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Mankato/North Mankato Area Planning Organization (MAPO)

Warren Street Corridor Study

Study Report

September 2020

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I. Introduction

The Mankato/North Mankato Area Planning Organization (MAPO) and the City of Mankato are working together to identify multimodal transportation improvements on Warren Street between Riverfront Drive and Highland Park (**Figure 1**). Warren Street provides an important connection from City Center Mankato in the Minnesota River Valley to the Minnesota State University (MSU) Campus on the Mankato hilltop. The segment from Riverfront Drive to Highland Park plays a complex role as it passes through City Center core areas with high vehicle traffic volumes, pedestrian cross-traffic and road right-of-way confined by the topographical constraints of a wooded ravine. The corridor serves multiple transportation users including automobiles, transit, pedestrians and bicyclists. MAPO and the City of Mankato desire to define a comprehensive vision for Warren Street in preparation for the 2021 street reconstruction project to continue their momentum in City Center reinvestment. The study included:

- Defining the issues and potential opportunities along the corridor.
- Establishing the corridor vision and goals.
- Developing and evaluating potential multimodal infrastructure improvement alternatives.
- Developing an implementation plan in preparation that identifies potential projects and cost estimates.

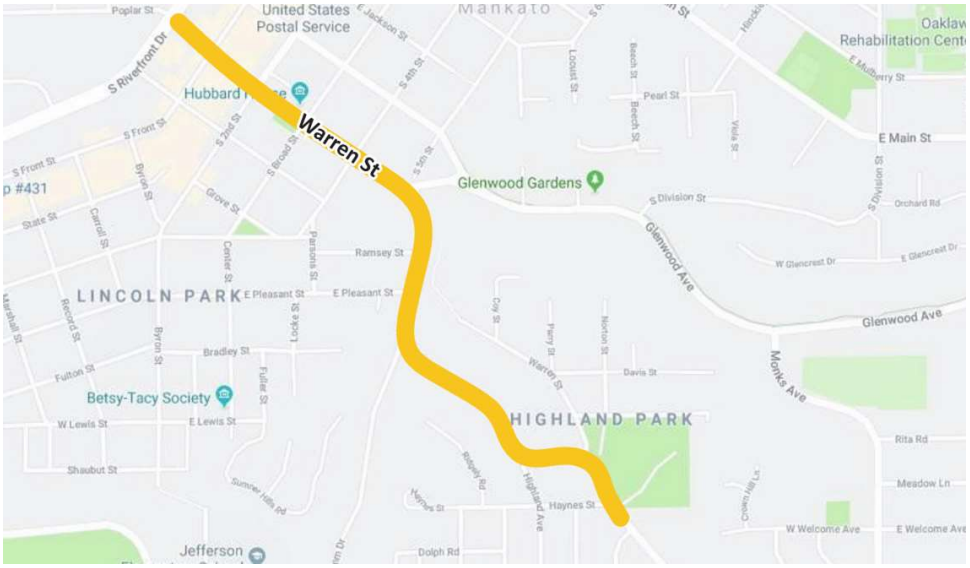

Figure 1 - Corridor Study Area

The remainder of the study report is organized into sections to provide context on the study background and purpose, agencies involved, existing and future conditions, improvement options, recommendations and an implementation plan. Some of these areas have standalone summary documents which are refenced in this report.

II. Study Partners

The Warren Street Corridor Study was a joint effort between:

- City of Mankato
- MAPO

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

III. Public Involvement

Public involvement was an integral part of the Warren Street Corridor Study. Input from business owners, property owners, interested citizens, elected officials and other corridor users was critical to understanding issues and needs and to vet improvement concepts and priorities.

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

1. *Public Informational Meetings* – Two public information meetings were held as a part of this study. The first occurred during the early phases of the study to solicit input on issues, needs and opportunities along the corridor considering existing traffic operations, crash history, existing access, land use, transit routes and stops, and the existing bicycle network within the study area. The second occurred later in the study to gather input on the range of improvement concepts studied. The second meeting occurred in web format due to COVID-19 precautions. The public was invited via postcard, local media, and social media and was able to comment on alternatives and submit a survey response on the City's Sound Off page. Visitors were also able to view boards and a prerecorded presentation on the website. Public information meeting summaries are included in **Appendix A.**
2. *Pop-Up Meetings* – Project staff met with business owners and residents at a variety of pop-up style meetings in 2019. These included:
    - 8/27/19: Mankato Night to Unite – Highland Park
    - 8/29/19: Alive After 5 Mankato
    - 9/7/19: Mankato United Way Human Foosball Tournament
    - 9/19/19: Cherry Ridge Apartments
    - 10/2/19: Mankato State University Student Senate
    - 10/2/19 – 10/4/19: Mankato Transit Outreach
    - 10/8/19: Colonial Square Apartments
    - 10/9/19: VINE Faith in Action
    - 10/10/19: Durham Apartments (SMILES)
    - 10/15/19: Highland Park Neighborhood Association
    - 10/16/19: Gus Johnson Apartments (SMILES)
    - 11/18/19: Lincoln Park Neighborhood Association
3. *City Council Updates* – City staff provided informal updates throughout the project process. A planned formal updated and presentation during the 4/6/20 Worksession was postponed and later delivered by city staff. Council members were provided with a notated presentation which documented study progress to date and the range of alternatives to be shared with the public. This occurred prior to the second open house.
4. *MAPO Updates* – Formal updates to the MAPO Technical Advisory Committee (TAC) and MAPO Policy Board were not provided during the study based on timing of meetings relative to the study schedule as well as COVID-19. Summary presentations are planned with these groups after study acceptance by the city.
5. *Study Communications* – MAPO hosted a project website for the study throughout the entire process at https://mnmapo.org/warren/ . Study documents, concept alternatives and public involvement notices were posted on the website at key study milestones.

IV. Existing Conditions

Existing and no-build (2041) conditions were documented on Warren Street with a focus on previous studies, land use, traffic operations, safety, access, pedestrian/bicycle accommodations and environmental resources. This information served as the framework for developing improvement goals for Warren Street into the future and was based on the technical study analysis. A detailed Existing and No-Build Conditions document was prepared and is in **Appendix B** for reference.

Additionally, a Purpose and Need Framework was developed based on study findings which can seen in **Appendix C**. This document has been developed to aid in any future NEPA documentation that may be required based on project impacts and funding types.

Key elements are as follows:

Transportation System Characteristics

In the context of the overall transportation system, Warren Street serves as a minor arterial roadway providing a key connection from Riverfront Drive in Mankato's City Center core to Stadium Road on the MSU campus. The connection to Riverfront Drive and associated land uses such as HyVee, Cub Foods, and other properties including potential future redevelopment influence traffic and use of the Warren Street Corridor.

Traffic Operations

Existing operations show acceptable delays throughout the entire network. Certain movements at the intersection with Riverfront Drive are Level of Service D, meaning the movement is on the verge of being considered unacceptable to most drivers.

The 2041 analysis of the existing network with future traffic volumes indicates similar results as existing conditions. There is generally sufficient capacity in the system to handle projected growth. Traffic on Glenwood Avenue may begin to have difficulties in accessing Warren Street and drivers may take alternate routes to avoid longer delays during peak periods.

Traffic Safety

Crash data from 2014-2018 was analyzed at all key intersections. The intersections with 2nd Street, 4th Street, Glenwood Avenue, and Val Imm Drive all operate outside of the normal/expected range of crashes with a critical index above 1. **Table 1** provides summary information each intersection.

Table 1 - Crash Analysis Summary

Intersection	Total Crashes	Critical Index	Critical Rate	Observed Crash Rate	Statewide Average
Riverfront Dr at Warren St	18	0.47	1.07	0.5	0.7
Front St at Warren St	8	0.73	1.18	0.86	0.52
2nd St at Warren St	28	**1.51**	0.96	1.45	0.52
Broad St at Warren St	14	0.76	0.46	0.74	0.52
4th St at Warren St	10	**1.15**	0.46	0.53	0.18
Glenwood Ave at Warren St	23	**2.19**	0.42	0.92	0.18
Ramsey St at Highland Ave	1	0.12	0.50	0.06	0.18
Pleasant St at Highland Ave	3	0.38	0.48	0.18	0.18
Val Imm Dr at Highland Ave	9	**1.14**	0.52	0.56	0.18
Cedar St at Highland Ave	5	0.73	0.52	0.38	0.18
Cedar St at Warren St	1	0.15	0.54	0.08	0.18

Access

There are 38 access points along Warren Street in the study area including seven primary accesses (seven per mile), 10 secondary accesses (10 per mile), and 21 private accesses (21 per mile). Both primary and secondary access counts fall within or below MAPO's recommendations for 9 to 19 accesses per mile along minor arterial roadways.

Pedestrian and Bicycle Connections

Sidewalks are present along both sides of the corridor except for a gap on the south side between Val Imm Drive and Highland Avenue. Sidewalk space is typically constrained and right against the roadway curb. Designated pedestrian crossings are currently limited to signalized intersections. Pedestrian crossings of a 4-lane undivided roadway section are prone to the possibly of a multiple-threat situation. As a driver yields to a pedestrian crossing one of two lanes of traffic, the driver in the second lane may not see the pedestrian and continue at full speed. See **Figure 2** below. Positive intersection control with red lights signaling a need to stop help alleviate this risk.

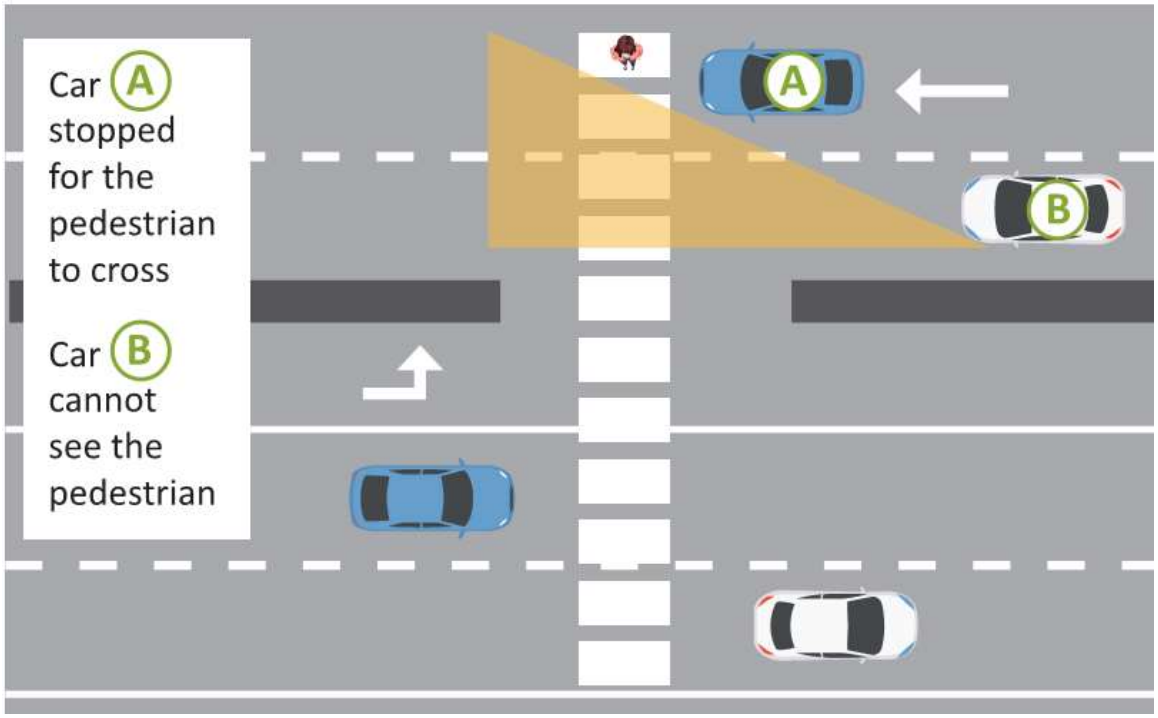

Figure 2 - Multiple Threat Situation

In terms of bicycle accommodations, there is no dedicated facility present. A bicycle network analysis was completed which indicated that experienced adult bicycle riders may be comfortable using the roadway, but less experienced users may not be.

Transit

Routes 6, 7, 10, and 11 intersect or travel along a portion of Warren Street in the study area.

V. Key Transportation Issues

An important element of the study was the identification of key transportation issues. The following information provides a summary of issues identified by existing conditions analysis and public input. This information is also documented in **Appendix D** in more detail.

Issues were identified as primary and secondary issues. Primary issues are vital to the success of a potential project in making the required improvements needed. Secondary issues are also important

but were not considered to set the framework for potential improvements. They may relate to items that can be addressed regardless of the alternative selected from this study.

Primary Issues

Lack of Connectivity (Pedestrian and Bicycle)

Input collected over the Study's various public engagement efforts indicated need for increased pedestrian connectivity throughout and across the corridor. Public comments relating to pedestrian connectivity included sidewalk condition, sidewalk width, lack of curb cuts, Americans with Disabilities Act (ADA) compliance, and traffic noise/speed affecting the pedestrian environment. Public engagement indicated the corridor's lack of bicycle facilities is a source of discomfort to bicyclists and is a deterrent to bicycle use. This is particularly evident for southward (uphill) traveling bicyclists who, due to the uphill grade, are unable to maintain a comfortable speed with vehicle traffic. Further information regarding corridor bicycle connectivity can be found in the bicycle network analysis.

A primary issue is the lack of pedestrian and bicyclist connectivity throughout and across the corridor. This lack of connectivity suppresses active transportation (as evidenced though the public engagement process) throughout the corridor and presents an opportunity for increased multimodal use. Limited and/or poor accommodations for non-motorized users can lead to less active trips when some are converted to use vehicle or transit instead.

Lack of Comfortable Crossings

A primary issue is the lack of comfortable pedestrian and bicyclist crossings across and throughout the corridor. This lack of connectivity suppresses active transportation throughout the corridor and presents an opportunity for increased multimodal use.

- Lack of designated pedestrian crossings in desirable locations.
- Vehicles stopping in crosswalks while waiting for signal lights. This issue was reported prevalent at several intersections including at Second Street. Study staff received input that potential causes of this issue include high vehicle speeds, insufficient pedestrian/wheelchair signage, and insufficient pavement markings.
- "Walk" signal lighting too quick at multiple corridor crossings. Public input indicated the amount of time allowing pedestrians to cross the street is insufficient.

Spot Intersection Safety

Public engagement and data review/analysis indicated there are issues related to traffic safety at several intersections including 2nd Street, 4th Street, Glenwood Avenue and Val Imm Drive. All intersections are experiencing an amount of crashes outside of the normal/expected range based on the type of intersection.

Secondary Issues

Public engagement also identified a variety of secondary issues, including:

- Alignment of roadway/steep grades/ice in winter (particularly southern segment)
- Inconsistent road names
- Sidewalk maintenance issues (both sidewalk condition and winter maintenance)
- Lighting concerns in several areas throughout corridor's northern and southern segments
- Site comments outside of the public right-of-way (ROW)
- Access point sight lines and safety related to vehicle speeds

VI. Study Goals and Objectives

Following the identification of issues and needs along Warren Street through both a technical and public process, study partners developed the following Corridor Study goals:

- Provide efficient vehicle mobility and access
- Safely accommodate all users (vehicles, transit, pedestrians, bicycles)
- Provide infrastructure improvements compatible with the historic and natural environment
- Develop a financially responsible implementation plan

The goals developed for this study are consistent with the key performance goals discussed in the MAPO 2045 Long Range Transportation Plan including: Accessibility and reliability, economic vitality, safety, and multimodal transportation. These goals were used to identify and evaluate the trade-offs between improvement options. Each goal was comprised of specific objectives and performance measures as well related to specific components or factors in the goals. Information on these can be seen in **Appendix E**.

VII. Identification and Evaluation of Alternatives

The study area has two unique segments where alternatives were considered, which are Riverfront Drive to Val Imm Drive and Val Imm Drive to Haynes St. Multiple improvement alternatives were identified and evaluated based on the existing conditions analysis and issues and needs identified through public, agency and stakeholder involvement. Full copies of the alternative drawings discussed here can be seen on the MAPO website (www.mnmapo.org) as well as in **Appendix F**. Also, a discussion of alternatives can be seen in the Future Conditions Traffic Analysis Memorandum in **Appendix G.** An evaluation matrix was used to compare the benefits and trade-offs between alternatives as compared to the study's goals, however remaining a technical document only. Alternatives shared with the public were presented using pros/cons versus scoring of technical metrics. This evaluation matrix can be seen in **Appendix H**.

Riverfront Drive to Val Imm Drive

The segment of Warren Street between Riverfront Drive and Val Imm Drive contains the downtown portion as well as an area with homes along both sides of the roadway. All alternatives analyzed considered a bike connection either along Warren Street in this area or using an alternative route to provide a dedicated connection between downtown and the MSU area. Other issues in this area include spot safety needs at the intersections with 2nd St, 4th St, Glenwood Ave, and Val Imm Dr, and minimal sidewalk level space to accommodate comfortable pedestrian activity and residential trash receptacles on pickup day.

The roadway right of way varies throughout the corridor, but ranges from 60' in some blocks up to 66'+ on others. All typical sections considered are based on the 60' width to ensure they are able to fit in the tightest locations.

Two-Lane with Shared Use Side Path

This concept would convert Warren Street from a 4-lane undivided roadway to a 2-lane undivided roadway. The reduction in lanes would provide additional space at sidewalk level for widened pedestrian facilities and streetscaping on the north side (right side of typical section) and a shared use side path with streetscaping on south side (left side of typical section). See **Figure 3.**

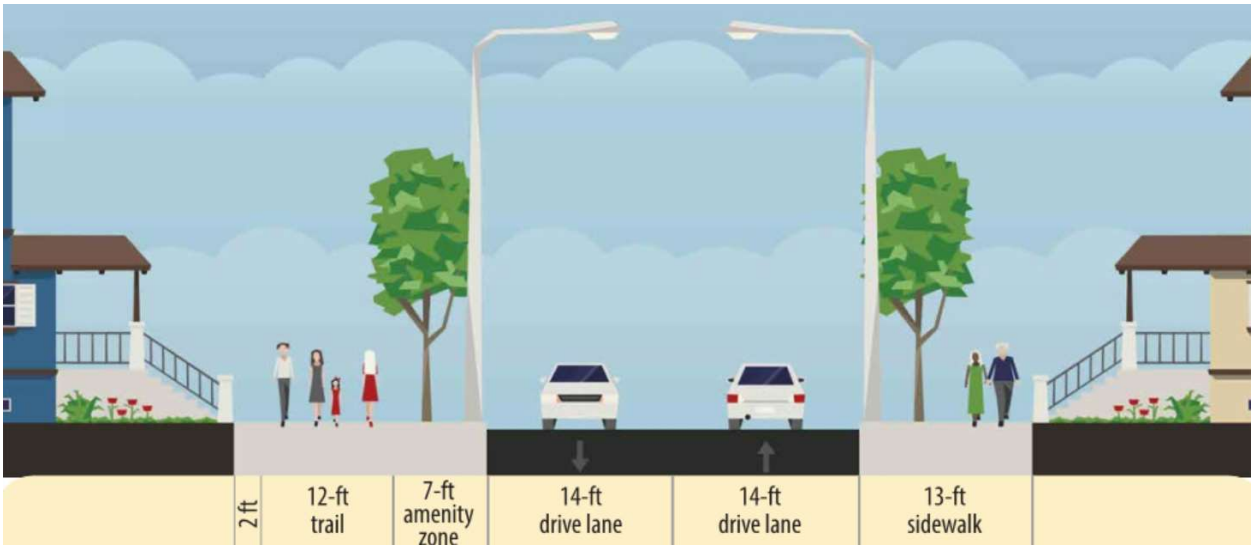

Figure 3 - Two-Lane with Shared Use Side Path Typical Section

Pros:

- Narrowest roadway allows for widest pedestrian facilities/amenity zones.
- Bike facility is separated from the roadway, which is the most comfortable for the most vulnerable bicycle users.

Cons:

- Only two lanes of traffic are provided, which means any left or right turning vehicles will slow down through traffic.
- Roadway capacity is less than other options.

The alternative can be summarized as a trade-off between vehicle accommodations and non-motorized accommodations. This alternative is similar in function to the University Parkway Concept presented in the City of Mankato Front Street Connection Plan. Both ideas would only allow for two lanes of traffic on Warren Street and allocated the remainder of the space to non-motorized travel and streetscaping areas.

Three-Lane with Buffered Bikeway

This concept would convert Warren Street from a 4-lane undivided roadway to a 3-lane undivided roadway. The reduction in lanes would provide additional space for the inclusion of on-street buffered bicycle lanes. See **Figure 4**.

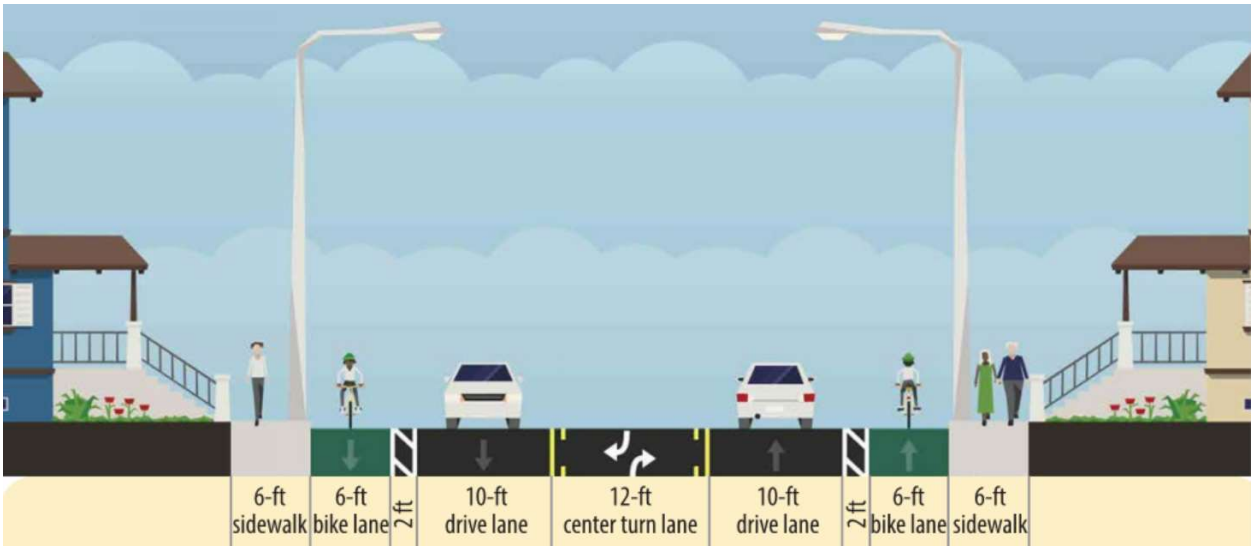

Figure 4 - Three Lane with Buffered Bikeway Typical Section

Pros:

- Center turn lane keeps left turning vehicles separated from through vehicles, which comes with an added safety benefit.
- 3-lane section provides ample capacity for projected traffic volumes.
- Bike facility is buffered from through traffic to add separation and increase comfort for bicycle lane users.

Cons:

- Lanes need to be narrow to fit within existing right of way.
- In some areas of the corridor, sidewalks would not be wider than they are today. Most vulnerable bicycle users (children) may still not be comfortable in the bicycle lane and would ride on the narrow sidewalk or take an alternate route.

Three-Lane with Alternate Bike Route

This concept would convert Warren Street from a 4-lane undivided roadway to a 3-lane undivided roadway. No dedicated bicycle accommodations would be provided along Warren St. A marked route would be designated along adjacent streets to allow bicyclists to navigate between downtown and the MSU campus without needing to stay on Warren St. See **Figure 5.**

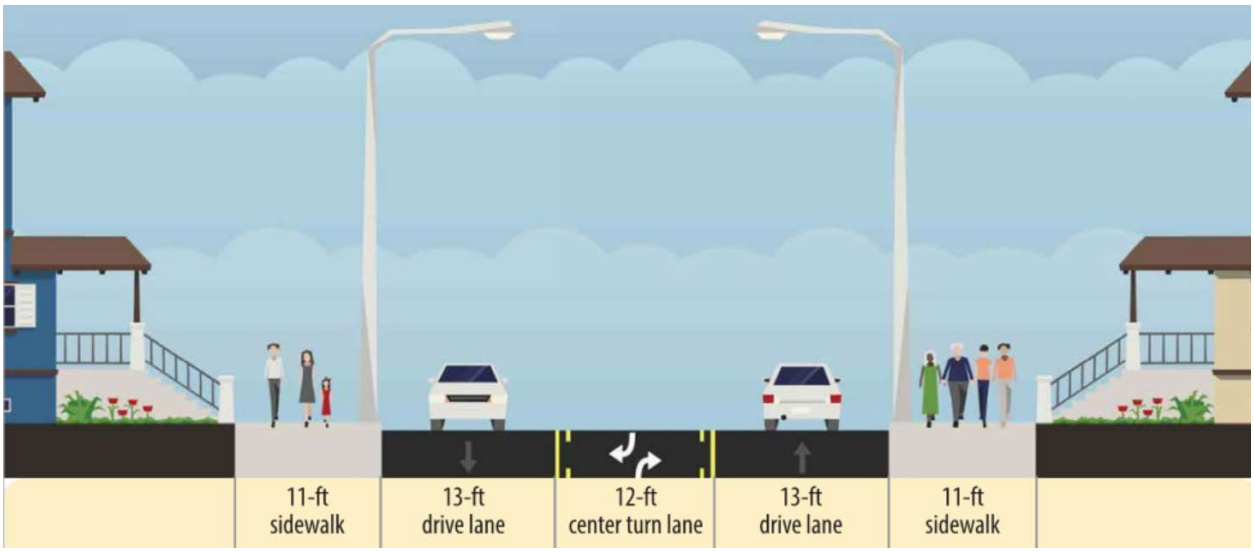

Figure 5 - Three Lane with Alternate Bike Route

Pros:

- Center turn lane keeps left turning vehicles separated from through vehicles, which comes with an added safety benefit.
- 3-lane section provides ample capacity for projected traffic volumes.
- Wide sidewalk facilities through corridor provide ample room for walking and streetscape elements.

Cons:

- Lanes need to be narrow to fit within existing right of way.
- In some areas of the corridor, sidewalks would not be wider than they are today. Most vulnerable bicycle users (children) may still not be comfortable in the bicycle lane and would ride on the narrow sidewalk or take an alternate route.

Warren Street at 4th Street

Two alternatives were considered at 4th Street which would correspond with the other roadway typical section alternatives analyzed and work to improve the safety issues experienced at the existing intersection.

Full Access Intersection

This concept would maintain a full access intersection at 4th Street with side street stop control. This would match the existing condition in terms of access but would differ in how Warren Street is designed. See **Figure 6.**

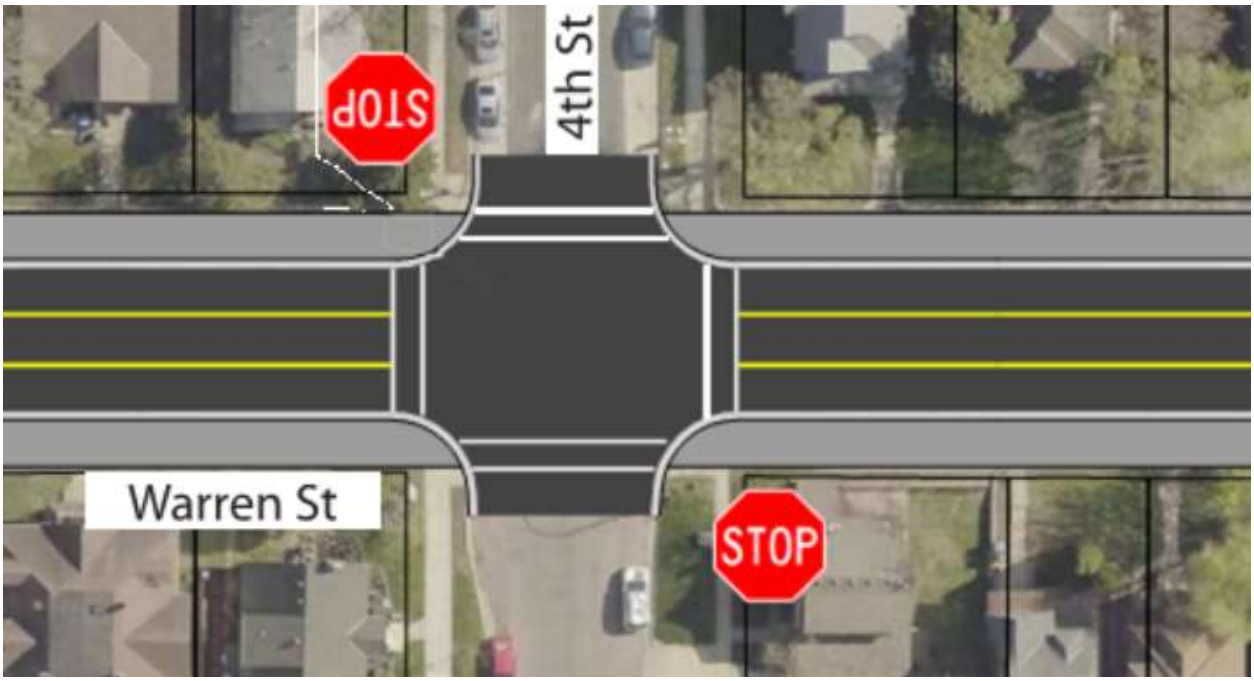

Figure 6 - Full Access Concept (Shown with 3-lane with Alternate Bike Route Concept)

Pros:

- Full access without vehicle trip rerouting.

Cons:

- With roadway narrowing to either 2- or 3-lane, the anticipated crash rate would be reduced compared to existing conditions but is not expected to completely solve existing safety issues.

Right-In/Right-Out Intersection

This concept would replace the center two-way left turn lane with a raised concrete median through the intersection. Note that this concept is only compatible with Warren Street alternatives that maintain 3-lanes of traffic. See **Figure 7.**

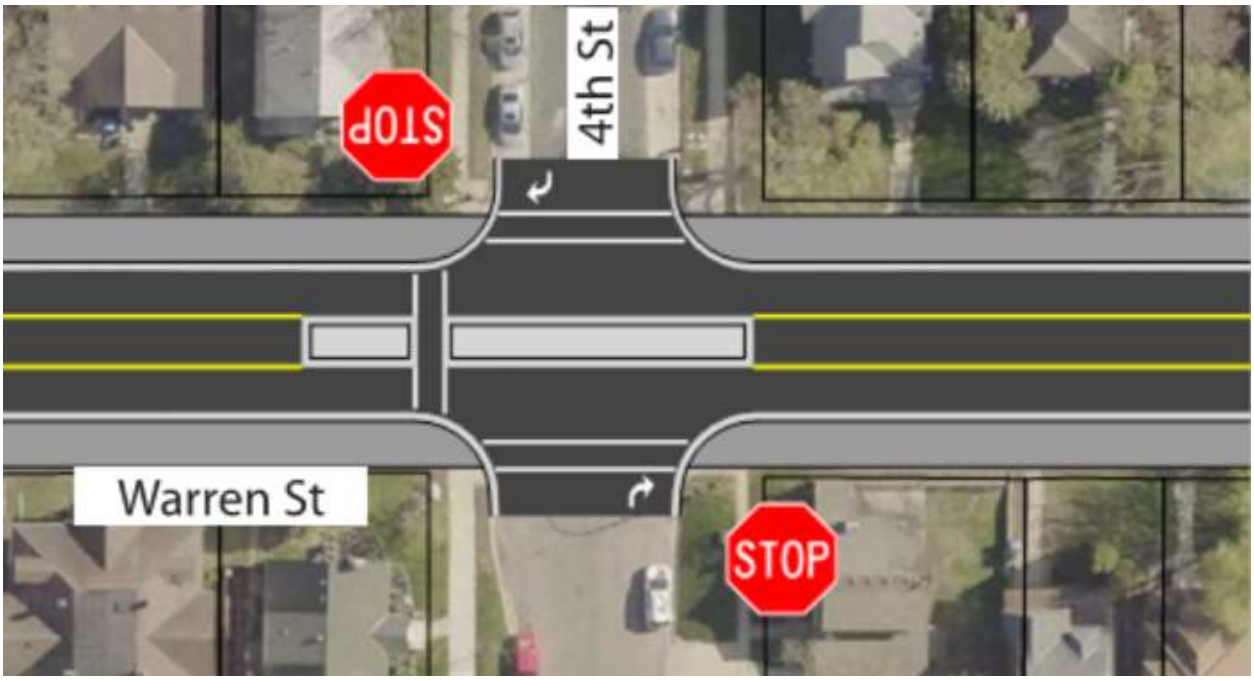

Figure 7 - Right-In/Right-Out Concept (Shown with 3-lane with Alternate Bike Route Concept)

Pros:

- Option anticipated to reduce crash levels within expected range for this type of intersection.
- Installation of a median would provide for an improved pedestrian crossing at this location. Users would be allowed to cross one direction of Warren Street traffic at a time.

Cons:

- Vehicles making through or left turning movements from 4th Street will need to reroute to Broad Street or Glenwood Ave. This is not expected to significantly alter operations at those intersections.

Warren Street at Glenwood Ave

Three alternatives were considered at the intersection of Warren Street and Glenwood Ave. In the future, traffic modeling indicates that there may be a noticeable delay on the Glenwood Avenue leg trying to access Warren Street as a side street stop. These delays, paired with the existing safety issue, and desire for an improved pedestrian crossing at this location led to the exploration of a variety of concepts. Alternatives analyzed include: Side street stop control, all way stop control, and a single lane roundabout.

Side Street Stop Control

This concept would maintain the same traffic control that is present in the existing condition, but would realign Glenwood Avenue to intersect Warren Street at a more perpendicular angle. See **Figure 8.**

Figure 8 - Side Street Stop Concept (Shown with 3-lane with Alternate Bike Route Concept)

Pros:

- Limited delay for Warren Street traffic.
- Can be paired with enhanced pedestrian crossing of Warren St.
- Sight lines improved due to intersection realignment.
- Improvements anticipated to fit within existing right of way.

Cons:

- Reduced through lanes on Warren Street increase delays for Glenwood Avenue traffic (2041 analysis). Users may end up changing travel patterns to avoid delays at this intersection during peak traffic periods.

<u>All Way Stop Control</u>

This concept would install stop signs on all three approaches and would realign Glenwood Avenue to intersect Warren Street at a more perpendicular angle. See **Figure 9.**

Figure 9 - All Way Stop Concept (Shown with 3-lane with Alternate Bike Route Concept)

Pros:

- Improved access for Glenwood Avenue traffic.
- Lowest expected crash rate of three options.
- Sight lines improved due to intersection realignment.
- Improvements anticipated to fit within existing right of way.

Cons:

- Stops all Warren Street traffic, therefore introduces the most delay of all options at this intersection.
- Does not meet volume warrant to justify installation. Users on Warren Street may not comply with stop signs due to relatively low volume on Glenwood Ave.

Single Lane Roundabout

This concept would convert the intersection to a single lane roundabout. See **Figure 10.**

Figure 10 - Roundabout Concept (Shown with 3-lane with Alternate Bike Route Concept)

Pros:

- Improved access for Glenwood Avenue traffic.
- Pedestrian crossings are improved. Users only need to cross one direct of Warren Street at a time. Traffic speeds are also lower at the crossings.

Cons:

- Significant impacts to adjacent properties.
- Construction cost is highest of all options at this intersection.
- Challenging grades to construct a roundabout would likely increase costs to fit it in.

Val Imm Drive to Haynes Street

This segment of Warren Street differs from the first in that land use is primary all residential or park along this stretch. The roadway is steeper in this area as it winds its way up the hill. Due to the grade of the roadway and proximity to built properties as well as steep slopes, major changes to this section of Warren Street would be extremely costly. Projected traffic volumes are able to operate well in this area by maintaining the roadway lanes and intersection control present today. That being said, several spot improvements were analyzed, including:

1. Installation of additional signing and striping to reinforce a pedestrian crossing at the intersection of Warren Street and Highland Ave. This could include marking the crossing, installing in-street pedestrian signs, warning signs, and possibly enhanced treatment such as a Rectangular Rapid Flash Beacon System (similar to those present further up Warren St).
2. Potential closures or realignments of access driveways into Highland Park. The western

driveway creates a 4th leg to the existing intersection, which can create confusion in terms of who has the right of way to drive in or out of the area. The eastern driveway is not aligned with Haynes St, causing the potential for overlapping left turn movements into the park and onto Haynes St. Realignments or closures of these driveways could improve safety and driver understanding. No particular relocation concepts were drawn as this was viewed as an opportunity driven improvement that would need to be completed with an understanding of other park amenities in mind.

3. Restripe the uphill section of Warren Street to include a bike lane, similar to Val Imm. Warren Street is 36' curb face to curb face in this area compared to 32' on Val Imm. There would be enough room to provide a dedicated bike lane for riders traveling up the hill, to remove them from vehicular traffic as it is not possible to maintain vehicle-like speeds due to grades. This striping concept was not drawn as it would be part of a larger pavement rehabilitation project. Ultimate space allocation would be determined at that point based on the type of project being considered.

Dismissed Alternatives

During alternative analysis, several ideas were discussed but ultimately dismissed as being fatally flawed when compared against the study goals.

1. Four-Lane Undivided Option – Leaving the roadway in a similar configuration will not improve safety for all users (vehicles, pedestrians, or bicyclists). Projected traffic volumes do not require 4 lanes of traffic to operate satisfactorily. In addition, a 4-lane roadway does not provide enough space for dedicated bicycle facilities.

2. Signal Removal at Front Street – The signal at Front does not meet volume warrants at the 60% threshold and is therefore not considered justified by volumes alone. However, to provide a controlled crossing for pedestrians at the intersection, a signal is desired to remain. This crossing at Warren Street is a part of the main pedestrian access route in the City of Mankato Front Street Connectivity Plan. The signal will need to be justified when it is intended to be replaced.

3. Three-Quarter Intersection at 4th Street – Along with full access and right-in/right-out that were considered, a ¾ intersection was also looked at to gain a pedestrian crossing with median refuge while still allowing left turns off of Warren Street. This would not fit within the right of way and therefore did not satisfy goals to provide infrastructure compatible with the built environment.

4. Alternatives Requiring Significant Right of Way Acquisition – Typical section alternatives that exceeded the available 60' or 66'+ of right of way available along the corridor were not considered as part of this effort due to the major cost implications that would arise from acquiring property from an entire side of the roadway as well as the existence of other viable options not requiring significant property acquisition. Many building structures are within 10' of the existing property lines.

VIII. Recommended Alternative and Implementation Plan

The PMT considered results of the technical analysis as well as public input and feedback when working towards a recommended alternative. The following describes the recommendations made along Warren Street as part of this study. See **Appendix I** for a figure of the recommended alternative.

Riverfront Drive to Val Imm Drive

Of the three alternatives in this area presented at the second open house, voting by attendees indicated an overall design to include some sort of bicycle accommodation along Warren Street, not on an alternate route. The recommended alternative in this area is a combination of the concepts presented to the public. The right of way along Warren Street varies between Riverfront and Front St, is 60' from Front Street to Broad St, and is 66'+ east of Broad Street. The recommended section changes based on width available. Between Broad Street and Val Imm Drive (66'+ of ROW), a one-way dedicated bicycle facility will be provided on each side of the roadway, at sidewalk level. This will provide a connection between the existing bicycle network present on Broad Street and Val Imm Dr. See the recommended section in **Figure 11**.

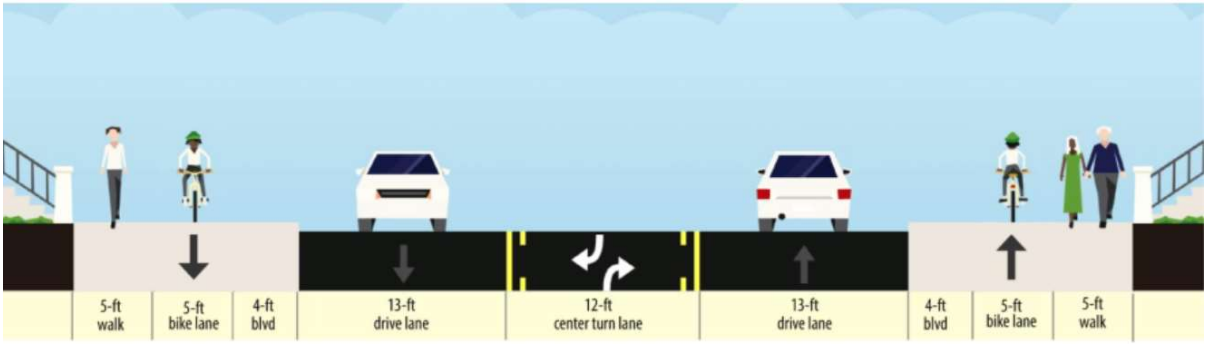

Figure 11 - Recommended Typical Section (Broad to Val Imm)

West of Broad St, the available space decreases to 60'. Keeping a dedicated bike facility would reduce the space available for pedestrians and not allow for signing or lighting to be placed along the road. In addition, the existing network in the city provides connections from Broad Street to other amenities, such as the river by using new facilities along Cherry St. The recommended section west of Broad Street is shown below in **Figure 12**, which provides a wide sidewalk-level area for pedestrians and streetscaping amenities.

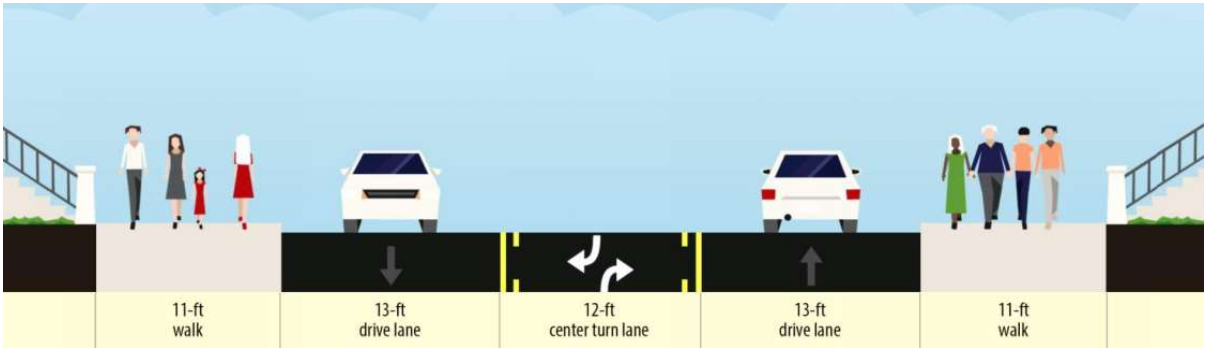

Figure 12 - Recommended Typical Section (Riverfront to Broad)

The intersections with Riverfront St, Front St, 2nd St, and Broad Street will all remain signalized. Opportunities to increase protection for vulnerable roadway users (pedestrians and bicyclists) should be considered as the design is furthered and refined. Curb extensions/bump outs could be accommodated on many of the side street approaches depending on the design vehicle. Dedicated

left turn lanes along Warren Street and Poplar Street are recommended as shown on the recommended alternative. This ties into recommendations at the intersection from the Riverfront Drive Corridor Study.

The intersection with Val Imm Drive will remain a side street stop, however the approach will be realigned to intersect Warren Street at a more perpendicular angle. This will improve sight lines and also reduce the speed of Warren Street to Val Imm Drive right turns. Lower speeds for that turning movement will promote a safer intersection for pedestrians. In addition, an enhanced pedestrian crossing with median refuge would be installed on the west leg. This crossing could include enhanced pavement markings, signage, and/or a Rectangular Rapid Flash Beacon System.

Warren Street at 4th Street

Two options were presented at the second open house to either keep this a full access intersection or install a center median to allow for protected pedestrian crossings and eliminate left turns and through movements from 4th Street to improve safety at this side-street stop controlled intersection. No recommendation was made by the PMT at this location. Both options would improve safety compared to the existing condition at a location that has an existing safety issue, with the balance in options weighing improved pedestrian crossings with vehicle circulation and rerouting in the area. A possibility of a hybrid approach also exists to include a refuge median for pedestrians while keeping all vehicle movements open assuming enough space is provided to accommodate the vehicle path while turning. A final decision on treatment at this location will occur within the typical City Community Investment Plan (CIP) process.

Warren Street at Glenwood Ave

Three options were presented at the second option house at this intersection, including: Side street stop, all way stop, and a roundabout. In all cases, the Glenwood Avenue approach would be realigned to intersect Warren Street at more of a perpendicular angle to improve sight lines. While a roundabout would provide additional capacity at this location, the added cost of that improvement compared to a standard intersection does not currently offset the anticipated benefits. The recommendation for this location is to maintain a side street stop intersection while providing an eastbound left turn lane from Warren Street to Glenwood Avenue as part of the overall 3-lane roadway section. In addition, an enhanced pedestrian crossing with median refuge would be installed on the east leg. This crossing could include enhanced pavement markings, signage, and/or a Rectangular Rapid Flash Beacon System. See **Figure 13.**

Figure 13 - Recommended Glenwood Avenue Intersection Treatment

Val Imm Drive to Haynes Street

The recommended alternative includes provisions for all three items analyzed in this section of Warren St, which include: Additional striping and signing at pedestrian crossing of Warren Street at Highland Ave, potential closures or realignments for the Highland Park driveways, and restriping of Warren Street up the hill to include a dedicated bicycle facility.

Improvement Costs

Conceptual cost estimates were prepared for the recommended alternative. The following assumptions were considered due to the level of design:

- Profile assumed to remain similar to existing
- Warren Street pavement section of 5" bituminous, 18" aggregate base, and 12" sand
- All prices used 2019 MnDOT average bid pricing, but were inflated to a 2021 construction year
- No city utilities were included, only roadway surface improvements and storm sewer
- No accommodations for poor soils or contaminated materials was assumed
- Minimal streetlighting (intersections only)
- Minimal landscaping/streetscaping
- Minimal ROW costs were assumed based on the available information, however it is possible that more or less could be incurred when the roadway is designed and survey is obtained.

Conceptual cost estimates are as follows:

- Riverfront Drive to Glenwood Avenue (west side of intersection): ~$3M
- Glenwood Avenue (west side of intersection) to Val Imm ~$1.8M

Implementation Plan

Multiple improvement alternatives were identified and evaluated based on the existing conditions analysis and issues and needs identified through public, agency and stakeholder involvement. Due to the costs of the overall recommended improvements, it is likely not feasible to construct them all within one project. Therefore, portions of the improvements were broken into the following implementation timeframes:

<u>Short-Term (2021 Reconstruction Project)</u>

- The city has budgeted $3.8M for improvements along Warren Street in 2021. Pavement conditions are poor and are in need of repair, along with aging underground utilities. Reconstructing Warren Street to build the recommended improvements starting at Front Street and constructing as far east as possible is recommended. Cost estimates prepared in this effort suggest that could potentially be through the 4th Street intersection, however that is contingent on: a more refined cost estimate once the improvements are designed, the cost of city utilities, the level of streetscaping and lighting incorporated, and a logical termini for the new bicycle improvements.

<u>Mid-Term (2-15 years)</u>

- Reconstructing Warren Street to build the remainder of the recommended improvements would fall into this timeframe. This will provide the city time to budget for this phase of construction. Additionally, improvements to the pedestrian crossing at the Warren Street and Highland Avenue intersection as well as restriping of Warren Street to include an uphill bike facility east of Val Imm would fall into this timeframe. Both the pedestrian crossing and restriping projects could occur independently or with a larger pavement

preservation project depending on available funding and the exact desires of each improvement.

- The 2021 project will start at Front Street, which will leave the intersection with Riverfront Drive untouched. Completion of these improvements is recommended to occur during a larger project on Riverfront Drive.

Opportunity/Development/Safety Driven

- Improvements allocated to this timeframe may depend on additional information and study. The driveway relocations or potential closures associated with Highland Park would fall into this timeframe. Further study of the park may be needed to ultimately determine what access modifications are possible and acceptable. This could be completed with or without a street reconstruction project.

IX. Next Steps

The purpose of the Warren Street Corridor Study was to develop a long-term plan for improvements to Warren Street, part of which will guide what will be included in the 2021 reconstruction project along Warren Street. The concepts developed as part of this study are high-level and will need additional refinement through preliminary and final design. Environmental review and permitting will also be required with exact requirements based on the scope of the project and the funding source. As projects turn from plan to reality, they will move forward as part of the City's CIP process, which involves additional public engagement specific to that project area and timing.

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

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

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