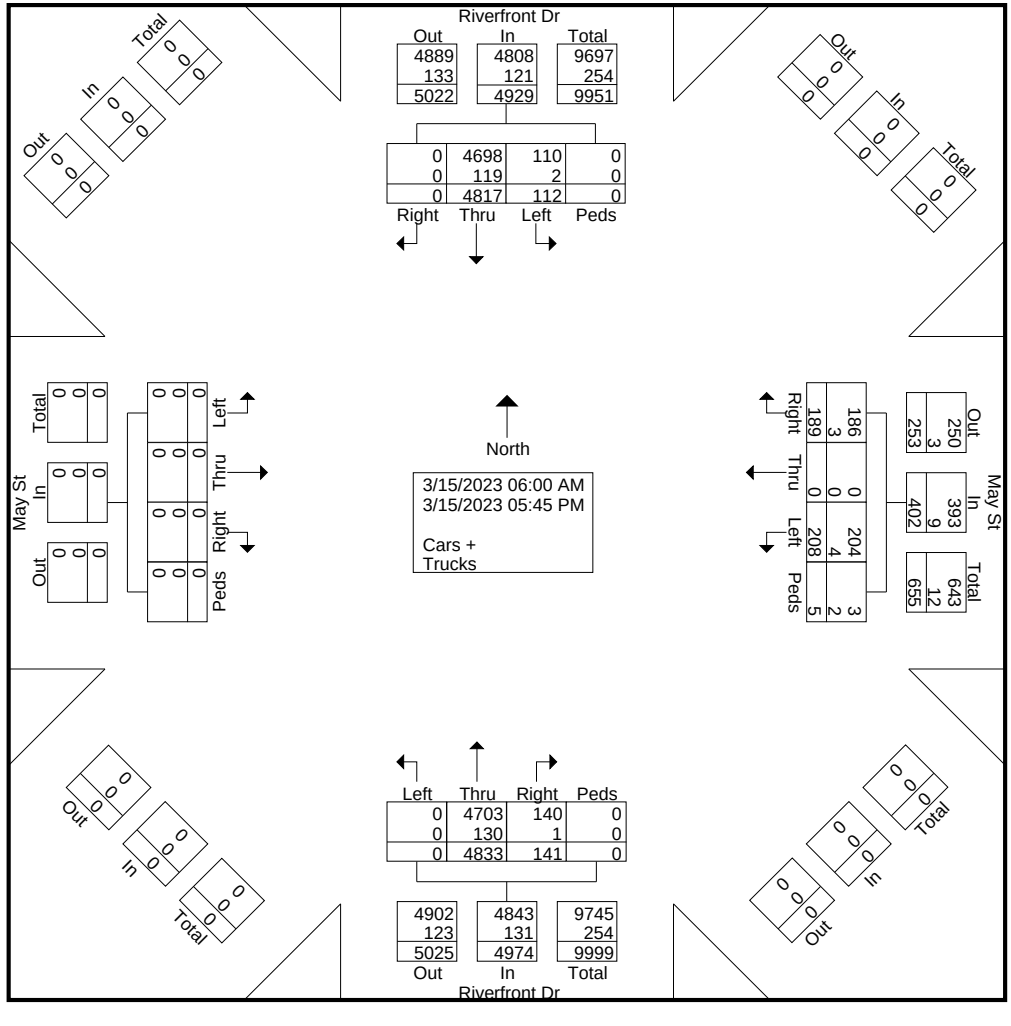
	Riverfront Dr Southbound					May St Westbound					Riverfront Dr Northbound					May St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
12:45 PM	0	101	3	0	104	7	0	4	0	11	3	86	0	0	89	0	0	0	0	0	204
Total	0	391	10	0	401	18	0	22	0	40	17	425	0	0	442	0	0	0	0	0	883
01:00 PM	0	94	4	0	98	6	0	9	0	15	4	117	0	0	121	0	0	0	0	0	234
01:15 PM	0	100	2	0	102	2	0	2	0	4	5	88	0	0	93	0	0	0	0	0	199
01:30 PM	0	92	4	0	96	5	0	3	0	8	3	79	0	0	82	0	0	0	0	0	186
01:45 PM	0	83	2	0	85	6	0	1	1	8	2	87	0	0	89	0	0	0	0	0	182
Total	0	369	12	0	381	19	0	15	1	35	14	371	0	0	385	0	0	0	0	0	801
02:00 PM	0	93	4	0	97	5	0	6	0	11	2	112	0	0	114	0	0	0	0	0	222
02:15 PM	0	102	2	0	104	3	0	2	0	5	2	98	0	0	100	0	0	0	0	0	209
02:30 PM	0	94	7	0	101	5	0	3	0	8	7	144	0	0	151	0	0	0	0	0	260
02:45 PM	0	108	2	0	110	6	0	4	0	10	1	143	0	0	144	0	0	0	0	0	264
Total	0	397	15	0	412	19	0	15	0	34	12	497	0	0	509	0	0	0	0	0	955
03:00 PM	0	110	5	0	115	3	0	5	0	8	3	122	0	0	125	0	0	0	0	0	248
03:15 PM	0	104	3	0	107	4	0	6	1	11	2	124	0	0	126	0	0	0	0	0	244
03:30 PM	0	115	4	0	119	3	0	3	0	6	3	138	0	0	141	0	0	0	0	0	266
03:45 PM	0	140	3	0	143	1	0	8	2	11	2	133	0	0	135	0	0	0	0	0	289
Total	0	469	15	0	484	11	0	22	3	36	10	517	0	0	527	0	0	0	0	0	1047
04:00 PM	0	144	0	0	144	5	0	9	0	14	5	122	0	0	127	0	0	0	0	0	285
04:15 PM	0	111	2	0	113	7	0	6	0	13	0	148	0	0	148	0	0	0	0	0	274
04:30 PM	0	134	5	0	139	5	0	8	0	13	3	172	0	0	175	0	0	0	0	0	327
04:45 PM	0	112	3	0	115	0	0	7	1	8	3	129	0	0	132	0	0	0	0	0	255
Total	0	501	10	0	511	17	0	30	1	48	11	571	0	0	582	0	0	0	0	0	1141
05:00 PM	0	123	5	0	128	5	0	3	0	8	11	165	0	0	176	0	0	0	0	0	312
05:15 PM	0	112	3	0	115	2	0	4	0	6	1	131	0	0	132	0	0	0	0	0	253
05:30 PM	0	102	3	0	105	2	0	8	0	10	2	88	0	0	90	0	0	0	0	0	205
05:45 PM	0	84	2	0	86	2	0	10	0	12	6	89	0	0	95	0	0	0	0	0	193
Total	0	421	13	0	434	11	0	25	0	36	20	473	0	0	493	0	0	0	0	0	963
Grand Total	0	4817	112	0	4929	189	0	208	5	402	141	4833	0	0	4974	0	0	0	0	0	10305
Apprch %	0	97.7	2.3	0		47	0	51.7	1.2		2.8	97.2	0	0		0	0	0	0		
Total %	0	46.7	1.1	0	47.8	1.8	0	2	0	3.9	1.4	46.9	0	0	48.3	0	0	0	0	0	
Cars +	0	4698	110	0	4808	186	0	204	3	393	140	4703	0	0	4843	0	0	0	0	0	10044
% Cars +	0	97.5	98.2	0	97.5	98.4	0	98.1	60	97.8	99.3	97.3	0	0	97.4	0	0	0	0	0	97.5
Trucks	0	119	2	0	121	3	0	4	2	9	1	130	0	0	131	0	0	0	0	0	261
% Trucks	0	2.5	1.8	0	2.5	1.6	0	1.9	40	2.2	0.7	2.7	0	0	2.6	0	0	0	0	0	2.5

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 3

Riverfront Dr at May St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 4

Riverfront Dr at May St
Mankato, Minnesota

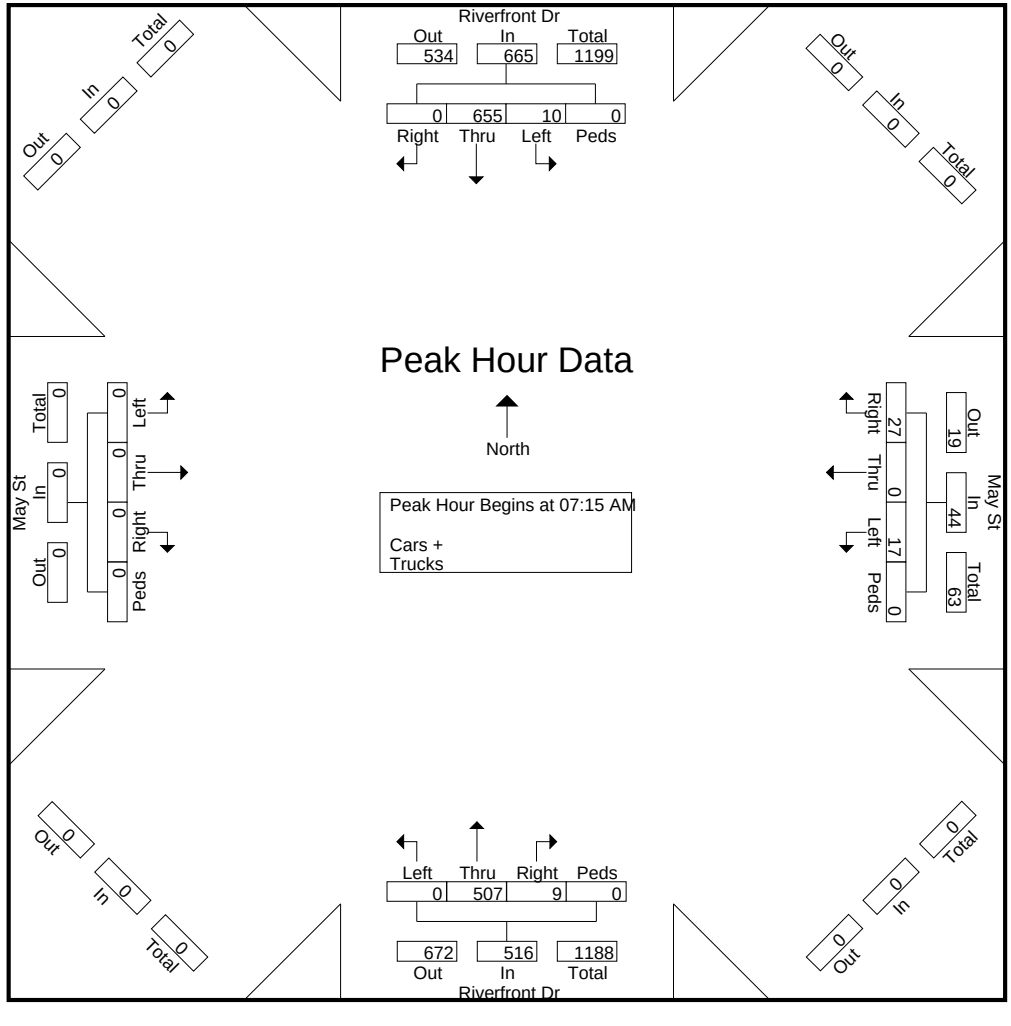
	Riverfront Dr Southbound					May St Westbound					Riverfront Dr Northbound					May St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 12:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	117	0	0	117	6	0	4	0	10	2	81	0	0	83	0	0	0	0	0	210
07:30 AM	0	185	**4**	0	189	**10**	0	3	0	**13**	**4**	131	0	0	135	0	0	0	0	0	337
07:45 AM	0	**204**	3	0	**207**	7	0	**6**	0	13	1	**179**	0	0	**180**	0	0	0	0	0	**400**
08:00 AM	0	149	3	0	152	4	0	4	0	8	2	116	0	0	118	0	0	0	0	0	278
Total Volume	0	655	10	0	665	27	0	17	0	44	9	507	0	0	516	0	0	0	0	0	1225
% App. Total	0	98.5	1.5	0		61.4	0	38.6	0		1.7	98.3	0	0		0	0	0	0		
PHF	.000	.803	.625	.000	.803	.675	.000	.708	.000	.846	.563	.708	.000	.000	.717	.000	.000	.000	.000	.000	.766

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 5

Riverfront Dr at May St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 6

Riverfront Dr at May St
Mankato, Minnesota

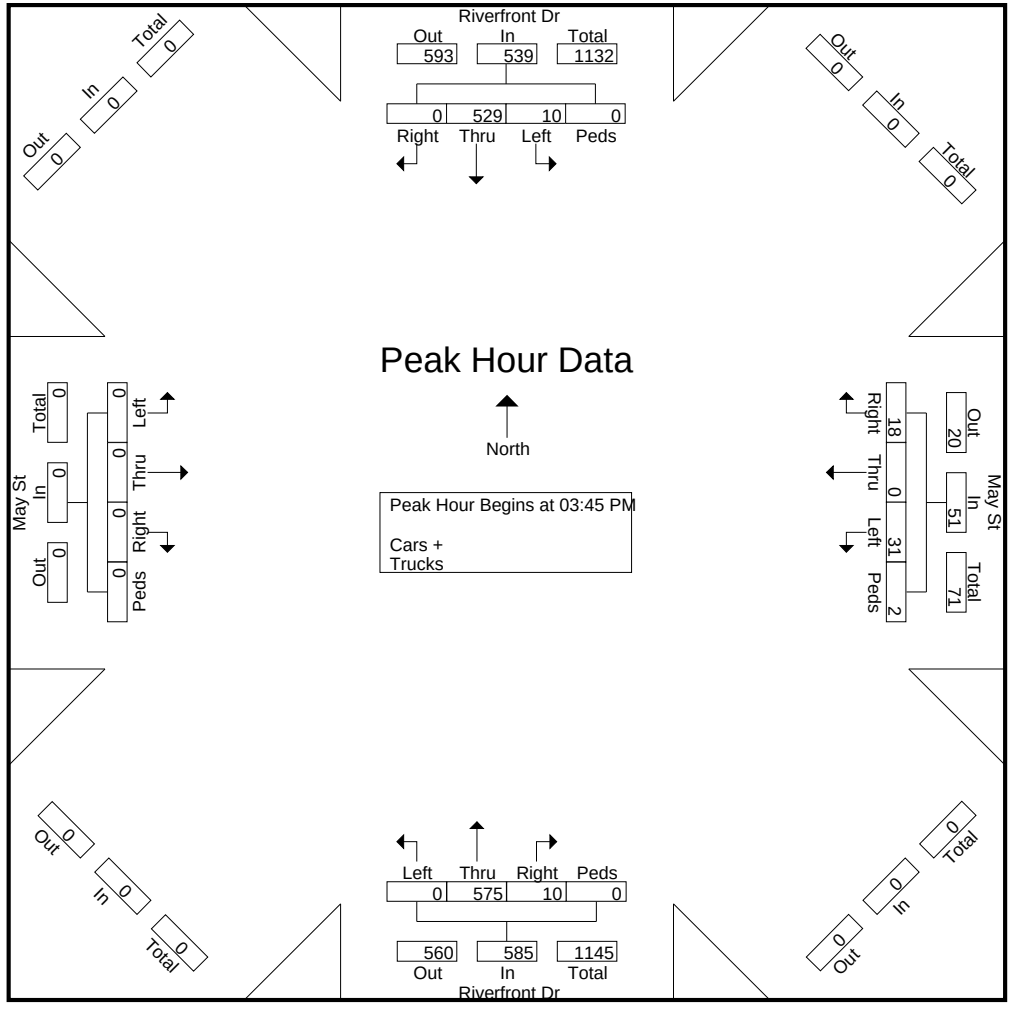
	Riverfront Dr Southbound					May St Westbound					Riverfront Dr Northbound					May St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:15 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:45 PM																					
03:45 PM	0	140	3	0	143	1	0	8	**2**	11	2	133	0	0	135	0	0	0	0	0	289
04:00 PM	0	**144**	0	0	**144**	5	0	**9**	0	**14**	**5**	122	0	0	127	0	0	0	0	0	285
04:15 PM	0	111	2	0	113	**7**	0	6	0	13	0	148	0	0	148	0	0	0	0	0	274
04:30 PM	0	134	**5**	0	139	5	0	8	0	13	3	**172**	0	0	**175**	0	0	0	0	0	**327**
Total Volume	0	529	10	0	539	18	0	31	2	51	10	575	0	0	585	0	0	0	0	0	1175
% App. Total	0	98.1	1.9	0		35.3	0	60.8	3.9		1.7	98.3	0	0		0	0	0	0		
PHF	.000	.918	.500	.000	.936	.643	.000	.861	.250	.911	.500	.836	.000	.000	.836	.000	.000	.000	.000	.000	.898

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at May St_03152023_0600-1800
Site Code : 7
Start Date : 3/15/2023
Page No : 7

Riverfront Dr at May St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Ruth St_03152023_Peaks
Site Code : 7
Start Date : 3/15/2023
Page No : 1

Riverfront Dr at Ruth St
Mankato, Minnesota

Groups Printed- Cars + - Trucks

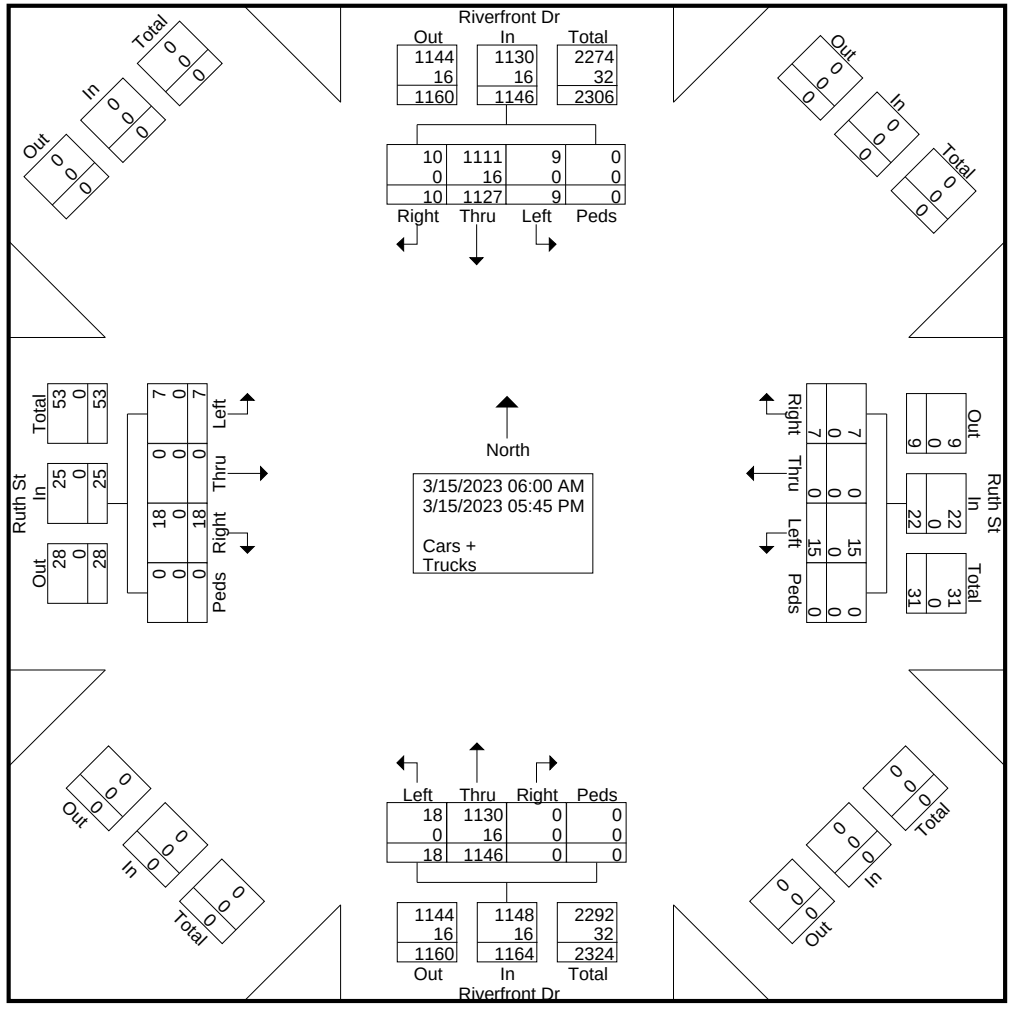
	Riverfront Dr Southbound					Ruth St Westbound					Riverfront Dr Northbound					Ruth St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:15 AM	3	112	0	0	115	1	0	4	0	5	0	85	3	0	88	1	0	0	0	1	209
07:30 AM	2	185	1	0	188	2	0	2	0	4	0	129	4	0	133	2	0	1	0	3	328
07:45 AM	1	199	2	0	202	1	0	4	0	5	0	191	1	0	192	4	0	0	0	4	403
Total	6	496	3	0	505	4	0	10	0	14	0	405	8	0	413	7	0	1	0	8	940
08:00 AM	1	150	0	0	151	1	0	2	0	3	0	118	1	0	119	0	0	0	0	0	273
Total	1	150	0	0	151	1	0	2	0	3	0	118	1	0	119	0	0	0	0	0	273
04:15 PM	1	108	2	0	111	0	0	1	0	1	0	153	3	0	156	4	0	2	0	6	274
04:30 PM	1	134	0	0	135	1	0	1	0	2	0	174	2	0	176	4	0	2	0	6	319
04:45 PM	0	113	3	0	116	0	0	1	0	1	0	128	1	0	129	1	0	1	0	2	248
Total	2	355	5	0	362	1	0	3	0	4	0	455	6	0	461	9	0	5	0	14	841
05:00 PM	1	126	1	0	128	1	0	0	0	1	0	168	3	0	171	2	0	1	0	3	303
Total	1	126	1	0	128	1	0	0	0	1	0	168	3	0	171	2	0	1	0	3	303
Grand Total	10	1127	9	0	1146	7	0	15	0	22	0	1146	18	0	1164	18	0	7	0	25	2357
Apprch %	0.9	98.3	0.8	0		31.8	0	68.2	0		0	98.5	1.5	0		72	0	28	0		
Total %	0.4	47.8	0.4	0	48.6	0.3	0	0.6	0	0.9	0	48.6	0.8	0	49.4	0.8	0	0.3	0	1.1	
Cars +	10	1111	9	0	1130	7	0	15	0	22	0	1130	18	0	1148	18	0	7	0	25	2325
% Cars +	100	98.6	100	0	98.6	100	0	100	0	100	0	98.6	100	0	98.6	100	0	100	0	100	98.6
Trucks	0	16	0	0	16	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	32
% Trucks	0	1.4	0	0	1.4	0	0	0	0	0	0	1.4	0	0	1.4	0	0	0	0	0	1.4

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Ruth St_03152023_Peaks
Site Code : 7
Start Date : 3/15/2023
Page No : 2

Riverfront Dr at Ruth St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Ruth St_03152023_Peaks
Site Code : 7
Start Date : 3/15/2023
Page No : 3

Riverfront Dr at Ruth St
Mankato, Minnesota

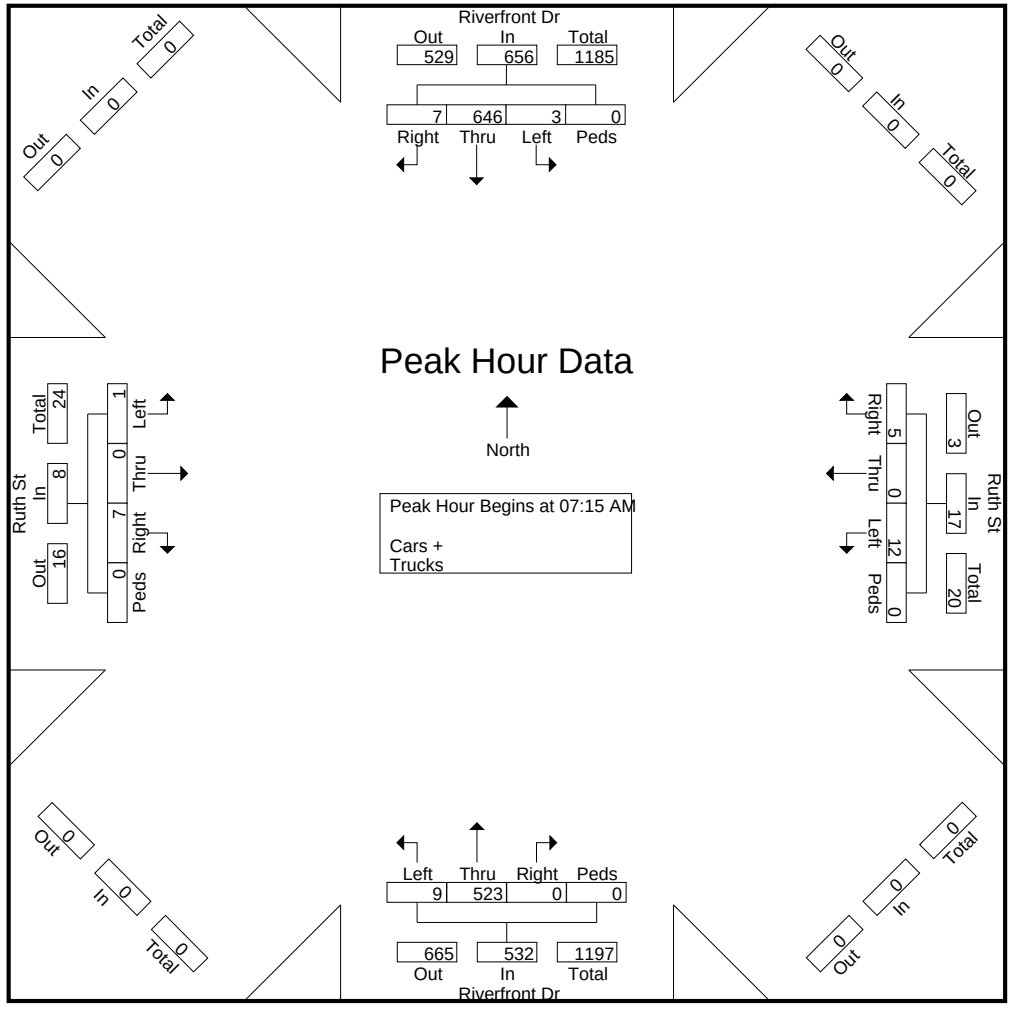
	Riverfront Dr Southbound					Ruth St Westbound					Riverfront Dr Northbound					Ruth St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 12:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**3**	112	0	0	115	1	0	**4**	0	**5**	0	85	3	0	88	1	0	0	0	1	209
07:30 AM	2	185	1	0	188	**2**	0	2	0	4	0	129	**4**	0	133	2	0	**1**	0	3	328
07:45 AM	1	**199**	**2**	0	**202**	1	0	4	0	5	0	**191**	1	0	**192**	**4**	0	0	0	**4**	**403**
08:00 AM	1	150	0	0	151	1	0	2	0	3	0	118	1	0	119	0	0	0	0	0	273
Total Volume	7	646	3	0	656	5	0	12	0	17	0	523	9	0	532	7	0	1	0	8	1213
% App. Total	1.1	98.5	0.5	0		29.4	0	70.6	0		0	98.3	1.7	0		87.5	0	12.5	0		
PHF	.583	.812	.375	.000	.812	.625	.000	.750	.000	.850	.000	.685	.563	.000	.693	.438	.000	.250	.000	.500	.752

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Ruth St_03152023_Peaks
Site Code : 7
Start Date : 3/15/2023
Page No : 4

Riverfront Dr at Ruth St
Mankato, Minnesota



Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Ruth St_03152023_Peaks
Site Code : 7
Start Date : 3/15/2023
Page No : 5

Riverfront Dr at Ruth St
Mankato, Minnesota

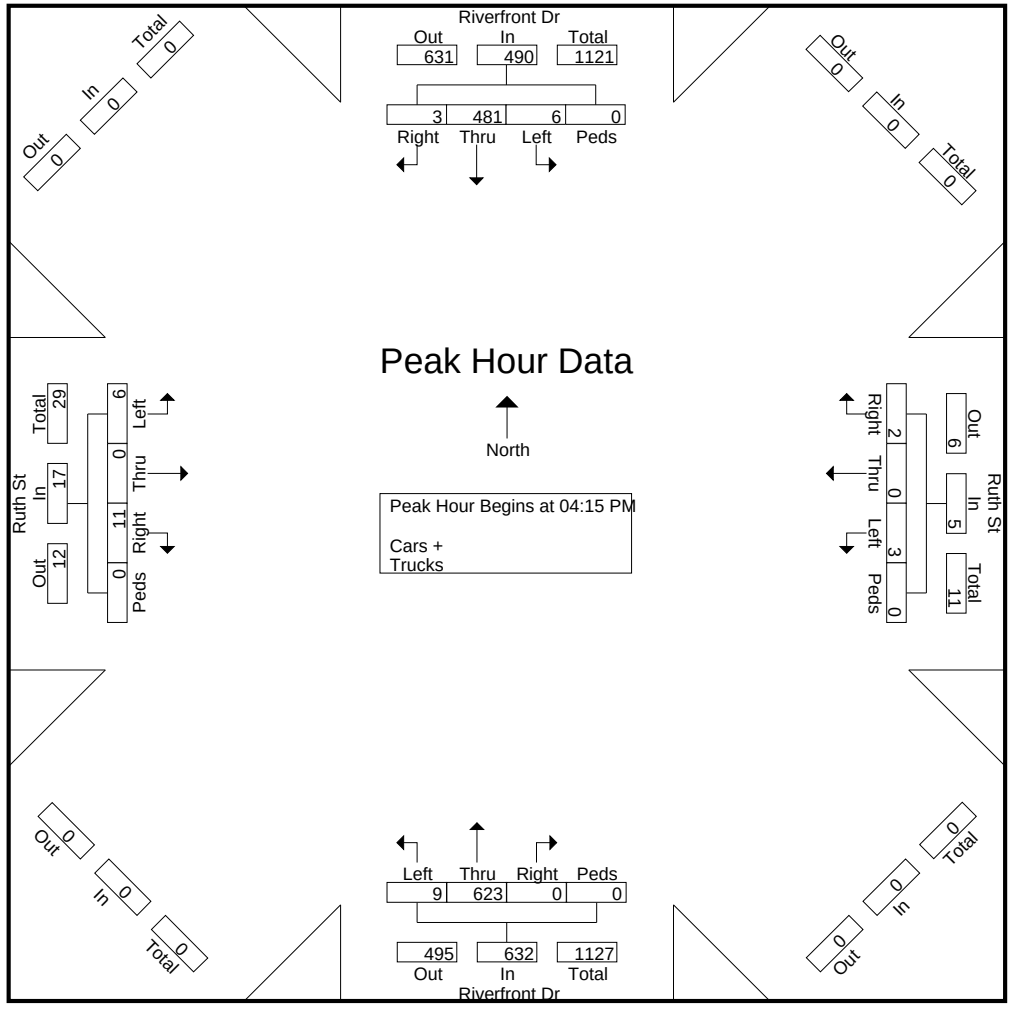
	Riverfront Dr Southbound					Ruth St Westbound					Riverfront Dr Northbound					Ruth St Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:15 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	**1**	108	2	0	111	0	0	**1**	0	1	0	153	**3**	0	156	**4**	0	**2**	0	**6**	274
04:30 PM	1	**134**	0	0	**135**	**1**	0	1	0	**2**	0	**174**	2	0	**176**	4	0	2	0	6	**319**
04:45 PM	0	113	**3**	0	116	0	0	1	0	1	0	128	1	0	129	1	0	1	0	2	248
05:00 PM	1	126	1	0	128	1	0	0	0	1	0	168	3	0	171	2	0	1	0	3	303
Total Volume	3	481	6	0	490	2	0	3	0	5	0	623	9	0	632	11	0	6	0	17	1144
% App. Total	0.6	98.2	1.2	0		40	0	60	0		0	98.6	1.4	0		64.7	0	35.3	0		
PHF	.750	.897	.500	.000	.907	.500	.000	.750	.000	.625	.000	.895	.750	.000	.898	.688	.000	.750	.000	.708	.897

Bolton & Menk, Inc.

12224 Nicollet Avenue
Burnsville, MN 55337

File Name : Riverfront Dr at Ruth St_03152023_Peaks
Site Code : 7
Start Date : 3/15/2023
Page No : 6

Riverfront Dr at Ruth St
Mankato, Minnesota



Appendix D: Warrant Analysis

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at Mabel St
Mankato, Minnesota
2023

LOCATION: Riverfront Dr at Mabel St
COUNTY: Nicollet
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB Mabel St	1
30	Minor App4:	WB Mabel St	1

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

THRESHOLDS 1A/1B: 600/900 150/75 150/75

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	0	0	0	/	0	/	0	/	/
1:00 - 2:00	0	0	0	/	0	/	0	/	/
2:00 - 3:00	0	0	0	/	0	/	0	/	/
3:00 - 4:00	0	0	0	/	0	/	0	/	/
4:00 - 5:00	0	0	0	/	0	/	0	/	/
5:00 - 6:00	0	0	0	/	0	/	0	/	/
6:00 - 7:00	220	194	414	/	4	/	3	/	/
7:00 - 8:00	612	476	1088	X/X	6	/	20	/	/
8:00 - 9:00	473	357	830	X/	8	/	16	/	/
9:00 - 10:00	318	281	599	/	14	/	10	/	/
10:00 - 11:00	316	313	629	X/	15	/	10	/	/
11:00 - 12:00	368	451	819	X/	9	/	15	/	/
12:00 - 13:00	396	449	845	X/	10	/	18	/	/
13:00 - 14:00	375	372	747	X/	10	/	16	/	/
14:00 - 15:00	400	504	904	X/X	12	/	23	/	/
15:00 - 16:00	466	537	1003	X/X	6	/	26	/	/
16:00 - 17:00	496	618	1114	X/X	18	/	41	/	/
17:00 - 18:00	430	484	914	X/X	11	/	15	/	/
18:00 - 19:00	0	0	0	/	0	/	0	/	/
19:00 - 20:00	0	0	0	/	0	/	0	/	/
20:00 - 21:00	0	0	0	/	0	/	0	/	/
21:00 - 22:00	0	0	0	/	0	/	0	/	/
22:00 - 23:00	0	0	0	/	0	/	0	/	/
23:00 - 24:00	0	0	0	/	0	/	0	/	/

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

LOCATION: Riverfront Dr at Mabel St
COUNTY: Nicollet
REF. POINT:
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Mabel St	1
30	Minor App4: WB Mabel St	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

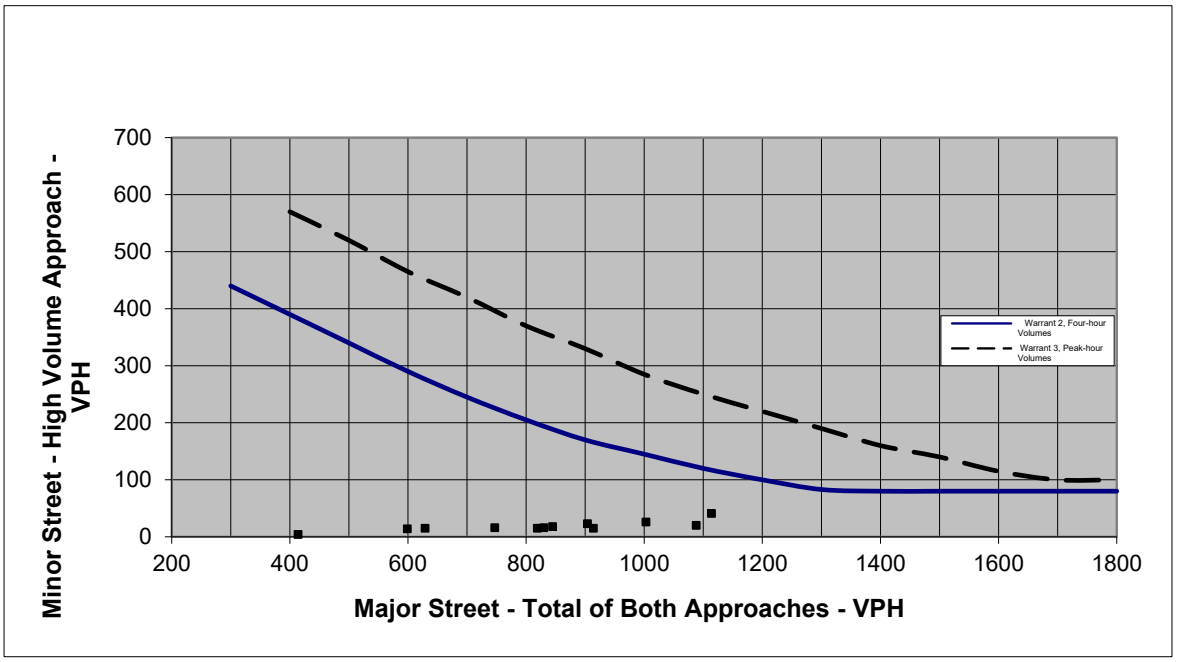


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria			Actual Hourly Count	
Major	Warrant 2, F	Warrant 3, Pe	Major	Actual Hourly Count
200			0	0
300	440		0	0
400	390	570	0	0
500	340	520	0	0
600	290	465	0	0
700	245	420	0	0
800	205	370	414	4
900	170	330	1088	20
1000	145	285	830	16
1100	120	250	599	14
1200	100	220	629	15
1300	83	190	819	15
1400	80	160	845	18
1500	80	140	747	16
1600	80	115	904	23
1700	80	100	1003	26
1800	80	100	1114	41
			914	15
			0	0
			0	0
			0	0
			0	0
			0	0
			0	0

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at May St
Mankato, Minnesota
2023

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet

DATE: 4/10/2023

OPERATOR: CW

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB May St	1
30	Minor App4:	WB May St	1

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

THRESHOLDS 1A/1B: 600/900 150/75 150/75

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	0	0	0	/	0	/	0	/	/
1:00 - 2:00	0	0	0	/	0	/	0	/	/
2:00 - 3:00	0	0	0	/	0	/	0	/	/
3:00 - 4:00	0	0	0	/	0	/	0	/	/
4:00 - 5:00	0	0	0	/	0	/	0	/	/
5:00 - 6:00	0	0	0	/	0	/	0	/	/
6:00 - 7:00	212	179	391	/	0	/	15	/	/
7:00 - 8:00	595	458	1053	X/X	0	/	44	/	/
8:00 - 9:00	469	360	829	X/	0	/	20	/	/
9:00 - 10:00	313	285	598	/	0	/	25	/	/
10:00 - 11:00	327	313	640	X/	0	/	31	/	/
11:00 - 12:00	390	441	831	X/	0	/	38	/	/
12:00 - 13:00	401	442	843	X/	0	/	40	/	/
13:00 - 14:00	381	385	766	X/	0	/	34	/	/
14:00 - 15:00	412	509	921	X/X	0	/	34	/	/
15:00 - 16:00	484	527	1011	X/X	0	/	33	/	/
16:00 - 17:00	511	582	1093	X/X	0	/	47	/	/
17:00 - 18:00	434	493	927	X/X	0	/	36	/	/
18:00 - 19:00	0	0	0	/	0	/	0	/	/
19:00 - 20:00	0	0	0	/	0	/	0	/	/
20:00 - 21:00	0	0	0	/	0	/	0	/	/
21:00 - 22:00	0	0	0	/	0	/	0	/	/
22:00 - 23:00	0	0	0	/	0	/	0	/	/
23:00 - 24:00	0	0	0	/	0	/	0	/	/

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

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet
REF. POINT:
DATE: 4/10/2023
OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB May St	1
30	Minor App4: WB May St	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

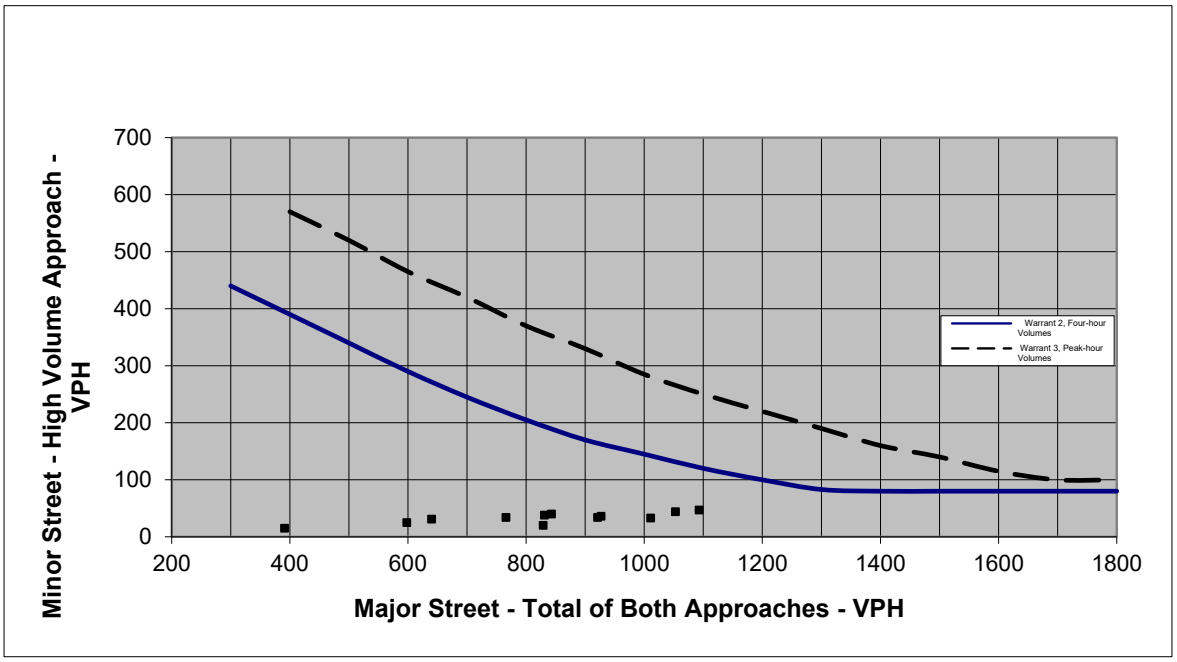


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria			Actual Hourly Count	
Major	Warrant 2, F	Warrant 3, Pe	Major	Actual Hourly Count
200			0	0
300	440		0	0
400	390	570	0	0
500	340	520	0	0
600	290	465	0	0
700	245	420	0	0
800	205	370	391	15
900	170	330	1053	44
1000	145	285	829	20
1100	120	250	598	25
1200	100	220	640	31
1300	83	190	831	38
1400	80	160	843	40
1500	80	140	766	34
1600	80	115	921	34
1700	80	100	1011	33
1800	80	100	1093	47
			927	36
			0	0
			0	0
			0	0
			0	0
			0	0
			0	0

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at May St (RIRO)
Mankato, Minnesota
2023

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet

DATE: 4/11/2023

OPERATOR: CW

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB May St	1
30	Minor App4:	WB May St	1

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

THRESHOLDS 1A/1B: 600/900 150/75 150/75

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	0	0	0	/	0	/	0	/	**/**
1:00 - 2:00	0	0	0	/	0	/	0	/	**/**
2:00 - 3:00	0	0	0	/	0	/	0	/	**/**
3:00 - 4:00	0	0	0	/	0	/	0	/	**/**
4:00 - 5:00	0	0	0	/	0	/	0	/	**/**
5:00 - 6:00	0	0	0	/	0	/	0	/	**/**
6:00 - 7:00	219	179	398	/	0	/	17	/	**/**
7:00 - 8:00	612	458	1070	X/X	0	/	65	/	**/**
8:00 - 9:00	486	360	846	X/	0	/	36	/	**/**
9:00 - 10:00	326	285	611	X/	0	/	33	/	**/**
10:00 - 11:00	352	313	665	X/	0	/	34	/	**/**
11:00 - 12:00	399	441	840	X/	0	/	52	/	**/**
12:00 - 13:00	415	442	857	X/	0	/	50	/	**/**
13:00 - 14:00	400	385	785	X/	0	/	47	/	**/**
14:00 - 15:00	429	509	938	X/X	0	/	52	/	**/**
15:00 - 16:00	503	527	1030	X/X	0	/	68	/	**/**
16:00 - 17:00	528	582	1110	X/X	0	/	77	/X	**/X**
17:00 - 18:00	458	493	951	X/X	0	/	43	/	**/**
18:00 - 19:00	0	0	0	/	0	/	0	/	**/**
19:00 - 20:00	0	0	0	/	0	/	0	/	**/**
20:00 - 21:00	0	0	0	/	0	/	0	/	**/**
21:00 - 22:00	0	0	0	/	0	/	0	/	**/**
22:00 - 23:00	0	0	0	/	0	/	0	/	**/**
23:00 - 24:00	0	0	0	/	0	/	0	/	**/**

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

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet
REF. POINT:
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB May St	1
30	Minor App4: WB May St	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

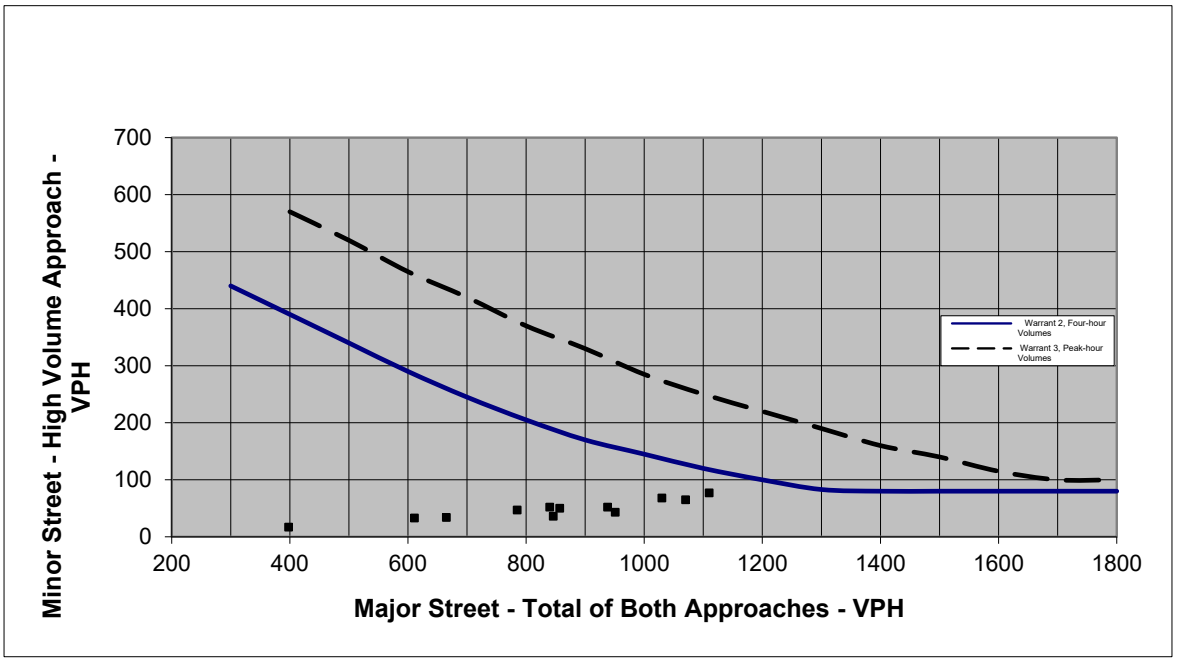


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria			Actual Hourly Count	
Major	Warrant 2, F	Warrant 3, Pe	Major	Actual Hourly Count
200			0	0
300	440		0	0
400	390	570	0	0
500	340	520	0	0
600	290	465	0	0
700	245	420	0	0
800	205	370	398	17
900	170	330	1070	65
1000	145	285	846	36
1100	120	250	611	33
1200	100	220	665	34
1300	83	190	840	52
1400	80	160	857	50
1500	80	140	785	47
1600	80	115	938	52
1700	80	100	1030	68
1800	80	100	1110	77
			951	43
			0	0
			0	0
			0	0
			0	0
			0	0
			0	0

BOLTON & MENK

Real People. Real Solutions.

ALL WAY STOP WARRANT ANALYSIS
FOR
Riverfront Dr at Mabel St
Mankato, Minnesota
2023

LOCATION: Riverfront Dr at Mabel St
COUNTY: Nicollet
REF. POINT:
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Mabel St	1
30	Minor App4: WB Mabel St	1

0.70 FACTOR USED? No

					300	200	
HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	0	0	0	0	0	0	/
1:00 - 2:00	0	0	0	0	0	0	/
2:00 - 3:00	0	0	0	0	0	0	/
3:00 - 4:00	0	0	0	0	0	0	/
4:00 - 5:00	0	0	0	0	0	0	/
5:00 - 6:00	0	0	0	0	0	0	/
6:00 - 7:00	220	194	4	3	414	7	X/
7:00 - 8:00	612	476	6	20	1088	26	X/
8:00 - 9:00	473	357	8	16	830	24	X/
9:00 - 10:00	318	281	14	10	599	24	X/
10:00 - 11:00	316	313	15	10	629	25	X/
11:00 - 12:00	368	451	9	15	819	24	X/
12:00 - 13:00	396	449	10	18	845	28	X/
13:00 - 14:00	375	372	10	16	747	26	X/
14:00 - 15:00	400	504	12	23	904	35	X/
15:00 - 16:00	466	537	6	26	1003	32	X/
16:00 - 17:00	496	618	18	41	1114	59	X/
17:00 - 18:00	430	484	11	15	914	26	X/
18:00 - 19:00	0	0	0	0	0	0	/
19:00 - 20:00	0	0	0	0	0	0	/
20:00 - 21:00	0	0	0	0	0	0	/
21:00 - 22:00	0	0	0	0	0	0	/
22:00 - 23:00	0	0	0	0	0	0	/
23:00 - 24:00	0	0	0	0	0	0	/

	Met (Hr)	Required (Hr)	
Allway Stop Warrant:	0	8	Not satisfied

REMARKS:

BOLTON & MENK

Real People. Real Solutions.

ALL WAY STOP WARRANT ANALYSIS
FOR
Riverfront Dr at May St
Mankato, Minnesota
2023

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet
REF. POINT:
DATE: 4/10/2023

OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB May St	1
30	Minor App4: WB May St	1

0.70 FACTOR USED? No

					300	200	
HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	0	0	0	0	0	0	/
1:00 - 2:00	0	0	0	0	0	0	/
2:00 - 3:00	0	0	0	0	0	0	/
3:00 - 4:00	0	0	0	0	0	0	/
4:00 - 5:00	0	0	0	0	0	0	/
5:00 - 6:00	0	0	0	0	0	0	/
6:00 - 7:00	212	179	0	15	391	15	X/
7:00 - 8:00	595	458	0	44	1053	44	X/
8:00 - 9:00	469	360	0	20	829	20	X/
9:00 - 10:00	313	285	0	25	598	25	X/
10:00 - 11:00	327	313	0	31	640	31	X/
11:00 - 12:00	390	441	0	38	831	38	X/
12:00 - 13:00	401	442	0	40	843	40	X/
13:00 - 14:00	381	385	0	34	766	34	X/
14:00 - 15:00	412	509	0	34	921	34	X/
15:00 - 16:00	484	527	0	33	1011	33	X/
16:00 - 17:00	511	582	0	47	1093	47	X/
17:00 - 18:00	434	493	0	36	927	36	X/
18:00 - 19:00	0	0	0	0	0	0	/
19:00 - 20:00	0	0	0	0	0	0	/
20:00 - 21:00	0	0	0	0	0	0	/
21:00 - 22:00	0	0	0	0	0	0	/
22:00 - 23:00	0	0	0	0	0	0	/
23:00 - 24:00	0	0	0	0	0	0	/

	Met (Hr)	Required (Hr)	
Allway Stop Warrant:	0	8	Not satisfied

REMARKS: _____

BOLTON & MENK

Real People. Real Solutions.

ALL WAY STOP WARRANT ANALYSIS
FOR
Riverfront Dr at May St (RIRO)
Mankato, Minnesota
2023

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet
REF. POINT:
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB May St	1
30	Minor App4: WB May St	1

0.70 FACTOR USED? No

					300	200	
HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	0	0	0	0	0	0	/
1:00 - 2:00	0	0	0	0	0	0	/
2:00 - 3:00	0	0	0	0	0	0	/
3:00 - 4:00	0	0	0	0	0	0	/
4:00 - 5:00	0	0	0	0	0	0	/
5:00 - 6:00	0	0	0	0	0	0	/
6:00 - 7:00	219	179	0	17	398	17	X/
7:00 - 8:00	612	458	0	65	1070	65	X/
8:00 - 9:00	486	360	0	36	846	36	X/
9:00 - 10:00	326	285	0	33	611	33	X/
10:00 - 11:00	352	313	0	34	665	34	X/
11:00 - 12:00	399	441	0	52	840	52	X/
12:00 - 13:00	415	442	0	50	857	50	X/
13:00 - 14:00	400	385	0	47	785	47	X/
14:00 - 15:00	429	509	0	52	938	52	X/
15:00 - 16:00	503	527	0	68	1030	68	X/
16:00 - 17:00	528	582	0	77	1110	77	X/
17:00 - 18:00	458	493	0	43	951	43	X/
18:00 - 19:00	0	0	0	0	0	0	/
19:00 - 20:00	0	0	0	0	0	0	/
20:00 - 21:00	0	0	0	0	0	0	/
21:00 - 22:00	0	0	0	0	0	0	/
22:00 - 23:00	0	0	0	0	0	0	/
23:00 - 24:00	0	0	0	0	0	0	/

	Met (Hr)	Required (Hr)	
Allway Stop Warrant:	0	8	Not satisfied

REMARKS: _____

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at May St (RIRO) with Development and Broad St Traffic Mankato, Minnesota

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB May St	1
30	Minor App4:	WB May St	1

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

THRESHOLDS 1A/1B: 600/900 150/75 150/75

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	0	0	0	/	0	/	0	/	**/**
1:00 - 2:00	0	0	0	/	0	/	0	/	**/**
2:00 - 3:00	0	0	0	/	0	/	0	/	**/**
3:00 - 4:00	0	0	0	/	0	/	0	/	**/**
4:00 - 5:00	0	0	0	/	0	/	0	/	**/**
5:00 - 6:00	0	0	0	/	0	/	0	/	**/**
6:00 - 7:00	221	180	401	/	0	/	22	/	**/**
7:00 - 8:00	617	461	1078	X/X	0	/	84	/X	**/X**
8:00 - 9:00	491	362	853	X/	0	/	47	/	**/**
9:00 - 10:00	330	287	617	X/	0	/	42	/	**/**
10:00 - 11:00	358	316	674	X/	0	/	44	/	**/**
11:00 - 12:00	402	444	846	X/	0	/	67	/	**/**
12:00 - 13:00	420	446	866	X/	0	/	65	/	**/**
13:00 - 14:00	406	388	794	X/	0	/	60	/	**/**
14:00 - 15:00	435	512	947	X/X	0	/	67	/	**/**
15:00 - 16:00	509	529	1038	X/X	0	/	88	/X	**/X**
16:00 - 17:00	533	585	1118	X/X	0	/	100	/X	**/X**
17:00 - 18:00	465	498	963	X/X	0	/	56	/	**/**
18:00 - 19:00	0	0	0	/	0	/	0	/	**/**
19:00 - 20:00	0	0	0	/	0	/	0	/	**/**
20:00 - 21:00	0	0	0	/	0	/	0	/	**/**
21:00 - 22:00	0	0	0	/	0	/	0	/	**/**
22:00 - 23:00	0	0	0	/	0	/	0	/	**/**
23:00 - 24:00	0	0	0	/	0	/	0	/	**/**

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

LOCATION: Riverfront Dr at May St
COUNTY: Nicollet
REF. POINT:
DATE: 4/11/2023
OPERATOR: CW

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB May St	1
30	Minor App4: WB May St	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

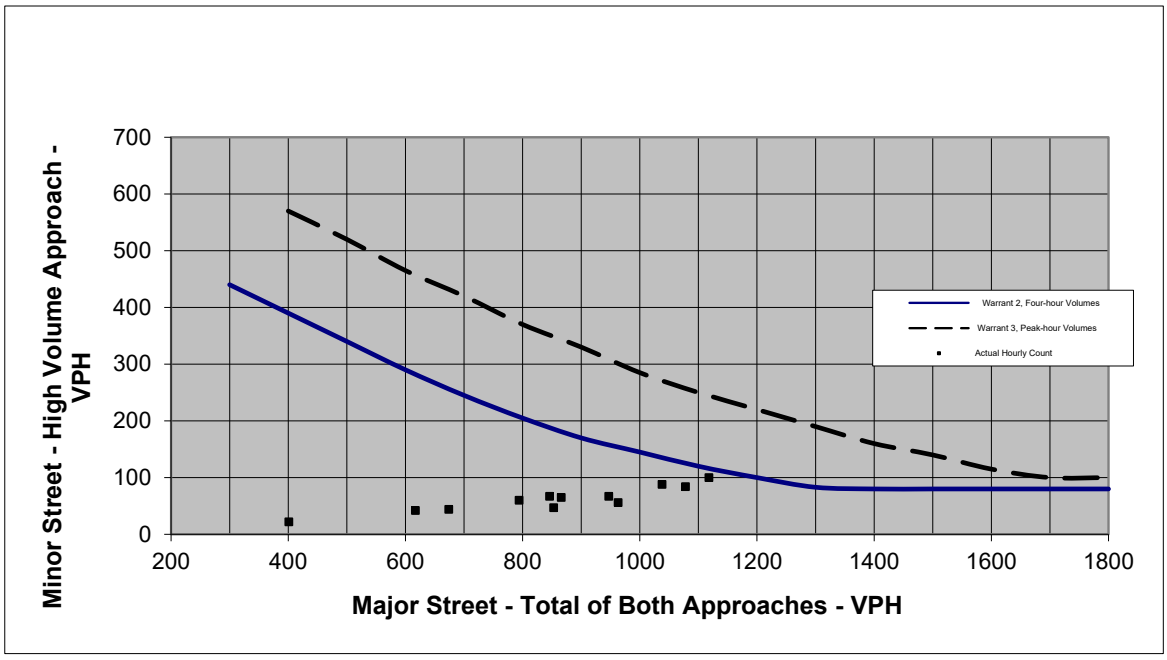


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria			Actual Hourly Count	
Major	Warrant 2, F	Warrant 3, Pe	Major	Actual Hourly Count
200			0	0
300	440		0	0
400	390	570	0	0
500	340	520	0	0
600	290	465	0	0
700	245	420	0	0
800	205	370	401	22
900	170	330	1078	84
1000	145	285	853	47
1100	120	250	617	42
1200	100	220	674	44
1300	83	190	846	67
1400	80	160	866	65
1500	80	140	794	60
1600	80	115	947	67
1700	80	100	1038	88
1800	80	100	1118	100
			963	56
			0	0
			0	0
			0	0
			0	0
			0	0
			0	0

BOLTON & MENK
Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at Good Counsel Dr
Mankato, Minnesota

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB Good Counsel Dr	1
30	Minor App4:	WB Good Counsel Dr	1

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

THRESHOLDS 1A/1B:				600/900			150/75	150/75	
HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	17	23	40	/	0	/	0	/	**/**
1:00 - 2:00	8	9	17	/	0	/	0	/	**/**
2:00 - 3:00	10	26	36	/	0	/	1	/	**/**
3:00 - 4:00	17	17	34	/	0	/	0	/	**/**
4:00 - 5:00	54	62	116	/	0	/	0	/	**/**
5:00 - 6:00	126	114	240	/	1	/	2	/	**/**
6:00 - 7:00	297	226	523	/	2	/	9	/	**/**
7:00 - 8:00	902	478	1380	X/X	8	/	8	/	**/**
8:00 - 9:00	564	366	930	X/X	6	/	24	/	**/**
9:00 - 10:00	375	336	711	X/	14	/	11	/	**/**
10:00 - 11:00	373	355	728	X/	16	/	15	/	**/**
11:00 - 12:00	409	500	909	X/X	4	/	60	/	**/**
12:00 - 13:00	437	512	949	X/X	9	/	45	/	**/**
13:00 - 14:00	444	428	872	X/	9	/	53	/	**/**
14:00 - 15:00	417	606	1023	X/X	18	/	73	/	**/**
15:00 - 16:00	519	643	1162	X/X	9	/	145	/X	**/X**
16:00 - 17:00	502	755	1257	X/X	24	/	116	/X	**/X**
17:00 - 18:00	499	583	1082	X/X	15	/	31	/	**/**
18:00 - 19:00	331	342	673	X/	18	/	34	/	**/**
19:00 - 20:00	191	219	410	/	4	/	20	/	**/**
20:00 - 21:00	120	179	299	/	1	/	26	/	**/**
21:00 - 22:00	88	105	193	/	1	/	11	/	**/**
22:00 - 23:00	58	48	106	/	1	/	0	/	**/**
23:00 - 24:00	46	32	78	/	1	/	1	/	**/**

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

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
REF. POINT:
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Good Counsel Dr	1
30	Minor App4: WB Good Counsel Dr	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

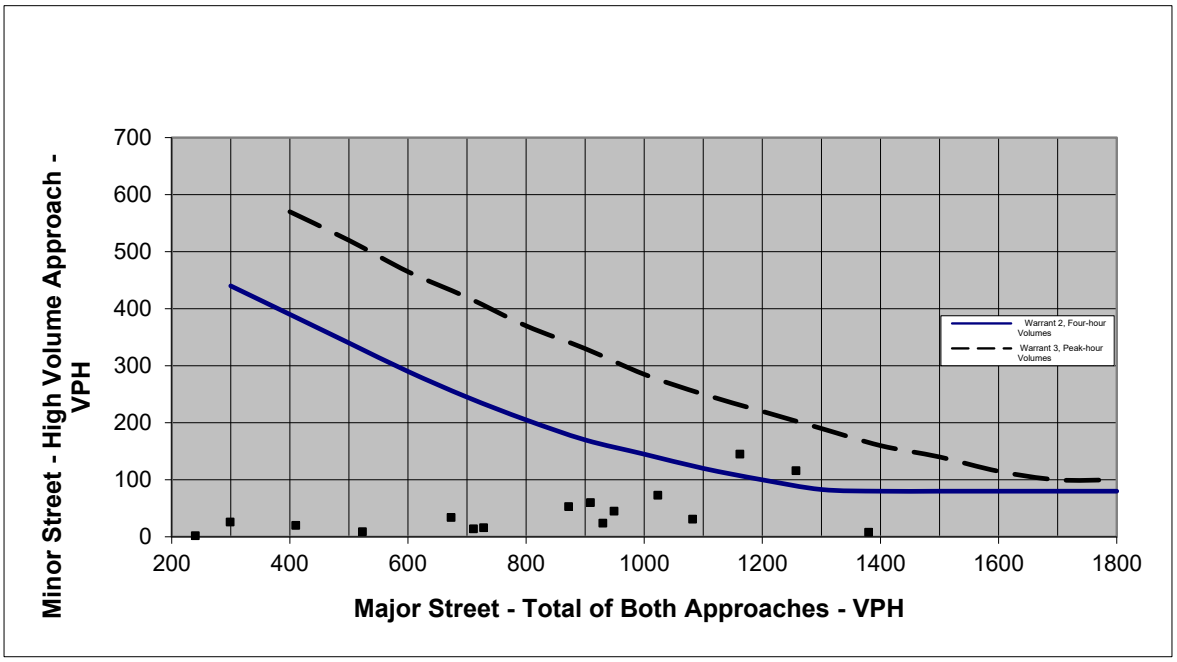


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria		
Major	Warrant 2, F	Warrant 3, Pe
200		
300	440	
400	390	570
500	340	520
600	290	465
700	245	420
800	205	370
900	170	330
1000	145	285
1100	120	250
1200	100	220
1300	83	190
1400	80	160
1500	80	140
1600	80	115
1700	80	100
1800	80	100

Actual Hourly Count	
Major	Actual Hourly Count
40	0
17	0
36	1
34	0
116	0
240	2
523	9
1380	8
930	24
711	14
728	16
909	60
949	45
872	53
1023	73
1162	145
1257	116
1082	31
673	34
410	20
299	26
193	11
106	1
78	1

BOLTON & MENK
Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at Good Counsel Dr
Mankato, Minnesota
With Development

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB Good Counsel Dr	1
30	Minor App4:	WB Good Counsel Dr	1

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

THRESHOLDS 1A/1B: 600/900 150/75 150/75

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	17	23	40	/	0	/	0	/	**/**
1:00 - 2:00	8	9	17	/	0	/	0	/	**/**
2:00 - 3:00	10	26	36	/	0	/	1	/	**/**
3:00 - 4:00	17	17	34	/	0	/	0	/	**/**
4:00 - 5:00	54	62	116	/	0	/	0	/	**/**
5:00 - 6:00	126	114	240	/	1	/	3	/	**/**
6:00 - 7:00	299	227	526	/	2	/	11	/	**/**
7:00 - 8:00	919	483	1402	X/X	8	/	10	/	**/**
8:00 - 9:00	570	368	938	X/X	6	/	30	/	**/**
9:00 - 10:00	378	337	715	X/	13	/	14	/	**/**
10:00 - 11:00	376	357	733	X/	16	/	19	/	**/**
11:00 - 12:00	411	501	912	X/X	4	/	76	/X	**/X**
12:00 - 13:00	439	515	954	X/X	9	/	57	/	**/**
13:00 - 14:00	448	431	879	X/	9	/	67	/	**/**
14:00 - 15:00	420	608	1028	X/X	18	/	93	/X	**/X**
15:00 - 16:00	525	645	1170	X/X	9	/	185	X/X	**X/X**
16:00 - 17:00	503	759	1262	X/X	24	/	148	/X	**/X**
17:00 - 18:00	506	585	1091	X/X	14	/	39	/	**/**
18:00 - 19:00	335	343	678	X/	16	/	43	/	**/**
19:00 - 20:00	194	220	414	/	4	/	25	/	**/**
20:00 - 21:00	121	180	301	/	1	/	33	/	**/**
21:00 - 22:00	89	105	194	/	1	/	14	/	**/**
22:00 - 23:00	58	48	106	/	1	/	0	/	**/**
23:00 - 24:00	46	32	78	/	1	/	1	/	**/**

	Met (Hr)	Required (Hr)	
Warrant 1A	1	8	Not satisfied
Warrant 1B	4	8	Not satisfied
Warrant 2	2	4	Not satisfied
Warrant 3	0	1	Not satisfied
Warrant 7	**5**	8	Not satisfied

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
REF. POINT:
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Good Counsel Dr	1
30	Minor App4: WB Good Counsel Dr	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

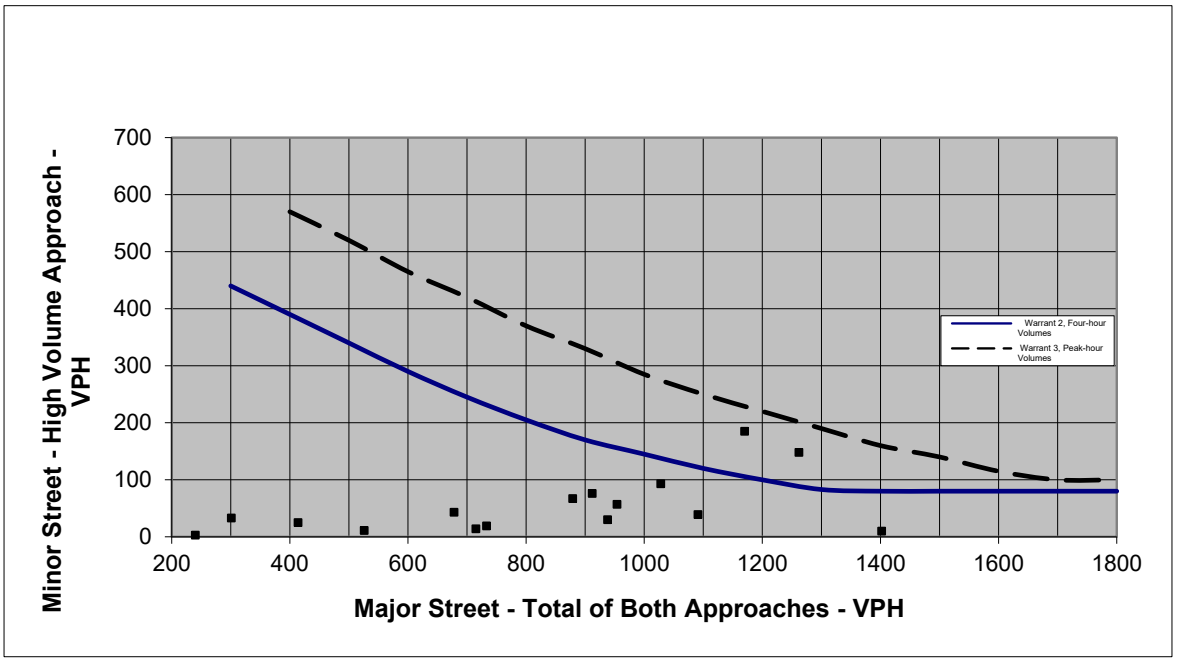


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria			Actual Hourly Count	
Major	Warrant 2, F	Warrant 3, Pe	Major	Actual Hourly Count
200			40	0
300	440		17	0
400	390	570	36	1
500	340	520	34	0
600	290	465	116	0
700	245	420	240	3
800	205	370	526	11
900	170	330	1402	10
1000	145	285	938	30
1100	120	250	715	14
1200	100	220	733	19
1300	83	190	912	76
1400	80	160	954	57
1500	80	140	879	67
1600	80	115	1028	93
1700	80	100	1170	185
1800	80	100	1262	148
			1091	39
			678	43
			414	25
			301	33
			194	14
			106	1
			78	1

BOLTON & MENK

Real People. Real Solutions.

SIGNAL WARRANTS ANALYSIS FOR

Riverfront Dr at Good Counsel Dr

Mankato, Minnesota

With Eastbound Right (No Westbound Right)

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description		Lanes
35	Major App1:	SB Riverfront Dr	2
35	Major App3:	NB Riverfront Dr	2
30	Minor App2:	EB Good Counsel Dr	1
30	Minor App4:	WB Good Counsel Dr	1

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

THRESHOLDS 1A/1B: 600/900 150/75 150/75

HOUR	MAJOR APP. 1	MAJOR APP. 3	TOTAL 1+3	MAJOR 1A/1B	MINOR APP. 2	MINOR 2 1A/1B	MINOR APP. 4	MINOR 4 (	**MET SAME 1A/1B**
0:00 - 1:00	17	23	40	/	0	/	0	/	**/**
1:00 - 2:00	8	9	17	/	0	/	0	/	**/**
2:00 - 3:00	10	26	36	/	0	/	1	/	**/**
3:00 - 4:00	17	17	34	/	0	/	0	/	**/**
4:00 - 5:00	54	62	116	/	0	/	0	/	**/**
5:00 - 6:00	126	114	240	/	1	/	2	/	**/**
6:00 - 7:00	297	226	523	/	2	/	9	/	**/**
7:00 - 8:00	902	478	1380	X/X	11	/	8	/	**/**
8:00 - 9:00	564	366	930	X/X	13	/	24	/	**/**
9:00 - 10:00	375	336	711	X/	22	/	11	/	**/**
10:00 - 11:00	373	355	728	X/	29	/	15	/	**/**
11:00 - 12:00	409	500	909	X/X	24	/	60	/	**/**
12:00 - 13:00	437	512	949	X/X	22	/	45	/	**/**
13:00 - 14:00	444	428	872	X/	22	/	53	/	**/**
14:00 - 15:00	417	606	1023	X/X	28	/	73	/	**/**
15:00 - 16:00	519	643	1162	X/X	14	/	145	/X	**/X**
16:00 - 17:00	502	755	1257	X/X	41	/	116	/X	**/X**
17:00 - 18:00	499	583	1082	X/X	27	/	31	/	**/**
18:00 - 19:00	331	342	673	X/	27	/	34	/	**/**
19:00 - 20:00	191	219	410	/	7	/	20	/	**/**
20:00 - 21:00	120	179	299	/	3	/	26	/	**/**
21:00 - 22:00	88	105	193	/	2	/	11	/	**/**
22:00 - 23:00	58	48	106	/	1	/	0	/	**/**
23:00 - 24:00	46	32	78	/	1	/	1	/	**/**

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

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
REF. POINT:
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Good Counsel Dr	1
30	Minor App4: WB Good Counsel Dr	1

0.70 FACTOR USED? No
POPULATION < 10,000? No
EXISTING SIGNAL ? No

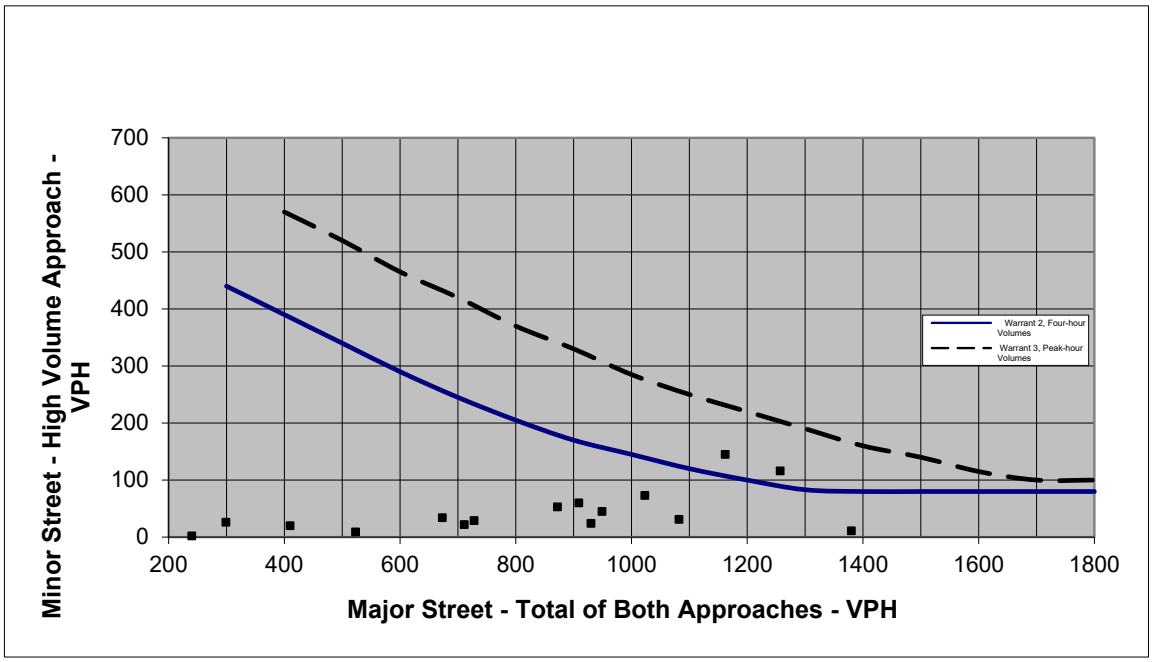


Figure 1. Four Hour and Peak Hour Warrant Analysis

Note: For data points outside the graph range, check the minor street volume against the lower thresholds

Warrant Criteria			Actual Hourly Count	
Major	Warrant 2,	Warrant 3, Pe	Major	Actual Hourly Count
200			40	0
300	440		17	0
400	390	570	36	1
500	340	520	34	0
600	290	465	116	0
700	245	420	240	2
800	205	370	523	9
900	170	330	1380	11
1000	145	285	930	24
1100	120	250	711	22
1200	100	220	728	29
1300	83	190	909	60
1400	80	160	949	45
1500	80	140	872	53
1600	80	115	1023	73
1700	80	100	1162	145
1800	80	100	1257	116
			1082	31
			673	34
			410	20
			299	26
			193	11
			106	1
			78	1

BOLTON & MENK

Real People. Real Solutions.

ALL WAY STOP WARRANT ANALYSIS FOR

Riverfront Dr at Good Counsel Dr
Mankato, Minnesota

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
REF. POINT:
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Good Counsel Dr	1
30	Minor App4: WB Good Counsel Dr	1

0.70 FACTOR USED? No

HOUR	MAJOR	MAJOR	MINOR	MINOR	300 MAJOR TOTAL Σ (APP. 1 & APP. 3)	200 MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	17	23	0	0	40	0	/
1:00 - 2:00	8	9	0	1	17	1	/
2:00 - 3:00	10	26	0	2	36	2	/
3:00 - 4:00	17	17	0	1	34	1	/
4:00 - 5:00	54	62	0	1	116	1	/
5:00 - 6:00	126	114	1	3	240	4	/
6:00 - 7:00	297	226	2	15	523	17	X/
7:00 - 8:00	902	478	11	125	1380	136	X/
8:00 - 9:00	564	366	13	101	930	114	X/
9:00 - 10:00	375	336	22	40	711	62	X/
10:00 - 11:00	373	355	29	39	728	68	X/
11:00 - 12:00	409	500	24	81	909	105	X/
12:00 - 13:00	437	512	22	81	949	103	X/
13:00 - 14:00	444	428	22	77	872	99	X/
14:00 - 15:00	417	606	28	217	1023	245	X/X
15:00 - 16:00	519	643	14	217	1162	231	X/X
16:00 - 17:00	502	755	41	392	1257	433	X/X
17:00 - 18:00	499	583	27	163	1082	190	X/
18:00 - 19:00	331	342	27	129	673	156	X/
19:00 - 20:00	191	219	7	58	410	65	X/
20:00 - 21:00	120	179	3	69	299	72	/
21:00 - 22:00	88	105	2	30	193	32	/
22:00 - 23:00	58	48	1	5	106	6	/
23:00 - 24:00	46	32	1	1	78	2	/

	Met (Hr)	Required (Hr)	
Allway Stop Warrant:	3	8	Not satisfied

REMARKS:

BOLTON & MENK

Real People. Real Solutions.

ALL WAY STOP WARRANT ANALYSIS FOR

Riverfront Dr at Good Counsel Dr
Mankato, Minnesota
With Development

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
REF. POINT:
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Good Counsel Dr	1
30	Minor App4: WB Good Counsel Dr	1

0.70 FACTOR USED? No

HOUR	MAJOR	MAJOR	MINOR	MINOR	300 MAJOR TOTAL Σ (APP. 1 & APP. 3)	200 MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	17	23	0	0	40	0	/
1:00 - 2:00	8	9	0	1	17	1	/
2:00 - 3:00	10	26	0	2	36	2	/
3:00 - 4:00	17	17	0	1	34	1	/
4:00 - 5:00	54	62	0	1	116	1	/
5:00 - 6:00	126	114	1	4	240	5	/
6:00 - 7:00	299	227	2	17	526	19	X/
7:00 - 8:00	919	483	11	137	1402	148	X/
8:00 - 9:00	570	368	13	113	938	126	X/
9:00 - 10:00	378	337	21	45	715	66	X/
10:00 - 11:00	376	357	29	45	733	74	X/
11:00 - 12:00	411	501	24	99	912	123	X/
12:00 - 13:00	439	515	22	96	954	118	X/
13:00 - 14:00	448	431	22	93	879	115	X/
14:00 - 15:00	420	608	28	249	1028	277	X/X
15:00 - 16:00	525	645	14	263	1170	277	X/X
16:00 - 17:00	503	759	41	447	1262	488	X/X
17:00 - 18:00	506	585	26	182	1091	208	X/X
18:00 - 19:00	335	343	25	146	678	171	X/
19:00 - 20:00	194	220	7	66	414	73	X/
20:00 - 21:00	121	180	3	80	301	83	X/
21:00 - 22:00	89	105	2	35	194	37	/
22:00 - 23:00	58	48	1	5	106	6	/
23:00 - 24:00	46	32	1	1	78	2	/

	Met (Hr)	Required (Hr)	
Allway Stop Warrant:	4	8	Not satisfied

REMARKS:

BOLTON & MENK

Real People. Real Solutions.

ALL WAY STOP WARRANT ANALYSIS FOR

Riverfront Dr at Good Counsel Dr
Mankato, Minnesota

With Development , 80% Threshold Check

LOCATION: Riverfront Dr at Good Counsel Dr
COUNTY: Nicollet
REF. POINT:
DATE: 4/25/2023
OPERATOR: KL

Speed	Approach Description	Lanes
35	Major App1: SB Riverfront Dr	2
35	Major App3: NB Riverfront Dr	2
30	Minor App2: EB Good Counsel Dr	1
30	Minor App4: WB Good Counsel Dr	1

0.70 FACTOR USED? No

80% Threshold **240** **160**

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR TOTAL Σ (APP. 1 & APP. 3)	MINOR TOTAL APP. 2 + APP. 4	WARRANT MET
0:00 - 1:00	17	23	0	0	40	0	/
1:00 - 2:00	8	9	0	1	17	1	/
2:00 - 3:00	10	26	0	2	36	2	/
3:00 - 4:00	17	17	0	1	34	1	/
4:00 - 5:00	54	62	0	1	116	1	/
5:00 - 6:00	126	114	1	4	240	5	X/
6:00 - 7:00	299	227	2	17	526	19	X/
7:00 - 8:00	919	483	11	137	1402	148	X/
8:00 - 9:00	570	368	13	113	938	126	X/
9:00 - 10:00	378	337	21	45	715	66	X/
10:00 - 11:00	376	357	29	45	733	74	X/
11:00 - 12:00	411	501	24	99	912	123	X/
12:00 - 13:00	439	515	22	96	954	118	X/
13:00 - 14:00	448	431	22	93	879	115	X/
14:00 - 15:00	420	608	28	249	1028	277	X/X
15:00 - 16:00	525	645	14	263	1170	277	X/X
16:00 - 17:00	503	759	41	447	1262	488	X/X
17:00 - 18:00	506	585	26	182	1091	208	X/X
18:00 - 19:00	335	343	25	146	678	171	X/X
19:00 - 20:00	194	220	7	66	414	73	X/
20:00 - 21:00	121	180	3	80	301	83	X/
21:00 - 22:00	89	105	2	35	194	37	/
22:00 - 23:00	58	48	1	5	106	6	/
23:00 - 24:00	46	32	1	1	78	2	/

	Met (Hr)	Required (Hr)	
Allway Stop Warrant:	5	8	Not satisfied

REMARKS:

Appendix E: Traffic Operations

Intersection	Approach	AM Peak Hour											
		Traffic Delay (sec/veh)					Traffic Queuing (feet)					
		Movement (Delay - LOS)			Approach (Delay - LOS)	Intersection (Delay - LOS)	Left Turn		Through		Right Turn	
		L	T	R			Avg	Max	Avg	Max	Avg	Max
Riverfront Dr & May St *Side Street Stop Controlled*	WB	16 - C	-	5 - A	9 - A	1 - A	50	75	-	-	50	75
	NB	-	0 - A	0 - A	0 - A		-	-	-	-	-	-
	SB	5 - A	0 - A	-	1 - A		25	50	-	-	-	-
Riverfront Dr & Ruth St *Side Street Stop Controlled*	EB	16 - C	-	4 - A	6 - A	1 - A	25	50	25	50	25	50
	WB	21 - C	-	4 - A	17 - C		25	75	25	75	25	75
	NB	5 - A	0 - A	-	1 - A		25	50	-	-	-	-
	SB	3 - A	0 - A	0 - A	1 - A		25	25	25	25	-	-
Riverfront Dr & Mabel St *Side Street Stop Controlled*	EB	21 - C	-	3 - A	9 - A	1 - A	25	50	25	50	25	50
	WB	31 - D	-	12 - B	27 - D		25	75	25	75	25	75
	NB	6 - A	0 - A	0 - A	1 - A		25	75	25	75	-	-
	SB	5 - A	1 - A	0 - A	2 - A		25	100	25	100	25	25

Intersection	Approach	PM Peak Hour											
		Traffic Delay (sec/veh)					Traffic Queuing (feet)					
		Movement (Delay - LOS)			Approach (Delay - LOS)	Intersection (Delay - LOS)	Left Turn		Through		Right Turn	
		L	T	R			Avg	Max	Avg	Max	Avg	Max
Riverfront Dr & May St *Side Street Stop Controlled*	WB	19 - C	-	8 - A	15 - C	1 - A	50	100	-	-	50	100
	NB	-	0 - A	0 - A	0 - A		-	-	-	-	-	-
	SB	5 - A	0 - A	-	1 - A		25	50	-	-	-	-
Riverfront Dr & Ruth St *Side Street Stop Controlled*	EB	24 - C	-	3 - A	10 - B	0 - A	25	50	25	50	25	50
	WB	24 - C	-	4 - A	18 - C		25	50	25	50	25	50
	NB	4 - A	0 - A	-	1 - A		25	50	-	-	-	-
	SB	6 - A	0 - A	0 - A	1 - A		25	50	25	50	-	-
Riverfront Dr & Mabel St *Side Street Stop Controlled*	EB	16 - C	-	3 - A	8 - A	1 - A	25	75	25	75	25	75
	WB	17 - C	18 - C	5 - A	11 - B		25	75	25	75	25	75
	NB	6 - A	0 - A	0 - A	1 - A		25	75	25	75	25	25
	SB	6 - A	0 - A	0 - A	1 - A		25	75	25	75	-	-

Appendix F: Public Engagement Summary

RIVERFRONT DRIVE
INTERSECTION IMPROVEMENTS STUDY

27 ATTENDEES

MOST ATTENDEES LIVE WITHIN 1/4 MILE OF STUDY AREA

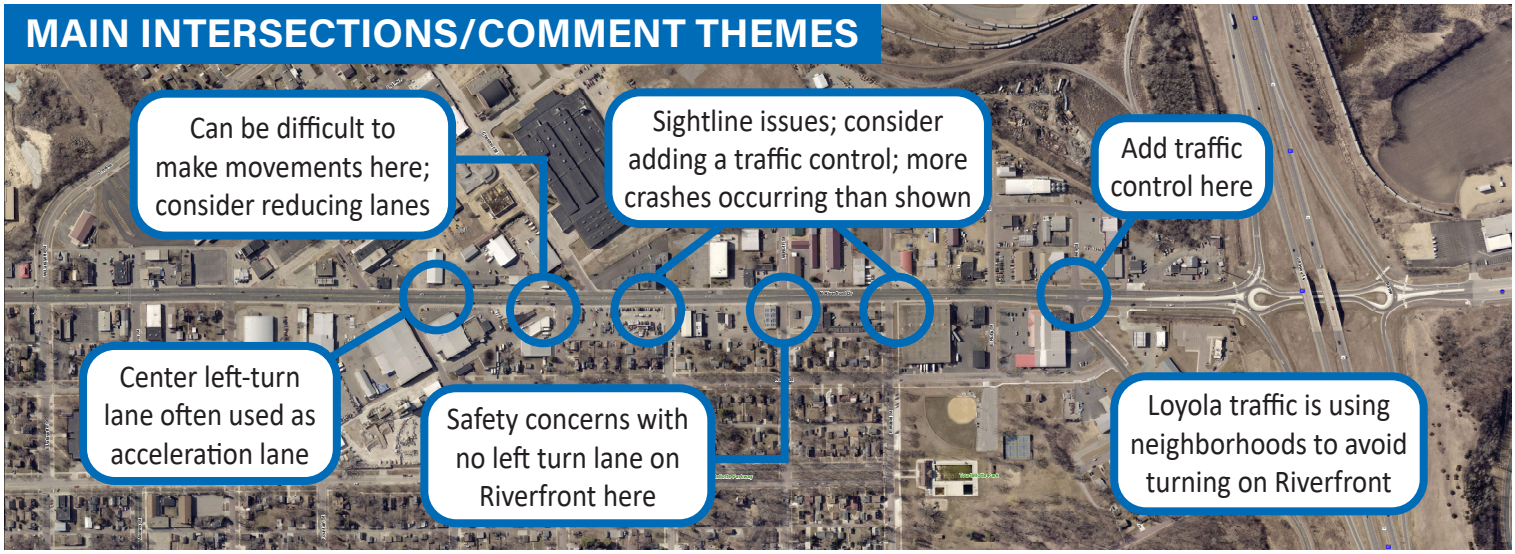
22 COMMENTS (IN-PERSON AND ONLINE)

OPEN HOUSE OVERVIEW

The Mankato/North Mankato Planning Organization (MAPO) and City of Mankato held a business meeting/public open house May 31 at Franklin Elementary School to gather community feedback on a quarter-mile section of Riverfront Drive between May Street and Mabel Street. Project representatives provided a formal presentation to area businesses and answered questions from the public as they reviewed large displays highlighting the history and existing conditions in the study area. Attendees made notes and comments on the study area map and comment cards. MAPO and the city promoted the event via Facebook, Twitter, Instagram, news release, and door-to-door delivery of flyers and door hangers.

LOCATION-SPECIFIC FEEDBACK

MAIN INTERSECTIONS/COMMENT THEMES



COMMON THEMES AND TAKEAWAYS

Common themes and takeaways from the open house feedback, online comments and project layout map include:

PEDESTRIAN AND BICYCLE SAFETY
Desire to add improved pedestrian and bicycle crossings, including medians on Riverfront Drive.

TURNS
Difficult to make a left turn at any of the intersections onto Riverfront Drive.

PARKING
Desire to add more street parking or adjust parking regulations.

SIGHTLINE ISSUES
Sightline issues at multiple intersections along Riverfront Drive.

CRASHES
Consider introducing a lane reduction and reduce access points to help with speeding and crash issues.

EXPAND STUDY AREA
Consider Riverfront Drive lane reduction, traffic calming, on-street parking, shoulders and pedestrian crossing enhancements.

MAPO MANKATO/NORTH MANKATO AREA PLANNING ORGANIZATION
MANKATO Leading the way...
BOLTON & MENK