MANKATO/NORTH MANKATO AREA PLANNING ORGANIZATION (MAPO)

Minnesota Trunk Highway 22 Corridor Study

Final Report

November 30, 2018

HIGHWAY 22 CORRIDOR STUDY

Highway 22 Corridor Study

Final Report

Prepared for:

DEPARTMENT OF TRANSPORTATION

District 7

MAPO
MANKATO/NORTH MANKATO AREA PLANNING ORGANIZATION

Prepared by:

SRF Consulting Group, Inc. | Engineers Planners Designers

KLJ

November 2018

SRF No. 10481

Acknowledgements

Technical Advisory Committee

Paul Vogel	MAPO	Sheila LeRoss	City of Kasota
Charles Androsky	MAPO	Clint Butterfield	City of Kasota
Lisa Bigham	MnDOT District 7	Patty Woodruff	City of Mapleton
Zak Tess	MnDOT District 7	Russ Wille	City of Saint Peter
Scott Thompson	MnDOT District 7	Ryan Thilges	Blue Earth County
Brett Paasch	MnDOT District 7	Dave Tiegs	Le Sueur County
Rebecca Arndt	MnDOT District 7	Sam Parker	Region Nine Development Commission
Anne Wolff	MnDOT District 7	Karl Friedrichs	Lime Township
Ronda Allis	MnDOT District 7	Dan Fogal	Mankato Township
Jeff Johnson	City of Mankato	Scott Morgan	Mankato Township
Landon Bode	City of Mankato	Craig Beckman	MnDNR

Consultant Team

Craig Vaughn	SRF Consulting Group	Erin Sejkora	SRF Consulting Group
Molly Stewart	SRF Consulting Group	Stewart Crosby	SRF Consulting Group
Ben Hobert	SRF Consulting Group	Amy Elias	SRF Consulting Group
Zachariah Heimer	SRF Consulting Group	Mike Bittner	KLJ Engineering
Benjamin Nault-Maurer	SRF Consulting Group	Joe DeVore	KLJ Engineering
Philip Kulis	SRF Consulting Group	Kevin Mackey	KLJ Engineering
Leif Garnass	SRF Consulting Group	Jeff Ostrom	KLJ Engineering

Table of Contents

List of Figures

List of Tables

List of Appendices

Introduction

Study Area

The Minnesota Department of Transportation (MnDOT) and the Mankato/North Mankato Area Planning Organization (MAPO) are partners in the development of the Highway 22 Corridor Study from Saint Peter to Mapleton. The corridor study limits extend approximately 30 miles with varying characteristics along its extent. For purposes of this study, the Highway 22 Corridor was divided into three segments, detailed below and shown in **Figure 1:**

- Segment 1 – US Highway (US) 169 to County State-Aid Highway (CSAH) 2 (Le Sueur/Blue Earth County Line) (Approximately 5.3 miles)
- Segment 2 – CSAH 2 to CSAH 90 (Approximately 9.3 miles)
- Segment 3 – CSAH 90 to Highway 30/CSAH 29 (South of Mapleton) (Approximately 15.4 miles)

Highway 22 through segment 1 is a principal arterial, mostly configured as a two-lane roadway with a combination of turn lanes and bypass lanes at intersections. The southbound section departing US 169 includes a truck climbing/passing lane through the County Road 41 intersection. It serves as a key connection for the City of Kasota and a gateway leading to Mankato to the south and Saint Peter to the north.

Segment 2 is a combination of a principal arterial from its northern limit at CSAH 2 to US 14; the remaining portion of segment 2 is a minor arterial roadway from US14 to CSAH 90. Highway 22 through segment 2 also transitions from a two-lane roadway with turn lanes to a four-lane divided roadway with turn lanes. Traffic control varies through this segment as well with side-street stop control, traffic signals and multilane roundabouts at varying intersections. The corridor context shifts from rural in nature to more urban/urbanizing through the Mankato city limits as well.

The Highway 22 segment on the south end of the corridor (segment 3) is a two-lane rural roadway with a minor arterial functional classification. While this segment extends from CSAH 90 to Highway 30/CSAH 29 south of Mapleton, most of the study focus was placed on the portion through the Mapleton city limits from CSAH 7 (Central Avenue) to Borchert Street SE/127th Street (TWP 49).

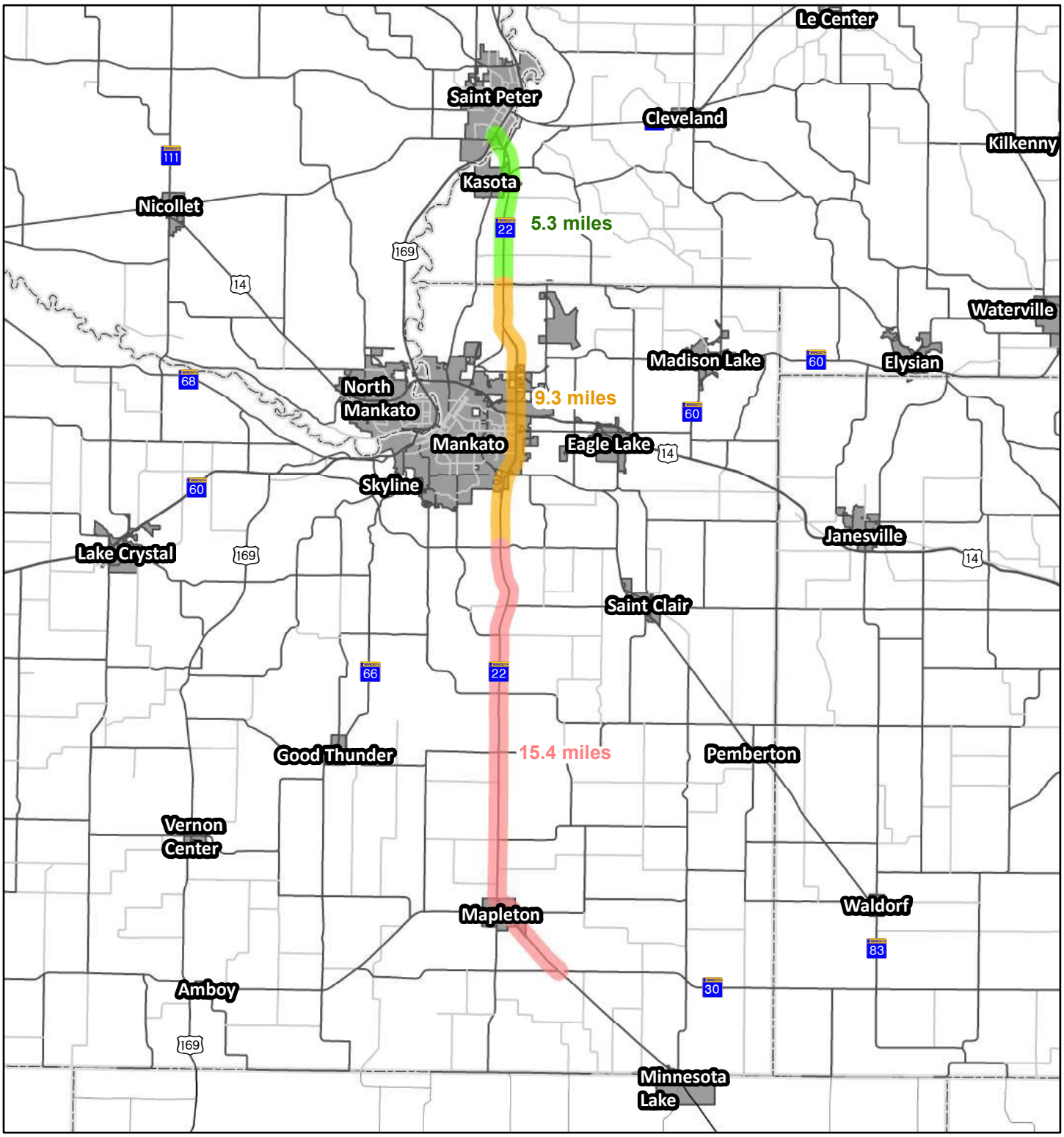


Figure 1. Study Area

Study Objectives and Major Tasks

The purpose of the Highway 22 Corridor Study was to identify and address current and future transportation issues along Highway 22 between Saint Peter and Mapleton. The key study outcome is evaluation and identification of future Highway 22 alternatives to be carried forward for further analysis as part of future environmental documentation and implementation. The Study evaluated existing and future transportation recommendations, including:

- Lane configurations
- Access management
- Safety
- Intersection control options
- Alternative intersection designs
- Bicycle and pedestrian connectivity
- Local roadway and trail networks
- Potential land use impacts and opportunities

The Highway 22 Corridor Study began in July 2017 as a cooperative effort between MnDOT and the MAPO. SRF Consulting Group, Inc. (SRF) was retained to assist with technical analysis, public input, and final documentation of the corridor study along with its partner, KLJ Engineering.

The study partners and consultant team completed the following tasks as part of the corridor study:

- Assessment of existing and future conditions
- Development of year 2030 and 2045 traffic conditions
- Analysis of existing and future traffic conditions
- Identification of existing and future issues along the corridor for each segment
- Preparation of a purpose and need statement and vision for each segment of the corridor
- Development of planning-level corridor improvement alternatives for each segment
- Evaluation of the planning-level alternatives, including cost estimates
- Identification of alternatives to carry forward for future environmental documentation for each segment
- Development of an implementation plan
- Solicitation of public input throughout the study

Stakeholder Engagement Process

MnDOT, MAPO, the study partners, and the consultant team recognized that public participation was critical for the success of the Highway 22 Corridor Study. During the initial stages of the study, a public involvement plan (PIP) was developed to guide the study team's engagement efforts and overall process (see **Appendix A**). The purpose of the PIP was to clearly articulate the goals, objectives, and strategies for public participation; to identify key stakeholders and define the roles of decision-making and advisory bodies; to identify available communication methods; and to set a schedule for conducting the public participation activities.

One of the chief focuses of the study was conducting meaningful engagement by seeking input from a variety of members of the public. It was important that the study identify the needs of multiple stakeholders, including business owners and residents, as well as local and regional users that rely on Highway 22 for transportation.

Technical Advisory Committee (TAC)

The TAC was composed of technical staff from the MAPO, MnDOT, City of Mankato, the City of Mapleton, City of Kasota, Blue Earth County, Le Sueur County, Lime Township, Mankato Township, MnDNR and Region Nine Development Commission. The TAC met five times during the study process to provide input and help guide the study process. Members of the TAC are listed in the acknowledgments section above.

Goals and Strategies

The study team was committed to creating meaningful dialogue with stakeholders and the public during the engagement process to meet the following goals:

- Establish a credible relationship early with the community and public
- Create an inclusive public participation process
- Understand the needs and concerns of stakeholders and the public regarding conceptual cross sections, intersection control options, heavy vehicle freight, geometrics, and pedestrians/bicyclists
- Solicit community input regarding preferences for the Highway 22 corridor
- Present information clearly and concisely to reflect the study goals
- Clearly demonstrate how public input influences concept development
- Ensure transparent decision-making
- Build consensus and acceptance for a set of potential solutions that identify corridor cross sections/concepts

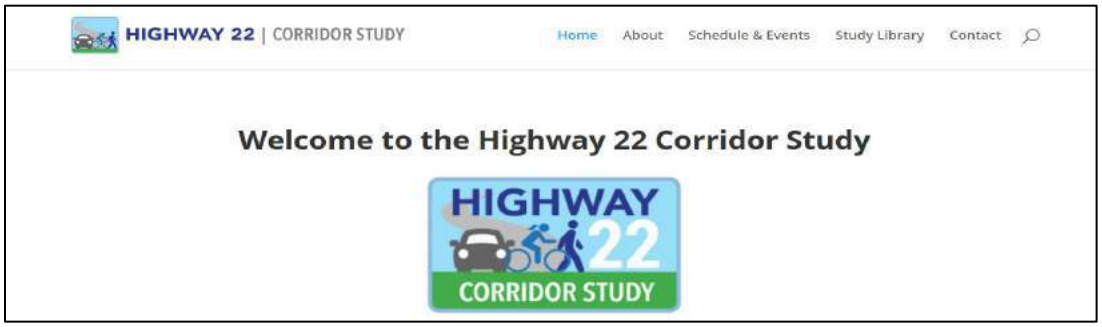
Outreach Tools

To meet the goals outlined above, the study team used a variety of methods to conduct inclusive outreach by building credibility, educating the community, and fostering support for the Highway 22 Corridor Study. A summary of the goal and purpose of each of the outreach activities is summarized below.

All outreach materials, including handouts, invitations and presentation boards are available in **Appendix A**.

Study Website

A study-specific website (https://th22corridorstudy.com/) was established to inform the public about the background and purpose, study schedule, opportunities for public participation and to serve as a repository for study information materials. The website also provided an additional tool for agency staff, stakeholders and the community to keep up with key milestones of the study as it progressed. Throughout the study, there were approximately 21,000 visits to the study specific website.



Focus Group Meetings

Multiple focus group meetings were held during the study. These targeted meetings allowed the study team to have open dialogue with businesses, residents, community leaders, and other interest groups in a more focused and intimate setting compared to an open house with the public. It was important to have dialogue with these specific stakeholders to build relationships, gain community insight, help identify preliminary issues and concerns, gain buy-in, and foster active support for the study. Approximately 30-40 total people participated in the focus group meetings which were held with the following groups:

- Community leaders, residents and business owners in Mapleton (November 1, 2017)
- Business owners north of US 14 in Mankato (November 2, 2017)
- Business owners south of US 14 in Mankato (November 2, 2017)
- Community leaders, residents and business owners in Kasota (November 2, 2017)
- Local school district members and parents in Mankato (November 13, 2017)

A summary from these focus group meetings is available in **Appendix A**.

Pop-Up Events

Pop-up outreach events were conducted at local events held in the Mankato community to gather feedback about the needs and opportunities within the corridor. This approach allowed the study team to hear community and non-local traveler concerns, along with their ideas, through face-to-face interaction in a relaxed environment by meeting where they already were instead of expecting them to come to us. Feedback was also collected at these events using informational display boards and hardcopies of a study survey (when appropriate). A half-page flyer with information about the project and contact information was also provided at these events.

Approximately 100 people participated in the pop-up event at Songs on the Lawn and approximately five people participated in the pop-up event at Hy Vee. Pop-up events included:

- Hy Vee (Mankato, January 18, 2018)
- Songs on the Lawn (Mankato, June 14, 2018)

Pop-up meetings were aimed at seeking input from community members at local events.

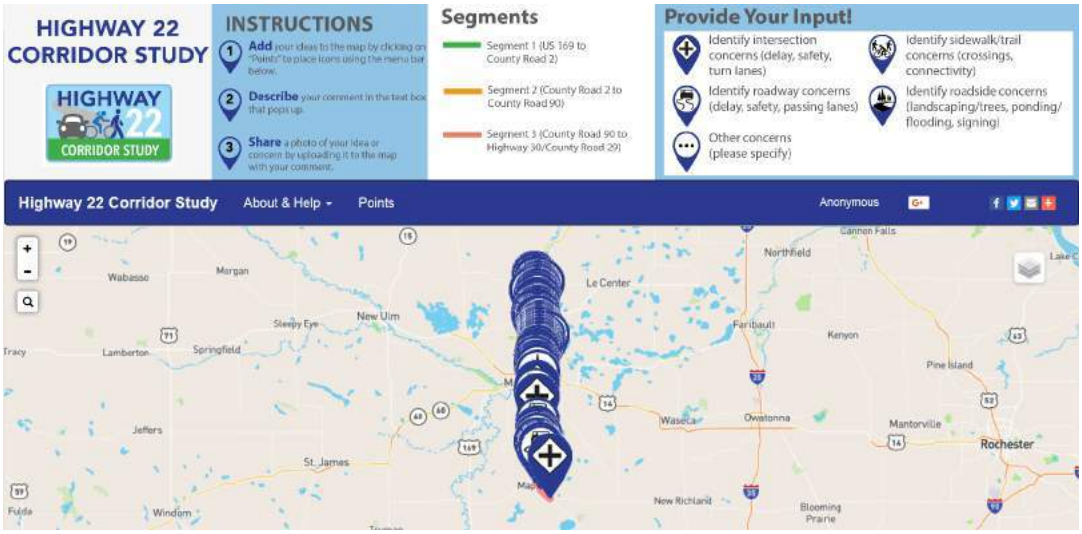
Open Houses

Public open houses were held at three key milestones throughout the study. These meetings provided the study team an in-person opportunity to present information to members of the public, collect feedback and answer questions regarding key aspects of the design and analysis of the corridor. Display boards, surveys, comment forms, and hands-on engagement activities were used to create an interactive open house format. A copy of the materials presented at each open house is available in **Appendix A**.

The first public open house was held early in the study process. The purpose of the open house was to introduce the study to the community, identify issues and needs, gather information, and request feedback as part of the public participation process. Various display boards and maps were presented to help facilitate discussion among attendees. Results from the initial data collection and

analysis were also shared and helped inform the understanding of existing conditions. Approximately 50-60 people attended the first public open house.

An online WikiMap was deployed as part of the first open house to gather interactive input on existing issues and needs along the corridor. A link to the map was provided at the open house and on the study's website.



The interactive on-line WikiMap survey tool was effective at gathering corridor issues/needs.

The second public open house was held to share future traffic conditions, proposed typical-section concepts for each of the three segments, proposed intersection control alternatives at various intersections, and proposed alignment alternatives for the Minnesota River State Trail. A "dot voting" exercise was used to gauge the community's response to the range of concepts presented and understand their preferences. A dot voting exercise was also used to identify preference for pedestrian crossing types and locations within the City of Mankato. The second open house was held in three separate locations Mapleton, Kasota, and Mankato. The same information was presented at each of the three open houses. Approximately 75-90 people total attended the second round of public open houses.

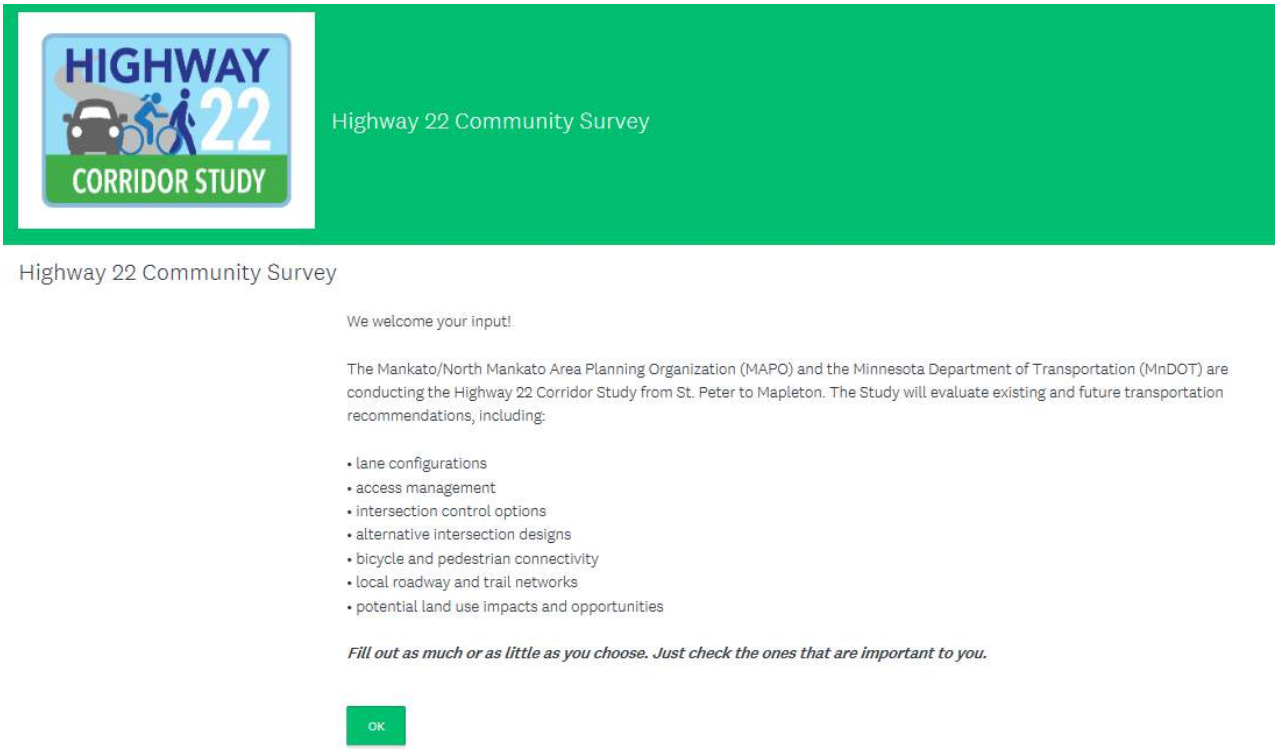
Public open house meetings provide a relaxed atmosphere to review study information.

The third and final public open house was held near the end of the study to present the draft corridor and intersection concept recommendations for each segment and gather feedback from the public prior to the study concluding. The study concept recommendations are further discussed in later sections in this document. Approximately 30-40 people attended the third public open house.

Surveys

To identify and gather the needs, concerns, and desires of the public and stakeholders as well as document their input, one survey was conducted during the study to coincide with the second round of open houses. The survey was primarily completed online using SurveyMonkey. This allowed stakeholders and the public an additional opportunity to share their thoughts if they were unable to attend an engagement activity in person. The survey was made available at each of the three open houses and at the pop-up event *Songs on the Lawn* in hard copy format as well.

The purpose of the survey was to gather feedback to determine various preferences along Highway 22 in segments 1 and 2 and to also gather input on the Minnesota River State Trail. Approximately 440 people completed the survey. Complete survey results are available in **Appendix A**.



Over 400 individuals responded to this survey during the study process.

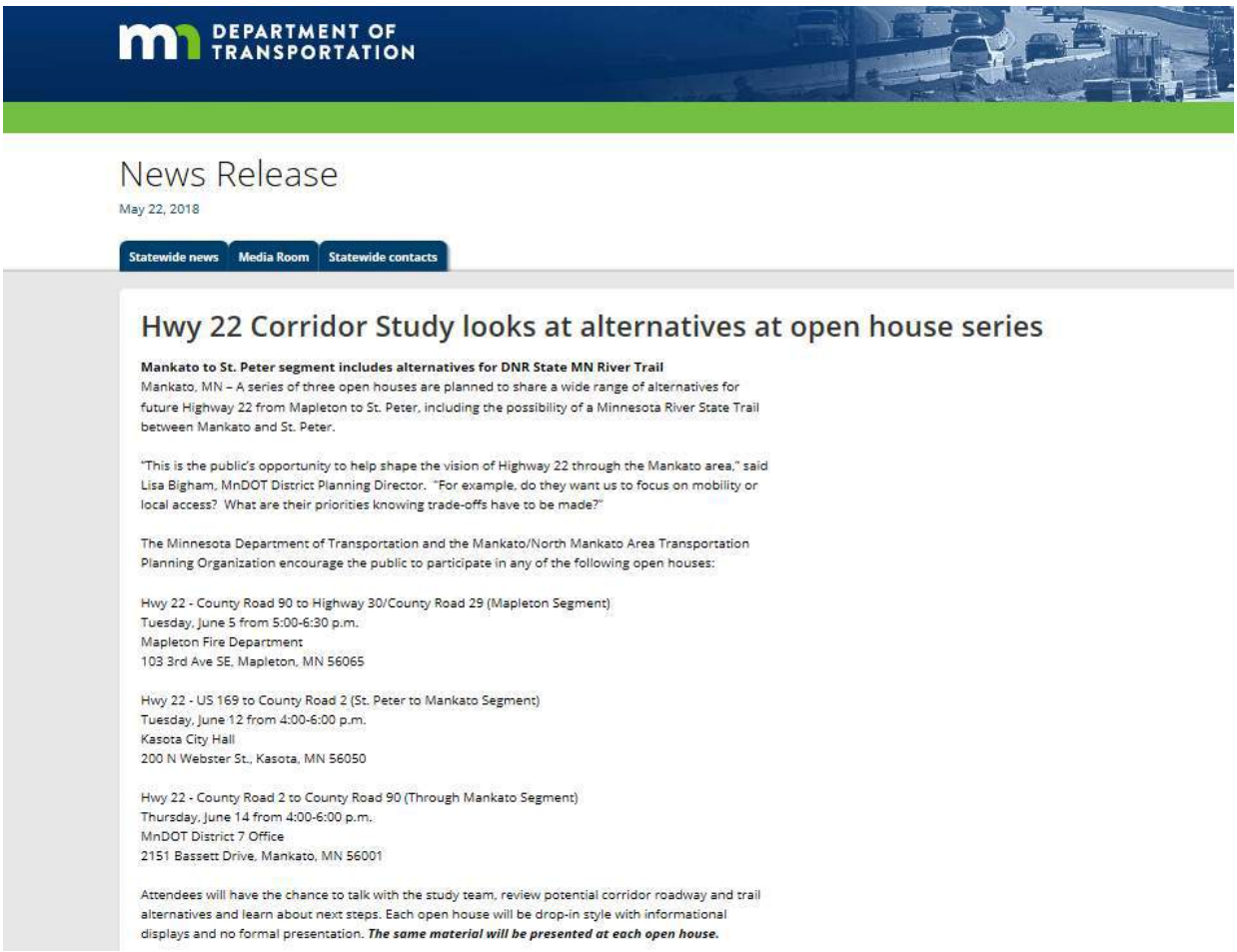
Social Media

Social media outlets, such as Facebook and Twitter, were used to promote the study's open houses, survey, and direct users to the study website for additional information. Communicating through these outlets provided an additional opportunity for stakeholders and the public to stay engaged with the study and provide their input as part of the process. There are approximately 50,000 followers of the MnDOT Facebook page and approximately 2,500 followers of the MnDOT District 7 Twitter account. Facebook events were created for each of the study's open houses and approximately 2,000 people were reached by each of these events.

MnDOT's Facebook page was used to share study information.

Traditional Media Outreach

MnDOT and the study team coordinated meeting notices, media advisories/press releases, and other relevant information with local media outlets.



DEPARTMENT OF TRANSPORTATION

News Release

May 22, 2018

Statewide news | Media Room | Statewide contacts

Hwy 22 Corridor Study looks at alternatives at open house series

Mankato to St. Peter segment includes alternatives for DNR State MN River Trail

Mankato, MN – A series of three open houses are planned to share a wide range of alternatives for future Highway 22 from Mapleton to St. Peter, including the possibility of a Minnesota River State Trail between Mankato and St. Peter.

"This is the public's opportunity to help shape the vision of Highway 22 through the Mankato area," said Lisa Bigham, MnDOT District Planning Director. "For example, do they want us to focus on mobility or local access? What are their priorities knowing trade-offs have to be made?"

The Minnesota Department of Transportation and the Mankato/North Mankato Area Transportation Planning Organization encourage the public to participate in any of the following open houses:

Hwy 22 - County Road 90 to Highway 30/County Road 29 (Mapleton Segment)
Tuesday, June 5 from 5:00-6:30 p.m.
Mapleton Fire Department
103 3rd Ave SE, Mapleton, MN 56065

Hwy 22 - US 169 to County Road 2 (St. Peter to Mankato Segment)
Tuesday, June 12 from 4:00-6:00 p.m.
Kasota City Hall
200 N Webster St., Kasota, MN 56050

Hwy 22 - County Road 2 to County Road 90 (Through Mankato Segment)
Thursday, June 14 from 4:00-6:00 p.m.
MnDOT District 7 Office
2151 Bassett Drive, Mankato, MN 56001

Attendees will have the chance to talk with the study team, review potential corridor roadway and trail alternatives and learn about next steps. Each open house will be drop-in style with informational displays and no formal presentation. ***The same material will be presented at each open house.***

MnDOT released all news releases through their website and coordinated with other news outlets.

Table 1 – Stakeholder Engagement Timeline

Date	Meeting/Event
7/27/2017	Technical Advisory Committee (TAC) Meeting #1
10/26/2017	Pop-Up Meeting 1 (CSAH 15/ CSAH 90 Open House)
11/1/2017	Segment 3 Focus Group
11/2/2017	Segment 2 Business (North of US 14) Focus Group
	Segment 2 Business (South of US 14) Focus Group
	Segment 1 Focus Group
11/13/2017	Segment 2 School District Focus Group
12/7/2017	Technical Advisory Committee (TAC) Meeting #2
12/13/2017	Agency Coordination Meeting (Trails) #1
1/18/2018	Open House #1
1/18/2018	Pop-Up Meeting 2 (Hy Vee)
3/7/2018	Agency Coordination Meeting (Trails) #2
3/27/2018	Technical Advisory Committee (TAC) Meeting #3
6/5/2018	Open House #2 (Mapleton)
6/12/2018	Open House #2 (Kasota)
6/14/2018	Open House #2 (Mankato)
6/14/2018	Pop-Up Meeting 3 (Songs on the Lawn)
8/7/2018	Technical Advisory Committee (TAC) Meeting #4
10/11/2018	Open House #3
11/6/2018	Technical Advisory Committee (TAC) Meeting #5

Existing and Future Conditions

The Existing and Future Conditions chapter is a comprehensive analysis of the existing and forecasted conditions along the Highway 22 corridor from US 169 in Saint Peter to Highway 30 south of Mapleton. The assessment draws upon data collected along the corridor, review of existing planning documents, public engagement meetings, and technical analysis of existing and future traffic data. The following is a discussion of this assessment.

Jurisdictional Classification

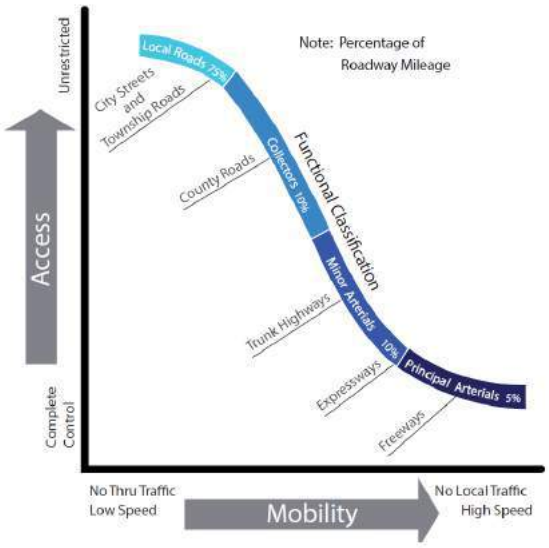
The hierarchy of jurisdictional classification is typically established so that higher-volume, regional corridors carrying inter-county traffic are maintained by the state (e.g., interstates and state trunk highways), while intermediate volume corridors with more limited travelsheds (e.g., CSAHs and county roads) are maintained by the counties. Roadways serving local traffic (e.g. Municipal State Aid Streets (MSASs), city streets and township roads) should be maintained by the municipalities or townships. Highway 22 is a state highway and MnDOT has jurisdiction over the corridor and therefore maintains the roadway in coordination with the surrounding counties, cities, and townships who maintain the intersecting roadways. **Figure 2** shows the existing jurisdictional classification of the roadways within the study area.

Functional Classification

The functional classification system defines both the function and role of a roadway within the hierarchy of an overall roadway system (see graphic below). This system is used to create a roadway network that collects and distributes traffic from neighborhoods and ultimately to the state or interstate highway system. Functional classification planning works to manage mobility, access, and alignment of routes. Functional classification also seeks to align designations that match current and future land uses with the roadway's purpose.

A roadway's functional classification is based on several factors, including:

- Trip characteristics: length of route, type and size of activity centers, and route continuity.
- Access to regional population centers, activity centers, and major traffic generators.
- Proportional balance of access, ease of approaching or entering a location.
- Proportional balance of mobility and ability to move without restrictions.
- Continuity between travel destinations.
- Relationship with neighboring land uses.
- Eligibility for state and federal funding.



The functional classification system is divided into four major categories: Principal Arterials, Minor Arterials, Collectors (major and minor) and local roadways. **Figure 3** shows the existing functional classification system of the roadways within the study area. As shown on **Figure 3,** Highway 22 is classified as a Principal Arterial from US 169 to US 14 in Mankato and a Minor Arterial from US 14 to the south leg of Highway 30 (southern study limits).

In Segment 1, the majority of the roadways that intersect Highway 22 are Collectors (major or minor) or local roadways except for US 169, which is a Principal Arterial.

In Segment 2, there is a range of classifications for the roadways that intersect Highway 22. US 14 is classified as an "Other Freeways & Expressways" and intersects Highway 22 with an interchange within the study area. The following is a summary of the Minor Arterials that intersect Highway 22:

- CSAH 3 (North Victory Drive) (west leg)
- CSAH 17 (Madison Avenue) (west leg)
- Hoffman Road (east and west legs)
- Highway 83/CSAH 60 (Stadium Road)
- CSAH 90

Additionally, there are several Collectors (major and minor) and local roadways that intersect Highway 22 in Segment 2.

In Segment 3, the majority of the roadways that intersect Highway 22 are Collectors (major and minor) or local roadways except for Highway 30 (north and south legs), which is a Minor Arterial.

The Mankato/North Mankato (MAPO) Long Range Transportation Plan (LRTP) identified several proposed functional classification changes within Segment 2. Below is a summary of these changes:

Table 2 – Proposed Future Functional Classification Changes (Segment 2)

Roadway	From	To	Existing Functional Classification	Future Functional Classification	Rationale
CSAH 5	US 14	Highway 22	Major Collector	Minor Arterial	Future Growth Area (Industrial) & Connectivity between US 14 and Highway 22
Premier Drive	Augusta Drive	CSAH 3	Local	Minor Collector	Future Growth Area (Commercial/Residential)
Adams Street	CSAH 3	Highway 22	Major Collector	Minor Arterial	Future Growth Area (Commercial)
Adams Street	Highway 22	CSAH 12	Minor Collector	Major Collector	Future Growth Area (Commercial)
Hoffman Road	Highway 22	CSAH 12 (Extension)	Minor Arterial	Minor Arterial	Future Growth Area (Commercial)
CSAH 17 (Madison Avenue)	Highway 22	CSAH 12	Major Collector	Minor Arterial	Future Growth Area (Commercial)
200th Street	Stoltzman Road	Highway 22	Local	Minor Collector	Future Growth Area (Residential)

Source: The Mankato/North Mankato 2045 Transportation Plan

The roadway network, outside of what is identified in **Table 2**, within the study area is in line with the functional classification principles discussed above. There does not appear to be any functional classification changes needed as part of this study.

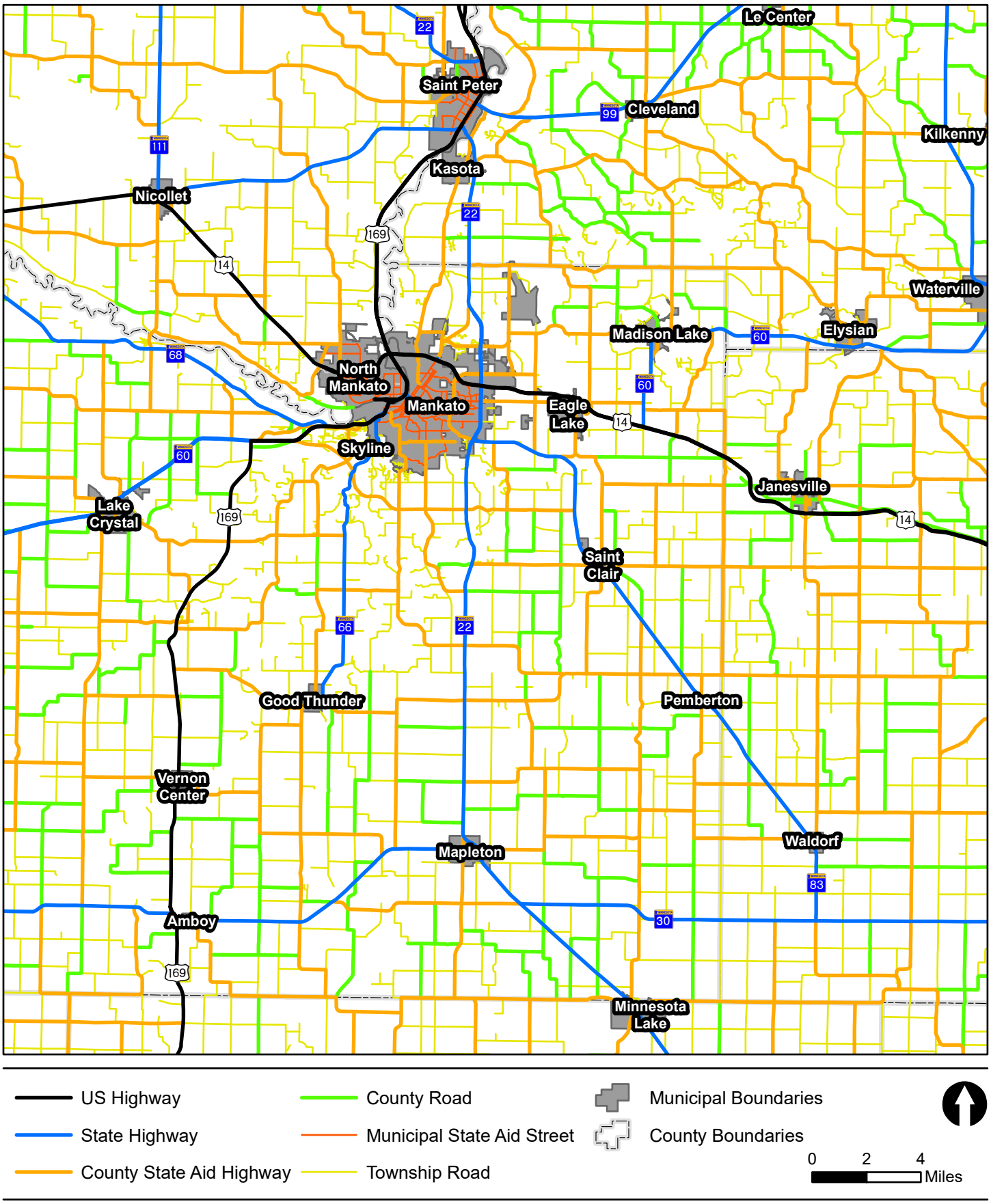


Figure 2. Existing Jurisdictional Classification

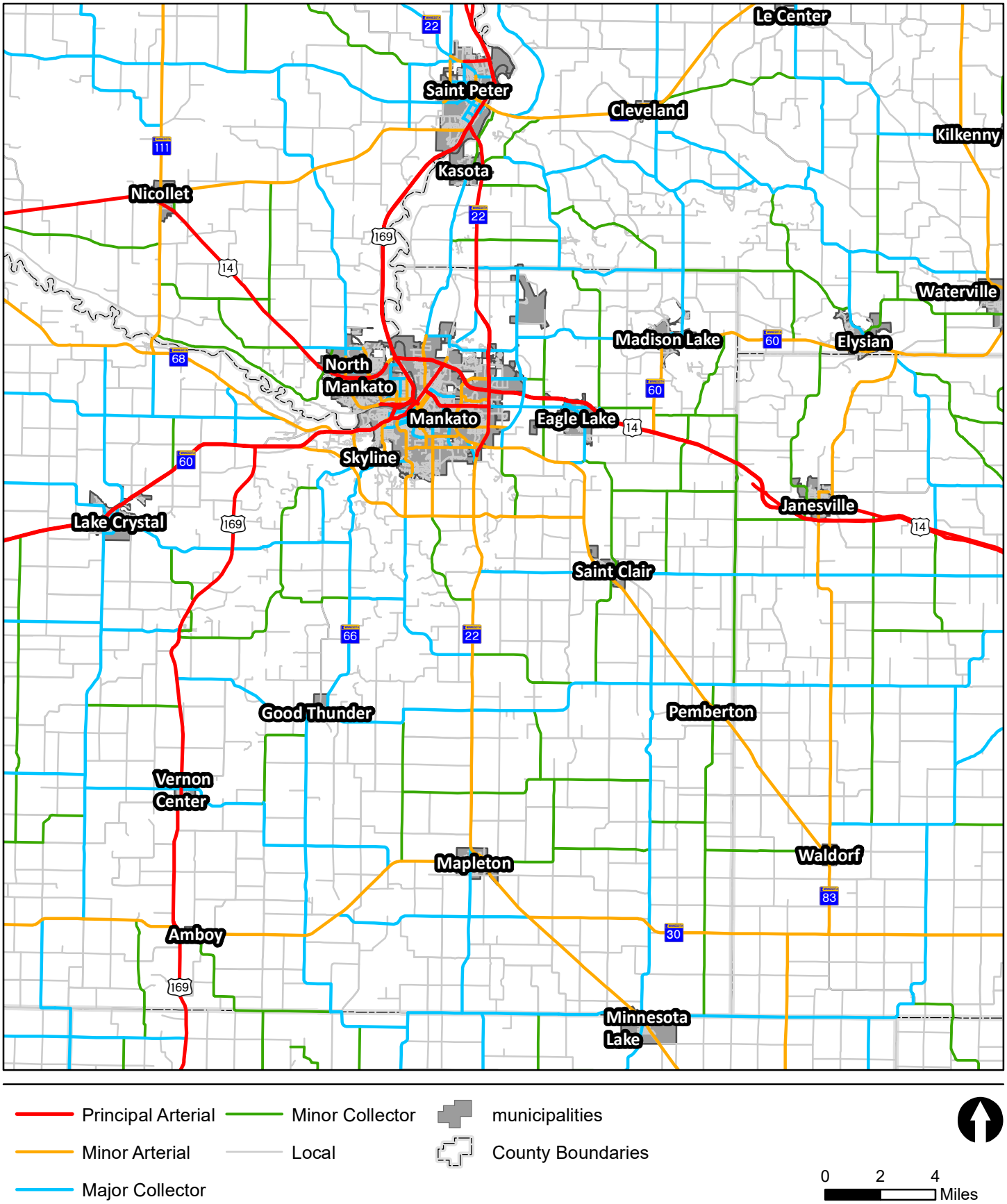


Figure 3. Existing Functional Classification

Land Use

Existing land uses surrounding the Highway 22 corridor predominately consist of agricultural/ vacant land except for the urban areas near the Cities of Kasota, Mankato and Mapleton. **Figure 4** through **Figure 7** depict land uses surrounding the study corridor. In Segment 1, residential, commercial, and industrial land uses are concentrated west of Highway 22 as shown on **Figure 4**. Urban, commercial land uses surround Segment 2 through the City of Mankato (see **Figure 5**). The majority of Segment 3 is characterized as agricultural/vacant land, with the exception of the commercial properties concentrated near the City of Mapleton (see **Figure 6** and **Figure 7)**. The City of Mapleton also has a mix of residential, commercial, and public/semi-public land uses.

The Cities of Mankato and Mapleton have established a future land use plan for their communities. **Figure 8** shows the future land uses for the City of Mankato. As shown, commercial land uses are concentrated adjacent to the Highway 22 corridor in the City of Mankato. This concentration is consistent with existing land uses. Notable future land use changes include an increase of residential properties and possible redevelopment of former big box commercial properties adjacent to Highway 22 within the city.

Figure 9 shows the future land uses for the City of Mapleton. As shown on the future land use map, the city is planning for the conversion of existing agricultural land to highway business land uses along Highway 22 in the northern part of the city. This change in land use has the potential for an increase in driveway/access requests along Highway 22, which may increase the need for additional turn lanes on Highway 22 to accommodate these accesses.

The map also identifies a large amount of industrial land along Highway 22 in the southern part of the City of Mapleton where it was previously a mix of commercial and agricultural land uses. The increase in industrial land use in southern Mapleton has the potential for an increase in driveway/access requests along Highway 22 which may increase the need for turn lanes on Highway 22 to accommodate these accesses. Industrial land use also has the potential to increase the freight movement along Highway 22 and mobility of this freight should be considered when developing alternatives for the Highway 22 corridor.

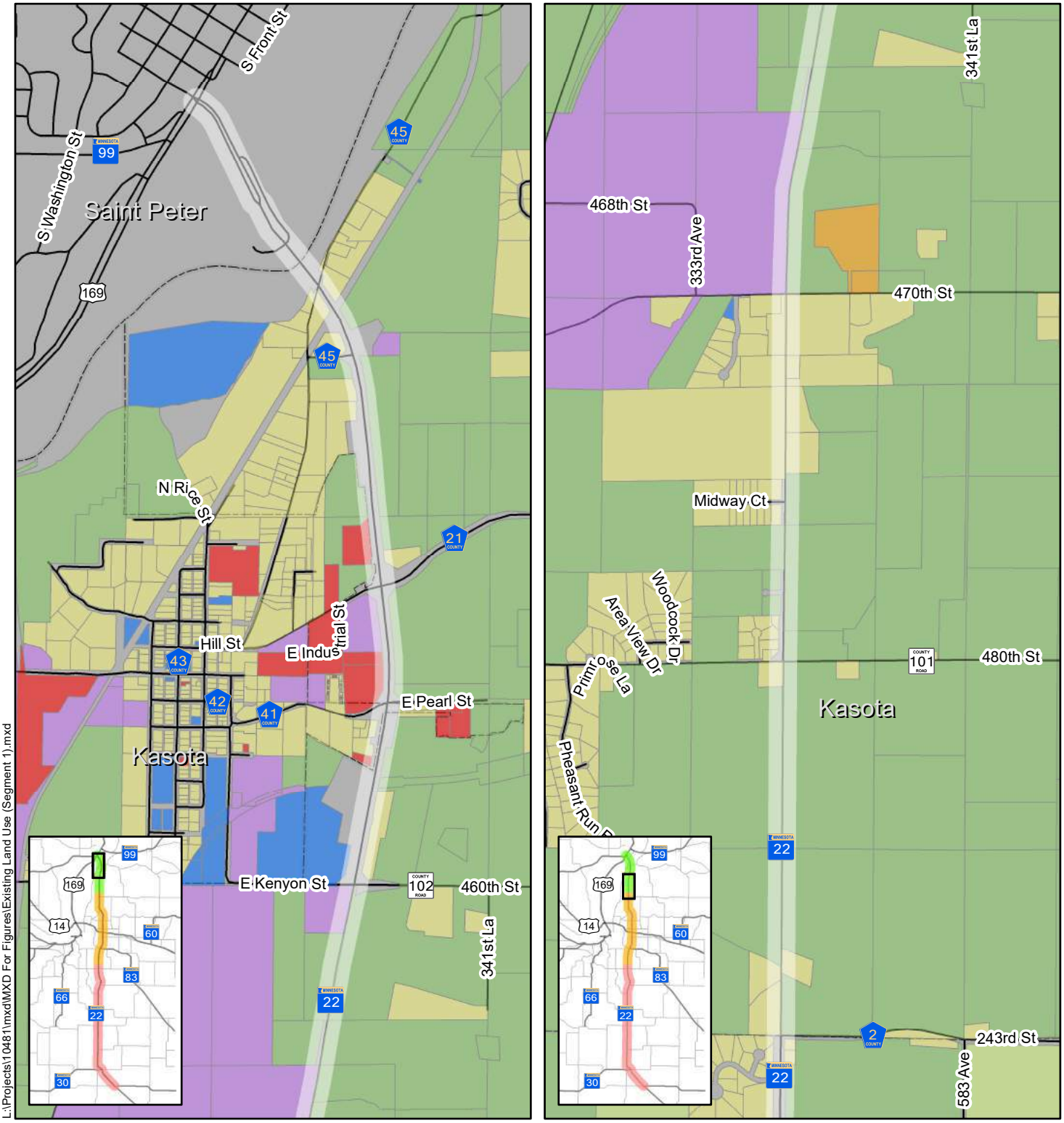
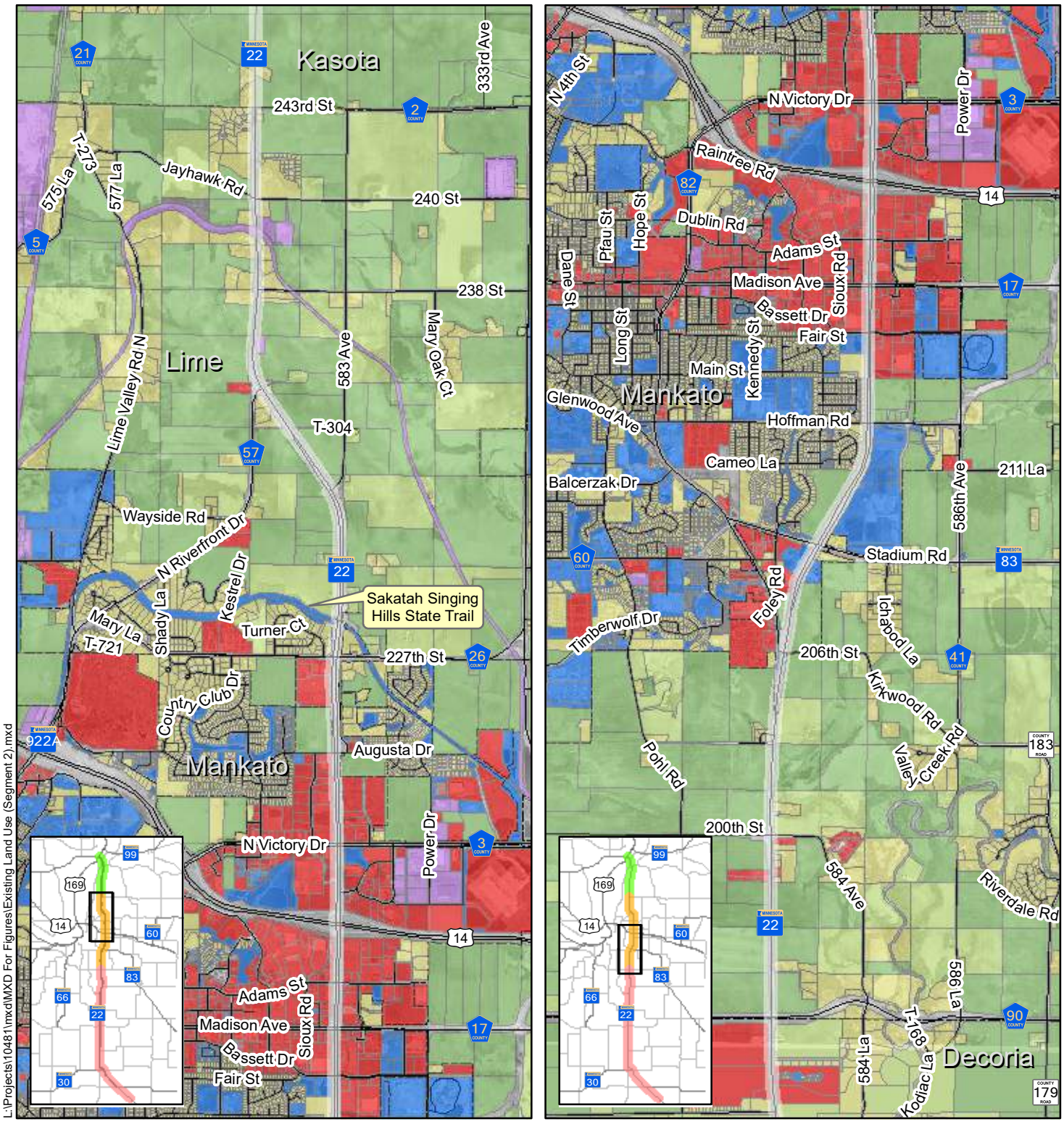


Figure 4. Existing Land Use (Segment 1)



Segment 1
Segment 2
Segment 3

Municipal & Township Boundaries
Agricultural/Vacant Land
Residential/Agricultural
Residential

Public-Semi-Public
Commercial
Industrial
Landfill

0 2,000 4,000 Feet

Figure 5. Existing Land Use (Segment 2)

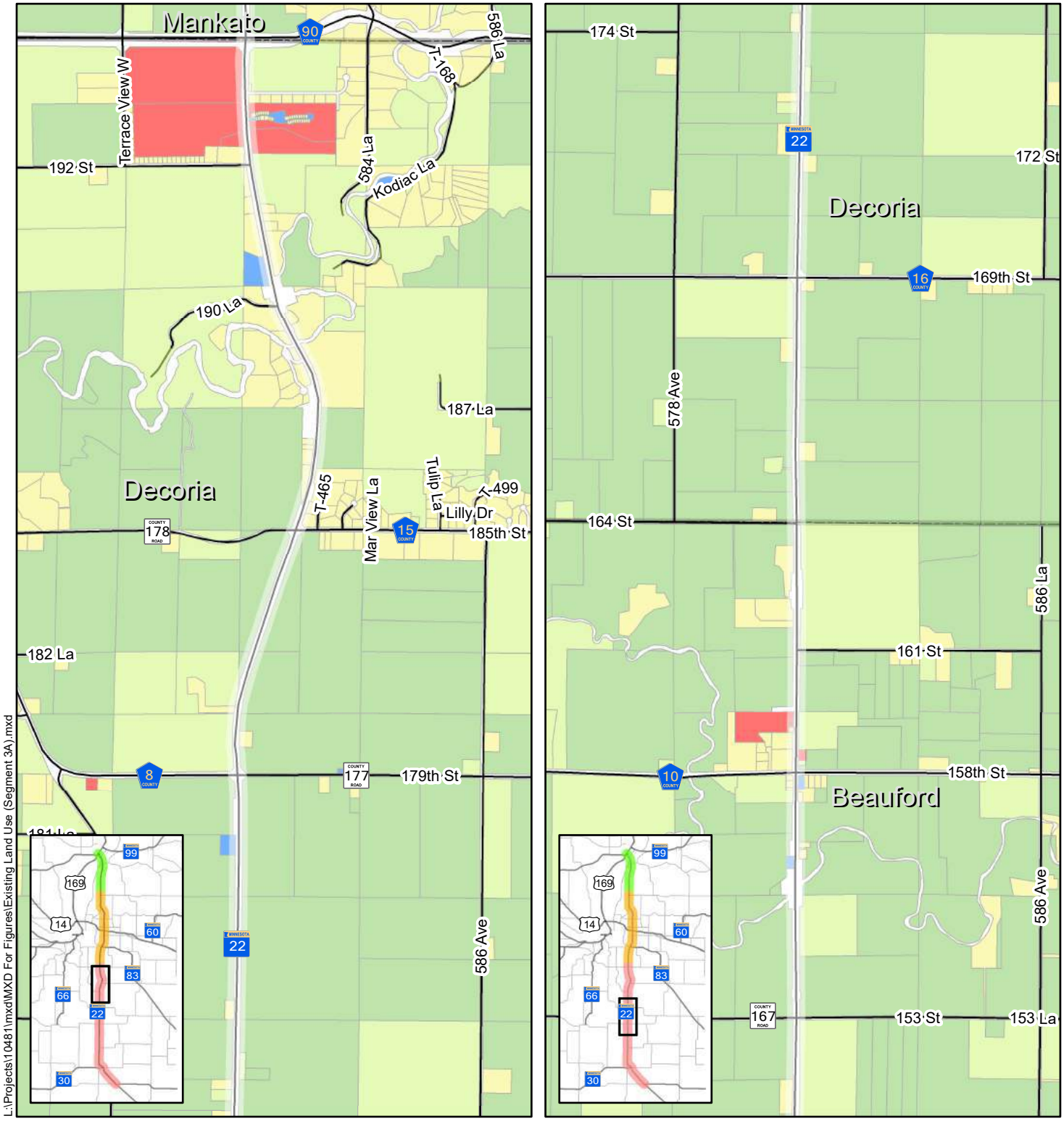


Figure 6. Existing Land Use (Segment 3A)

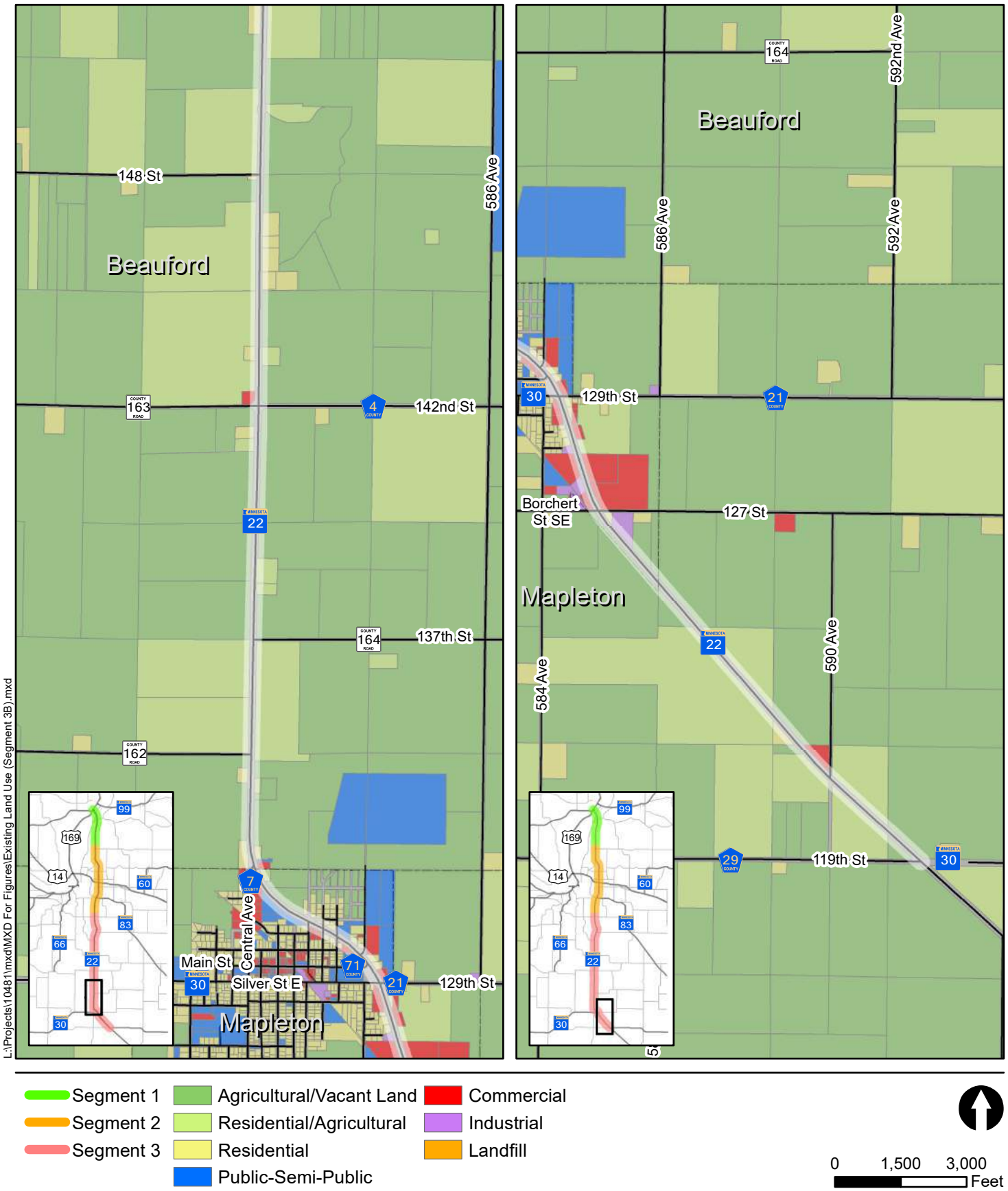


Figure 7. Existing Land Use (Segment 3B)

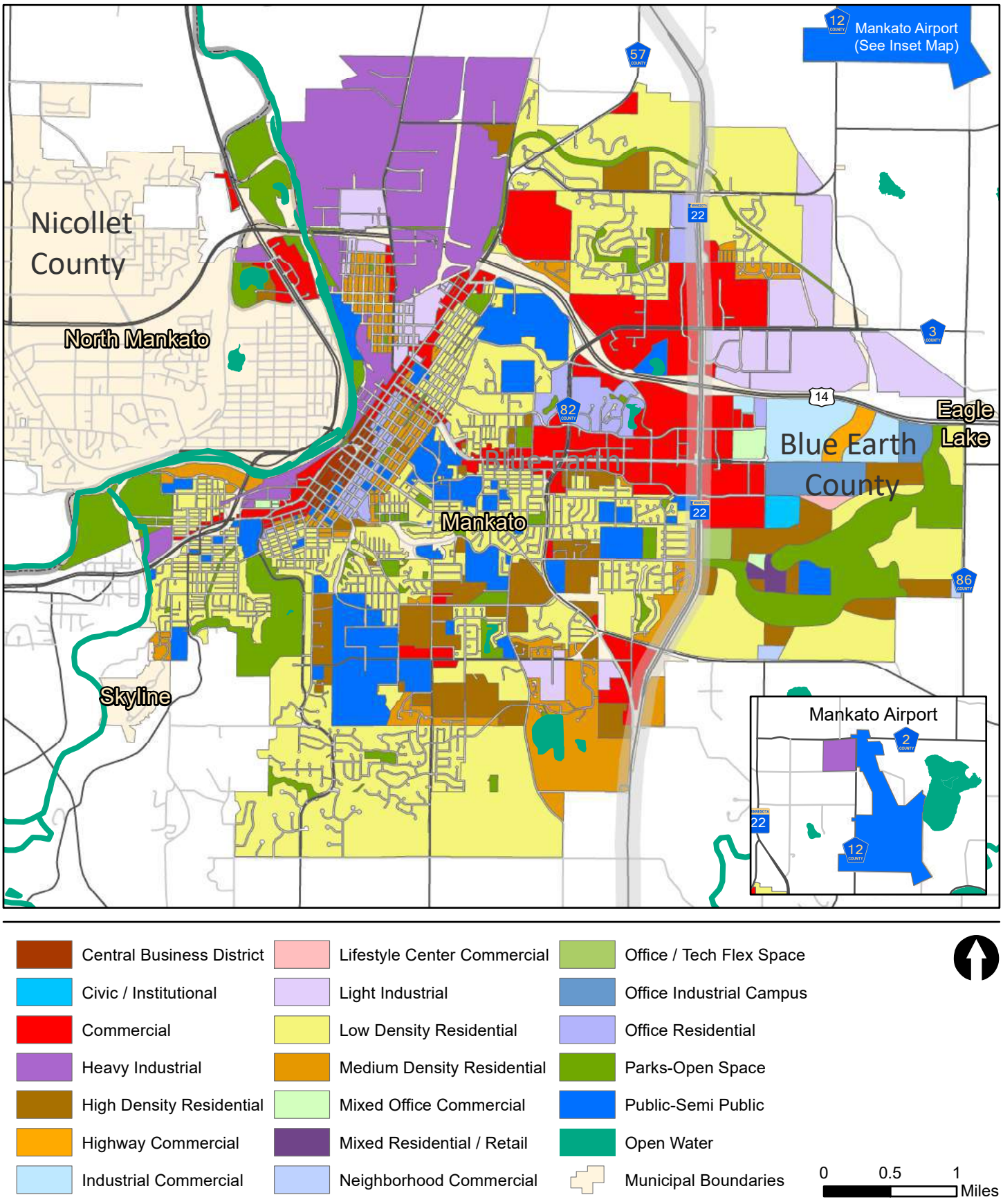


Figure 8. Future Land Use Plan (Segment 2)

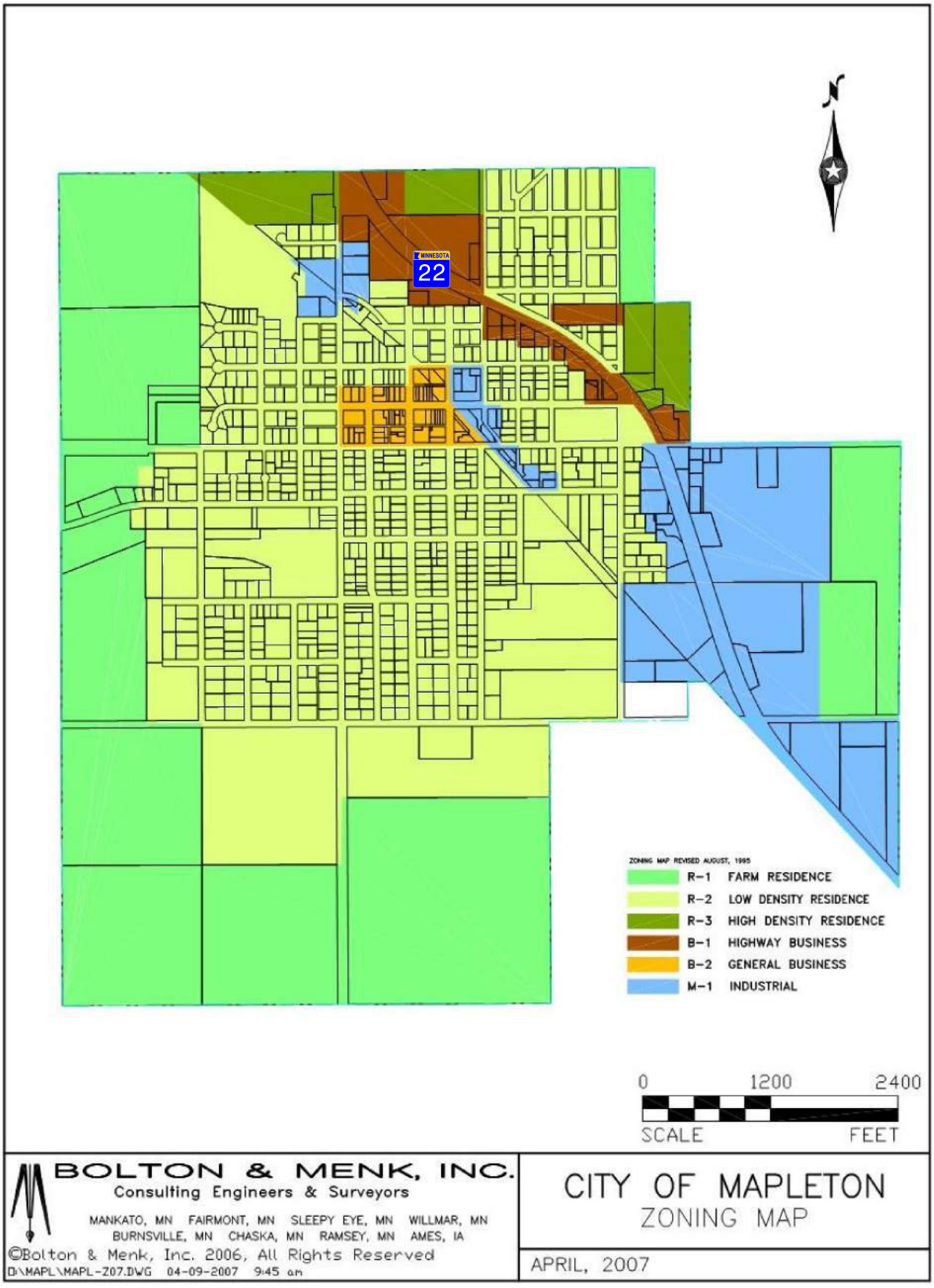


Figure 9. Future Land Use (Segment 3B)

Multimodal Trails, Sidewalks, and Crossings

Several multimodal trails and sidewalks exist within the study area. **Figure 10** provides an overall map of the study area and highlights the multimodal trails. **Figure 11** shows trail, sidewalk and bike lane network connections to Highway 22 within the MAPO boundary. Additionally, an extensive system of sidewalks within the City of Mankato provides linkages to these critical network routes.

There are three separate trail classifications: state, regional, and local. State trails are governed by the Minnesota Department of Natural Resources (MnDNR) and have been legislatively established for the following functions:

- Provide a recreational travel route that connects to other units of the state or national recreation system
- Provide access to areas of significant value
- Reestablish or permit travel along a historic route
- Provides commuter transportation

Regional trails are typically managed by the county agency they fall within. The primary purpose of these trails it to provide direct connections to other regional or state trails or provide destination-based service to a regional population. Destination trails typically follow routes of high-quality natural resources that make the trail itself a destination.

Finally, local trails are managed by city and township agencies. The purpose of these trails is to support local pedestrian/bicycle activity in populated areas by providing access to parks, schools, commercial areas, and regional trails.

The MnDNR has identified a potential trail segment from Mankato to Saint Peter as part of their Minnesota River State Trail Master Plan. No alignment has been established yet for this trail segment. Future coordination with the MnDNR will take place as part of this study and information will be incorporated into the study's final recommendations.

The MAPO is currently in the process of wrapping up their American with Disabilities Act (ADA) Transition Plan and Inventory. Recommendations from this plan should be considered during preliminary and final design for the Highway 22 corridor.

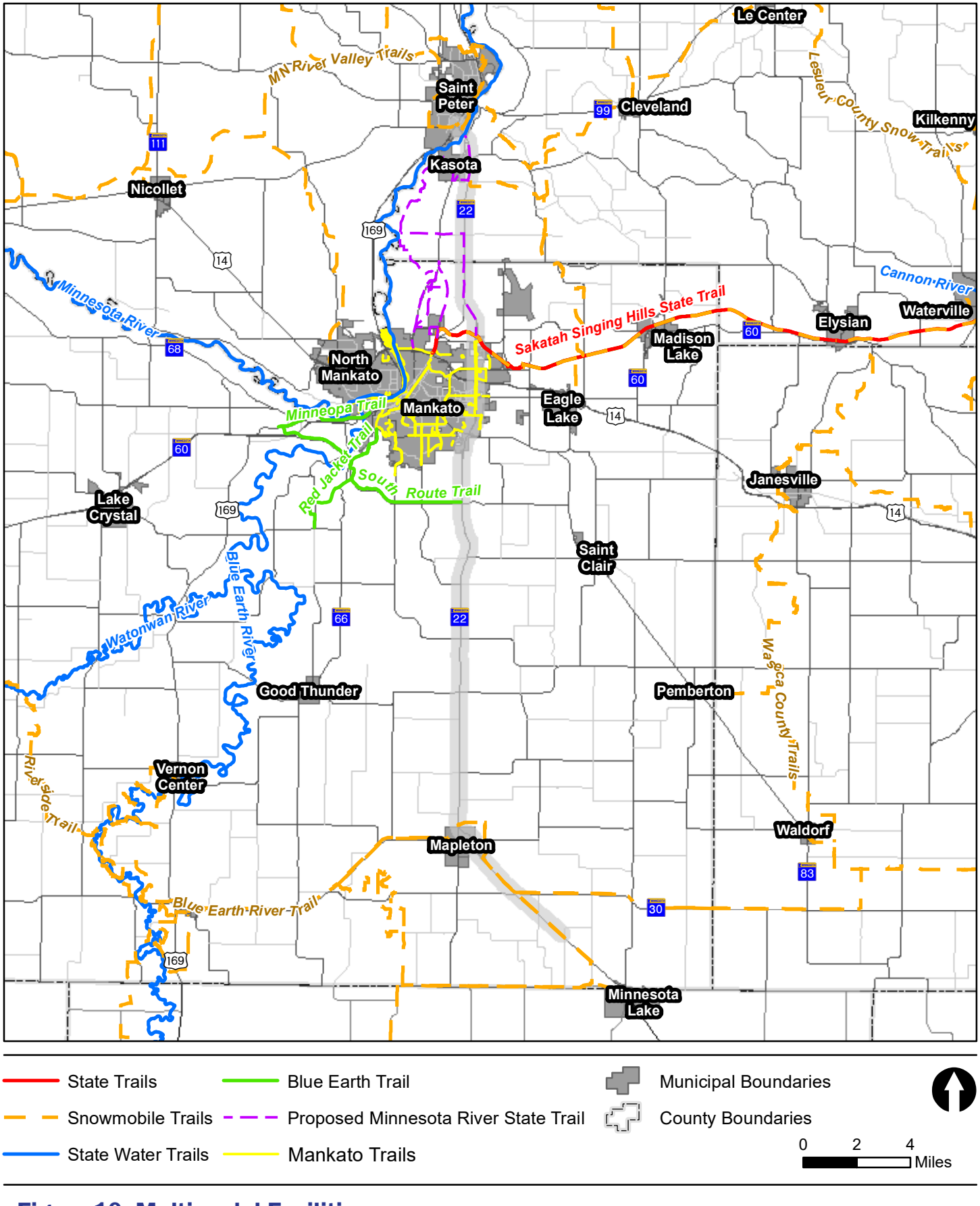


Figure 10. Multimodal Facilities

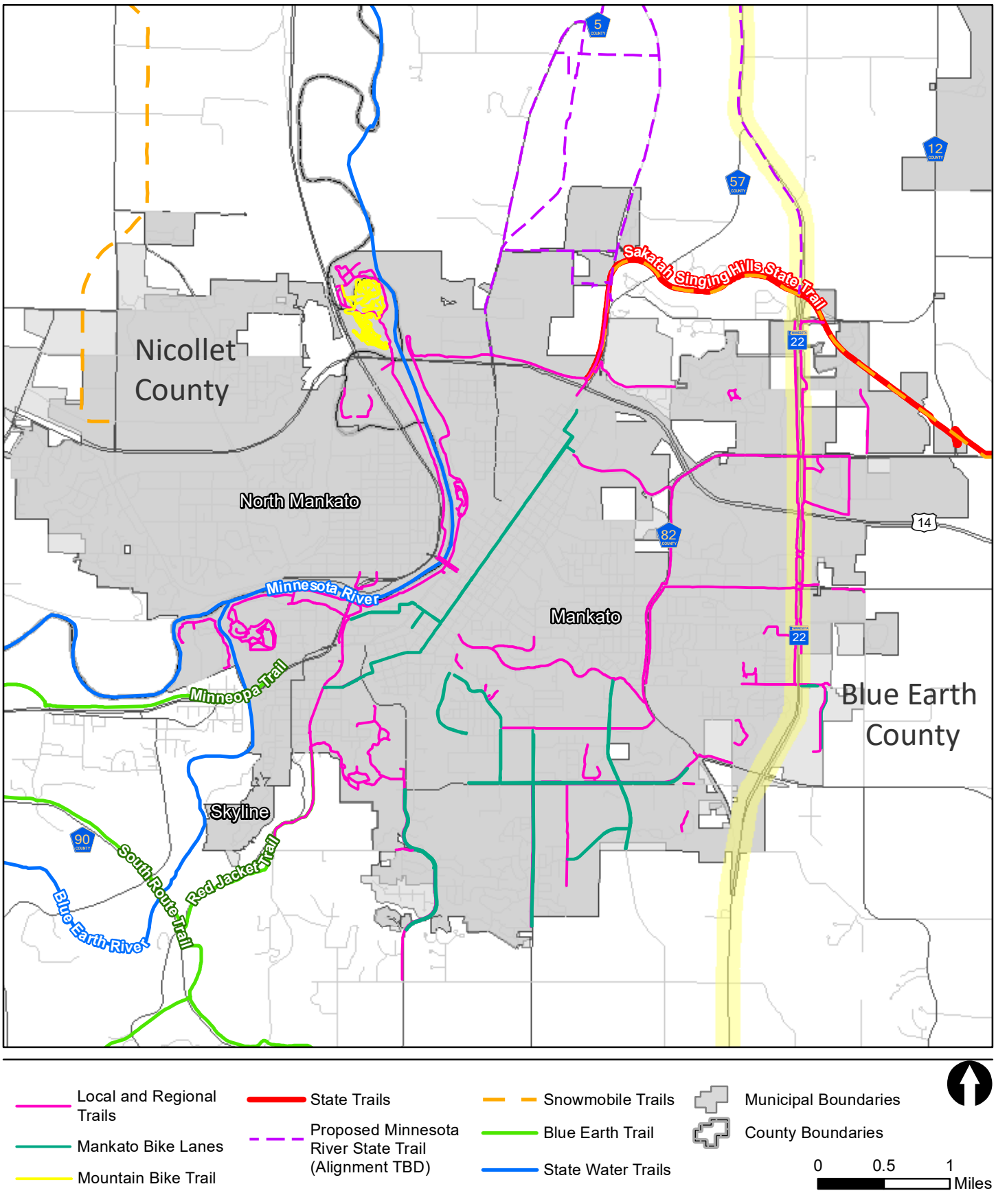


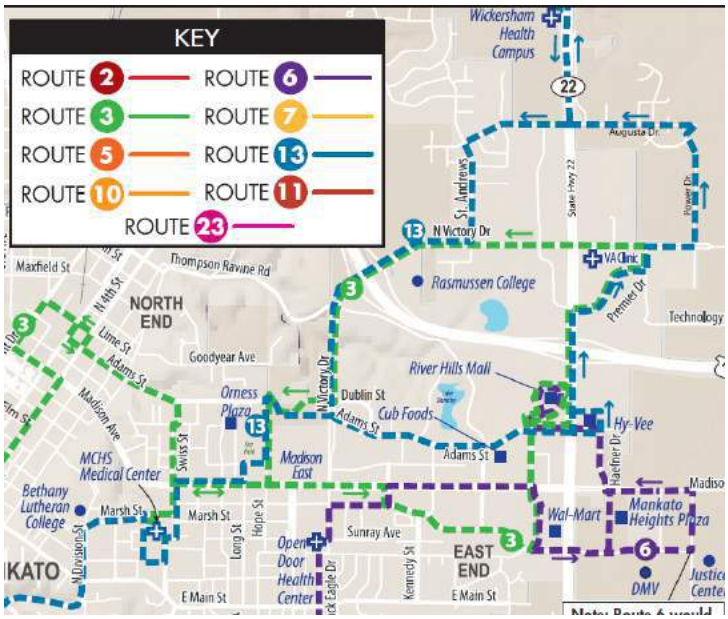
Figure 11. Existing Multimodal (Mankato)

Transit

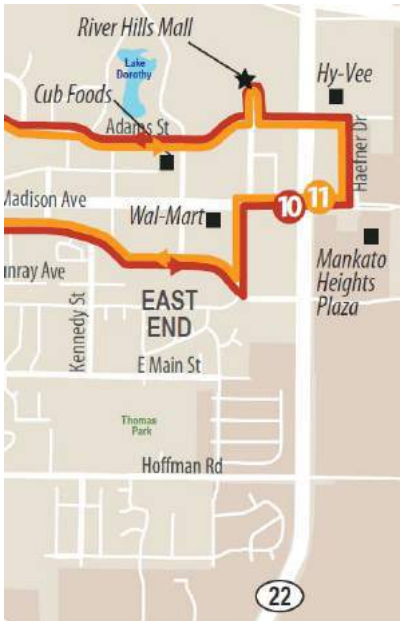
There are several transit options within the study area including public and private options. The following is a summary of these transit options.

Mankato Transit System (MTS) is the greater Mankato area's transit operator serving neighborhoods and commercial corridors, including Highway 22, within the Cities of Mankato and North Mankato including the Minnesota State University – Mankato campus area. The thumbnail graphics below show the existing transit service within the study area as of the final publish date of this report.

Vine Transit (aka True Transit) is a private transit service that serves Blue Earth, Le Sueur, and Nicollet Counties. Vine Transit offers a dependable and affordable transportation option to people who do not drive or do not have access to public transportation. Minnesota River Valley Transit (MRVT) is a private transit service that offers rides from Le Sueur through Saint Peter and into



MTS: Monday – Friday Routes
Source: City of Mankato



MTS: Saturday Routes
Source: City of Mankato

Mankato. Land to Air Express Bus service also serves the area with shuttle service from cities in Southern Minnesota, to Minneapolis/Saint Paul, and beyond. The Highway 22 corridor is used for these connections and should continue to serve this use amongst single occupancy travel.

The City of Mankato completed the Transit Development Plan (TDP) in early summer 2018. The plan was adopted by the Mankato City Council on June 25, 2018. The plan provides information about the existing transit system within the city and identifies opportunities for continued improvement in service and operations that meet a wider variety of transit needs in the Mankato area.

Freight

The statewide freight policy established in the Minnesota Go Statewide Freight System Plan is to "Provide an integrated system of freight transportation in Minnesota - highway, rail, water, air cargo, and intermodal terminals - that offers safe, reliable, and competitive access to statewide, national, and international markets." According to MnDOT, within the project area, US 169 is designated as an Oversized Overweight (OSOW) corridor with no weight restricts. Highway 22, within the project area, is designed as another OSOW route. There are no vertically-restrictive or weight-restrictive bridges identified along Highway 22 within the project area. Between US 169 and US 14, Highway 22 is on the Minnesota Twin Trailer Network. Between US 14 and Highway 30/CSAH 29, Highway 22 is on the Nation Truck Network.

The Highway 22 corridor is utilized by various modes of transportation including freight traffic. The following is summary of the type of freight usage observed for each segment of Highway 22.

Segment 1

Between Saint Peter and Mankato, approximately 5 percent of the daily traffic volume on Highway 22 is heavy vehicle (truck) traffic. During the mid-morning (9 a.m. to 11 a.m.) truck traffic can reach upwards of 10 percent of the traffic stream through this area. This percentage was validated by the daily turning movement counts that were collected as part of this study. There are several quarries located within Segment 1 that utilize the Highway 22 corridor.

Segment 2

Through Mankato, approximately 5 percent of the daily traffic volume on Highway 22 is heavy vehicle (truck) traffic. The results of the origin-destination analysis show that there is a high percentage of commercial business vehicles that travel to Mankato via US 14 mostly from east of Mankato.

Segment 3

In the Mapleton area, truck percentages range between eight and 15 percent of daily traffic, with higher percentages through City of Mapleton. Majority of the truck traffic consists of commuter traffic traveling to and from Mapleton (or further south) to Mankato.

Pavement, Bridges, Utilities

Data regarding the pavement, bridge conditions, and existing maintenance issues (i.e. drainage, guardrail, signing, etc.) along the portions of Highway 22 reviewed by the study was obtained from MnDOT.

Pavement

Pavements are rated based on their Ride Quality Index (RQI), Surface Rating (SR), and Pavement Quality Index (PQI). MnDOT uses a scale of 0-5.0 for RQI, 0-4.0 for SR, and 0-4.5 for PQI. The following is a summary of the pavement condition for each of the segments along Highway 22:

Segment 1

- 2017 RQI for the pavement on Highway 22 is fair condition
- RQI predicted to be 2.0 by the year 2022
- Remaining service life for 2017 is 0-4 years

Segment 2

- CSAH 2 to CSAH 57 (North Riverfront Drive) – 2017 RQI is fair condition, RQI predicted to be 2.0 by year 2023 and remaining service life is 2017 is 0-4 years.
- CSAH 57 (North Riverfront Drive) to CSAH 26 (227th Street) – 2017 RQI is fair condition, RQI predicted to be 2.0 by year 2029 and remaining service life is 2017 is 0-4 years.
- CSAH 26 (227th Street) to CSAH 3 (North Victory Drive) – 2017 RQI is fair condition, RQI predicted to be 2.0 by year 2029 and remaining service life is 2017 is 0-4 years.
- CSAH 3 (North Victory Drive) to US 14 – 2017 RQI is fair condition, RQI predicted to be 2.0 by year 2030 and remaining service life is 2017 is two years.
- US 14 to Highway 83/CSAH 60 (Stadium Road) – 2017 RQI is good condition, RQI predicted to be 2.0 by year 2027 and remaining service life is 2017 is five years.
- Highway 83/CSAH 60 (Stadium Road) to CSAH 90 – 2017 RQI is good condition, RQI predicted to be 2.0 by year 2029 and remaining service life is 2017 is 5-12 years.

Segment 3

- 2017 RQI for the pavement on Highway 22 is fair condition
- RQI predicted to be 2.0 by the year 2021-2024
- Remaining service life for 2017 is 0-2 years

MnDOT recently completed a pavement project in Segment 3 from CSAH 90 to CSAH 7 (Central Avenue) in Mapleton. This project is not reflected in information above.

Bridges

All bridges along the studied portions of Highway 22 were reviewed with respect to their bridge sufficiency ratings based on MnDOT Bridge data. The following bridges were noted to have existing condition issues:

Segment 2

- Bridge number 8436 (~Reference Point 58.447) was classified as structurally deficient with a sufficiency rating of 48.2 during the last inspection period.
- Bridge number 7033 (~Reference Point 55.830) was classified as ADEQ (not structurally deficient, not obsolete) with a sufficiency rating of 78.8 during the last inspection period.

Maintenance Issues

MnDOT maintenance staff keeps a log of maintenance issues on all roadways under their jurisdiction. The following items were noted for the Highway 22 corridor within the study area:

Segment 1

- Field on west side of road fills with water and occasionally overtops Highway 22. The water from the field also pours into MnDOT ditch and runs north, then under the highway and outlets, flowing north across a field on the east (~Reference Point 61.5). Preliminary analysis of drainage along the corridor shows that between Reference Points 61.0 and 61.5 there is an approximately 1,800-foot stretch of Highway 22 that is a low point with flat side slopes.
- Box culverts need repair or replacement (~Reference Points 58.9 and 60.6).
- Back slopes are higher than road and trap snow (~Reference Points 59.4 and 60.5).

Origin-Destination

An origin-destination (O-D) analysis was conducted for the corridor from Saint Peter to Mapleton. The main purpose of the O-D analysis was to understand if the corridor is mostly used for regional (through trips) or local trips (from one segment to the next OR from an external node to somewhere along the corridor). StreetLight data was used to assess the origins and destinations of travelers along the corridor. StreetLight processes navigation-GPS data that is obtained from connected cars and trucks, navigation guidance applications, cell phone GPS locate data, and commercial fleet management data. The StreetLight data sample size is substantially larger than traditional O-D analysis methods, such as license plate surveys. Due to recent construction activity in the area that likely altered travel patterns, data was gathered from January 2015 to December 2015 along the Highway 22 corridor. Data was broken down by personal vehicles, medium commercial vehicles (i.e. single unit trucks), and heavy commercial vehicles (i.e. semi-tractor trailers) to see how commercial vehicle and personal vehicle traffic patterns differ.

To understand local versus regional trips using the corridor, the corridor and areas adjacent to it were divided into zones. Any trip that originated or was destined for one of these zones was considered a local trip since at least one end of the trip was along (or immediately adjacent to) the corridor. A local trip could be classified as one of the following:

- **Local to Local:** The trip originated along (or adjacent to) and was destined for another zone along the corridor.
- **Local to Regional:** The trip originated along (or adjacent to) the corridor, but finished outside of the corridor zones.
- **Regional to Local:** The trip originated outside of the corridor zones, but was destined for somewhere along (or adjacent to) the corridor (within one of the zones).

A **regional to regional trip** is classified as a trip that originates and is destined outside of the corridor (does not begin or end within one of the identified zones); this is a trip that utilizes Highway 22 as a through route. At a detailed level – "Middle Filters" in StreetLight (more commonly referred to as select link analysis) were applied at various locations along the corridor to determine travel pattern variation. Additional information to support this analysis is included in **Appendix B**.

Based on the O-D analysis, most of the trips using the corridor are one of the three local trip types (i.e. local to local, local to regional, or regional to local), with a low percentage of trips being true regional to regional. Other key findings are:

General

- Highway 22 south of Mapleton has the highest regional to regional trip ends across all vehicle classifications (approximately 10 percent of all trip ends).
- There is a very low percentage of regional to regional trip ends across all vehicle classifications from north of Saint Peter to south of Mapleton (less than one percent).
- Local to local trip ends make up the highest percentage of all personal and medium commercial vehicle trips along the Highway 22 corridor.
- The highest percentage of regional to regional trip ends occurs for heavy commercial vehicles.

Segment 1

- Select link analysis of Segment 1 indicates that a significant amount of trip ends are local to regional trips to or north of Saint Peter (40 percent and 60 percent, respectively).
- 95+ percent of all traffic through Segment 1 has a trip end within a corridor zone south of Kasota.
- Pass through travel accounts for less than five percent of all trip ends.

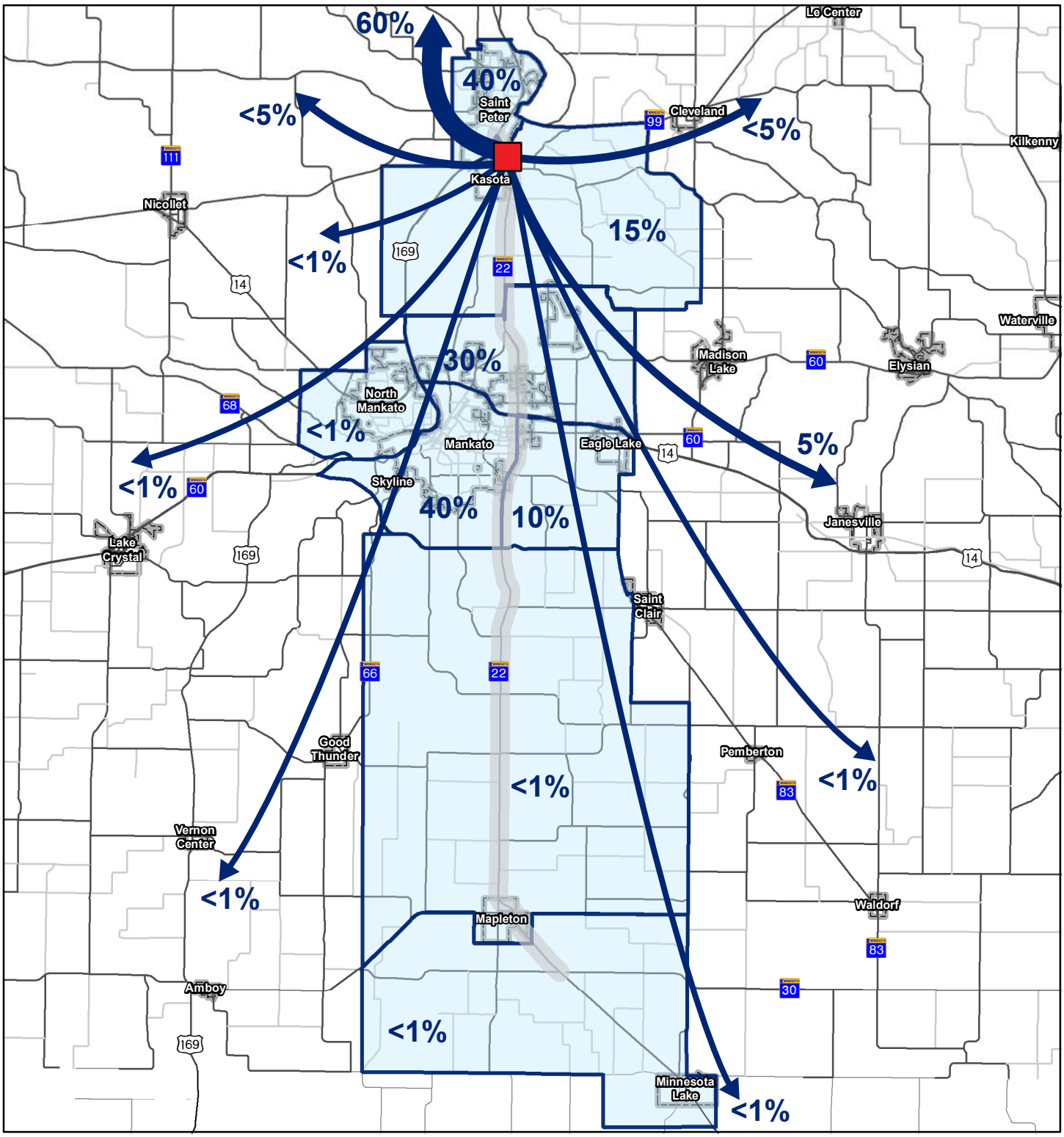
Segment 2

- Select link analysis of Segment 2 was performed at three different points – north of US 14, south of US 14, and north of CSAH 90; a significant amount of trip ends are local to local trips along the corridor in the immediate Mankato area.
- Looking at the point north of US 14, approximately 25 percent of trip ends are local to regional trips to or north of Saint Peter (10 percent and 15 percent, respectively).
- Looking at the point north of US 14, approximately 10 percent of trip ends are local to regional trips east on US 14.
- Looking at the point south of US 14, approximately 25 percent of trip ends are also local to regional trips to or north of Saint Peter (10 percent and 15 percent, respectively).
- Looking at the point south of US 14, approximately 15 percent of trip ends are local to regional trips east on US 14.
- Looking at the point north of CSAH 90, less than 10 percent of trip ends are local to regional trips to or north of Saint Peter (<5 percent a piece).
- Looking at the point north of CSAH 90, approximately 20 percent of trip ends are local to regional trips south of Mapleton.

Segment 3

- Select link analysis of Segment 3 indicates that a significant amount of trip ends are local to regional trips to or south of Mapleton (15 percent and 50 percent, respectively).
- Less than 10 percent of trip ends are local to regional trips to or north of Saint Peter (<5 percent a piece).
- Pass through travel accounts for approximately 10 percent of all trip ends.

Figure 12 through **Figure 16** present the select link analysis for the three segments.



Origin and Destination Zones: Segment 1

Analysis Point

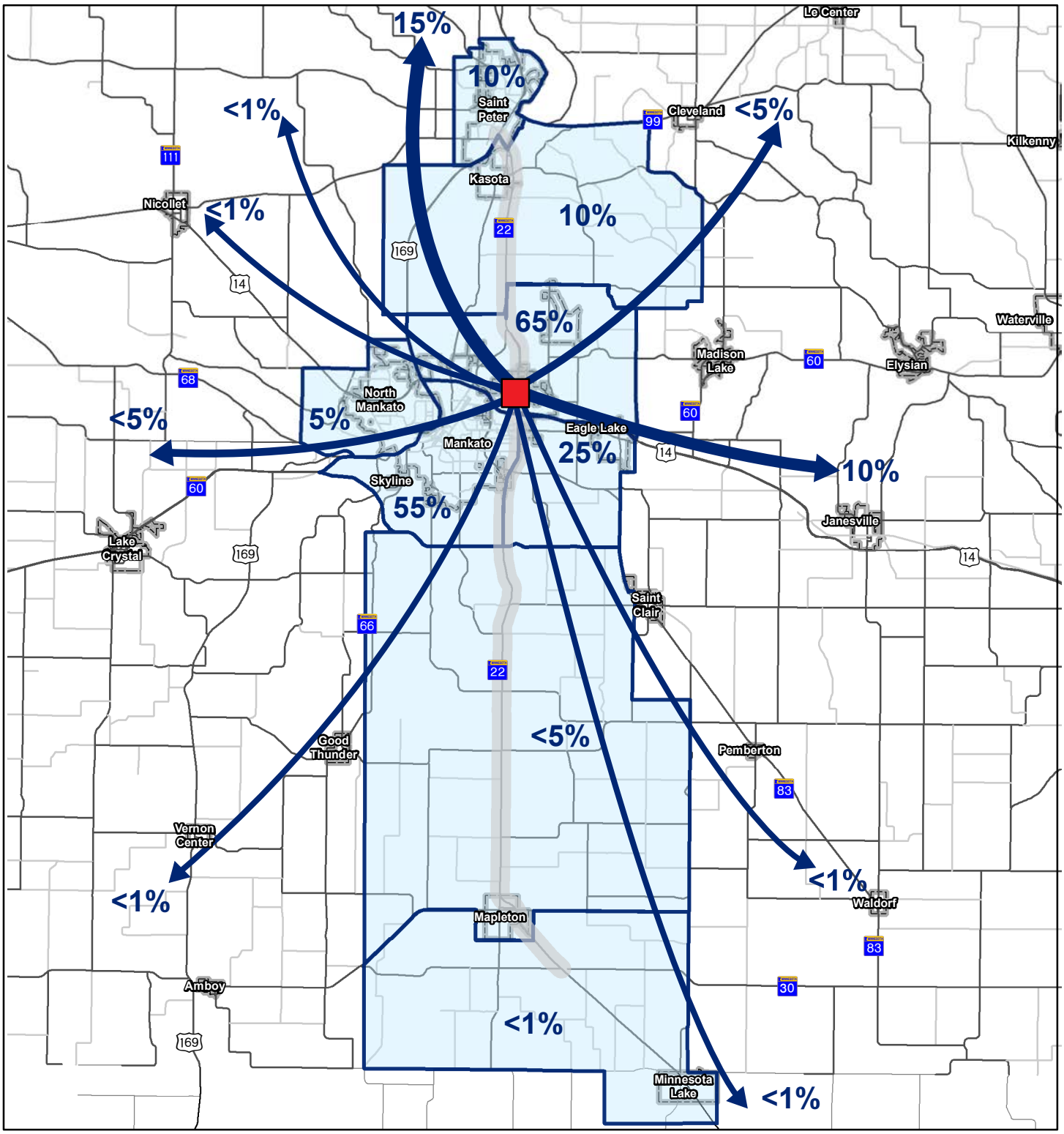
Origin and Destination Zone

% = Trips To or From Analysis Point

Regional to Regional (Pass Through) Trips = <5%

0 2 4 Miles

Figure 12. O-D Results (Segment 1)



Origin and Destination Zones: Segment 2 North of US 14

Analysis Point

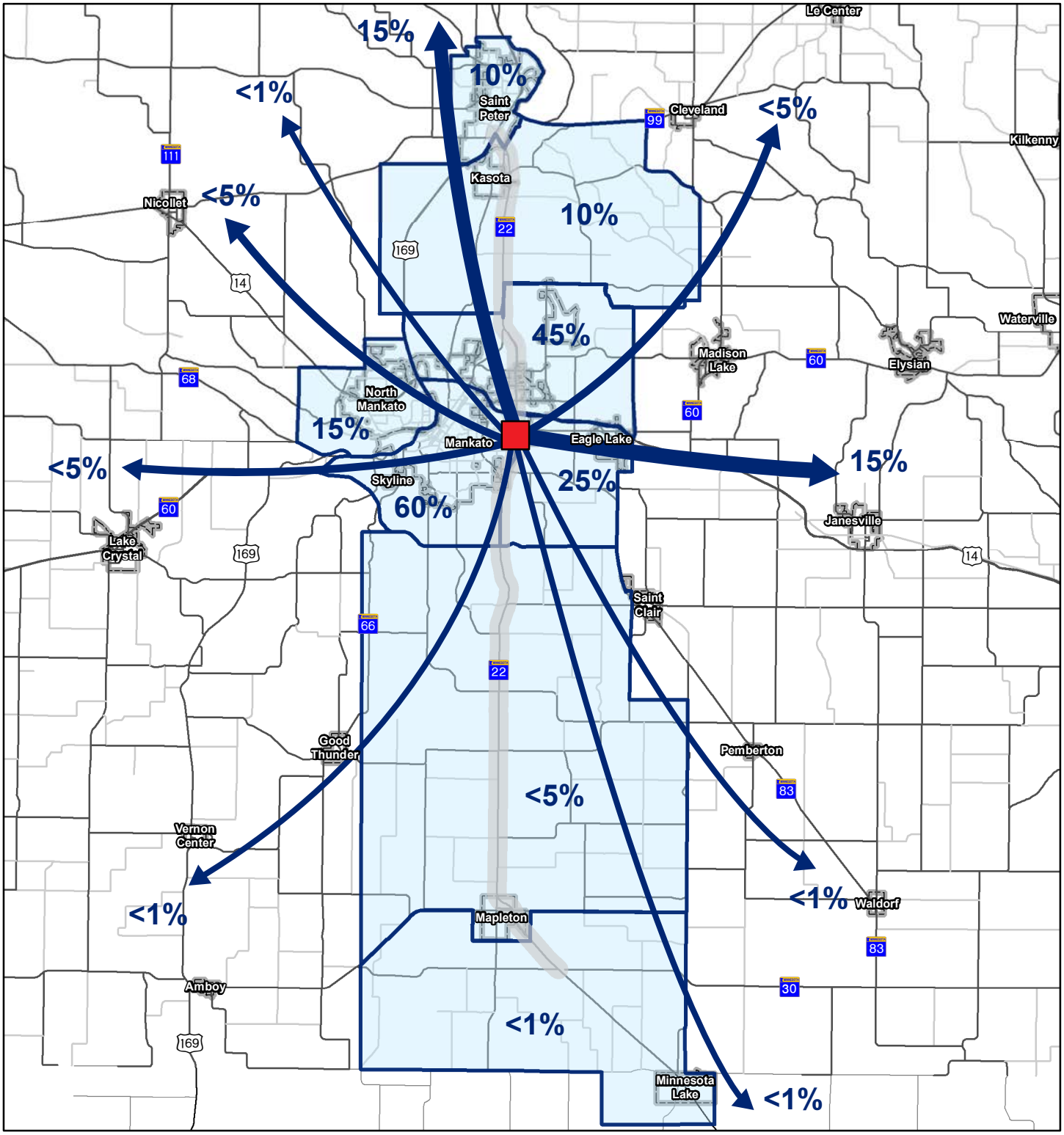
Origin and Destination Zone

% = Trips To or From Analysis Point

Regional to Regional (Pass Through) Trips = <5%

0 2 4 Miles

Figure 13. O-D Results (Segment 2 North of US 14)



Origin and Destination Zones: Segment 2 South of US 14

Analysis Point

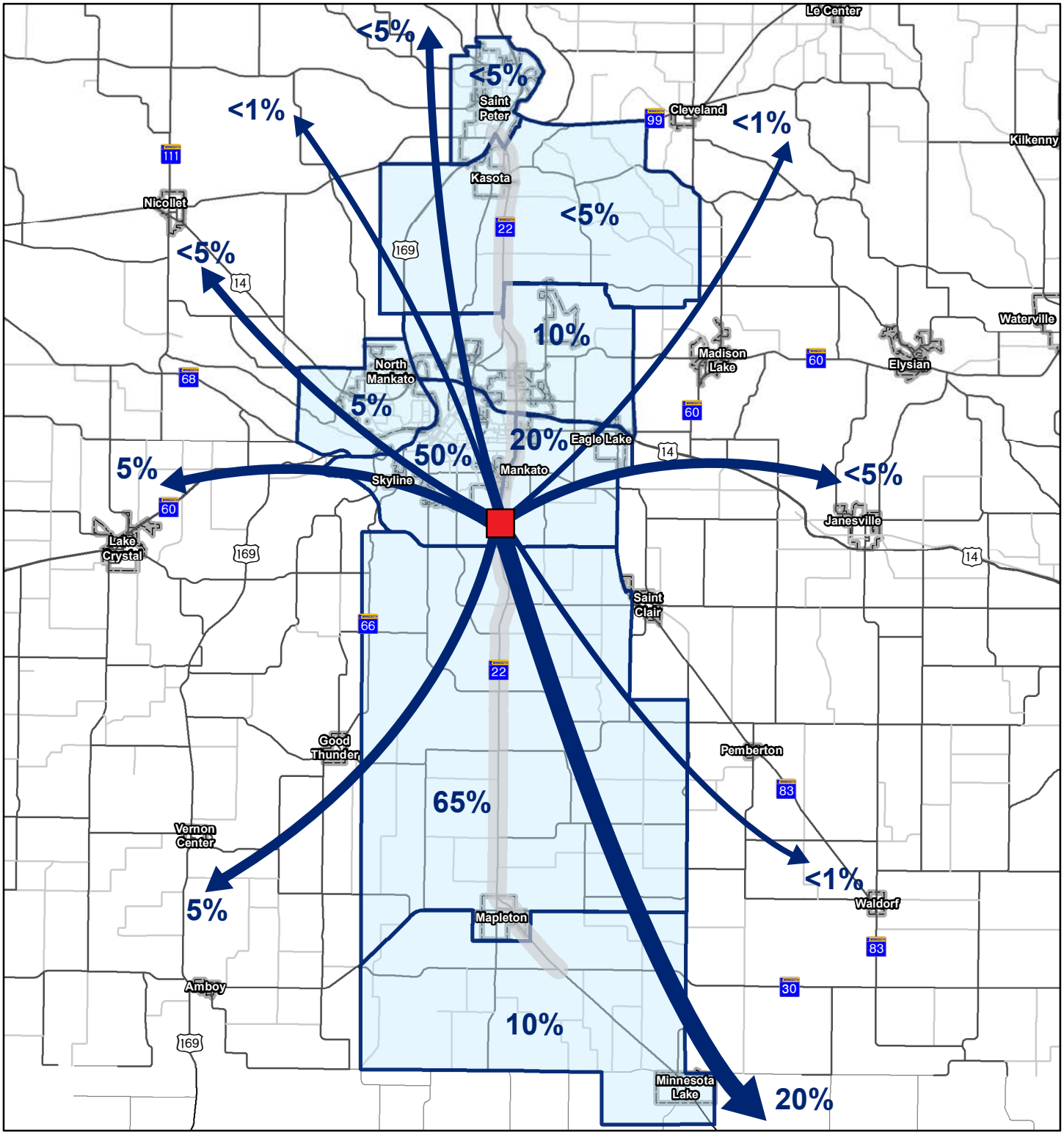
Origin and Destination Zone

% = Trips To or From Analysis Point

Regional to Regional (Pass Through) Trips = <5%

0 2 4 Miles

Figure 14. O-D Results (Segment 2 South of US 14)



Origin and Destination Zones: Segment 2 South End

Analysis Point

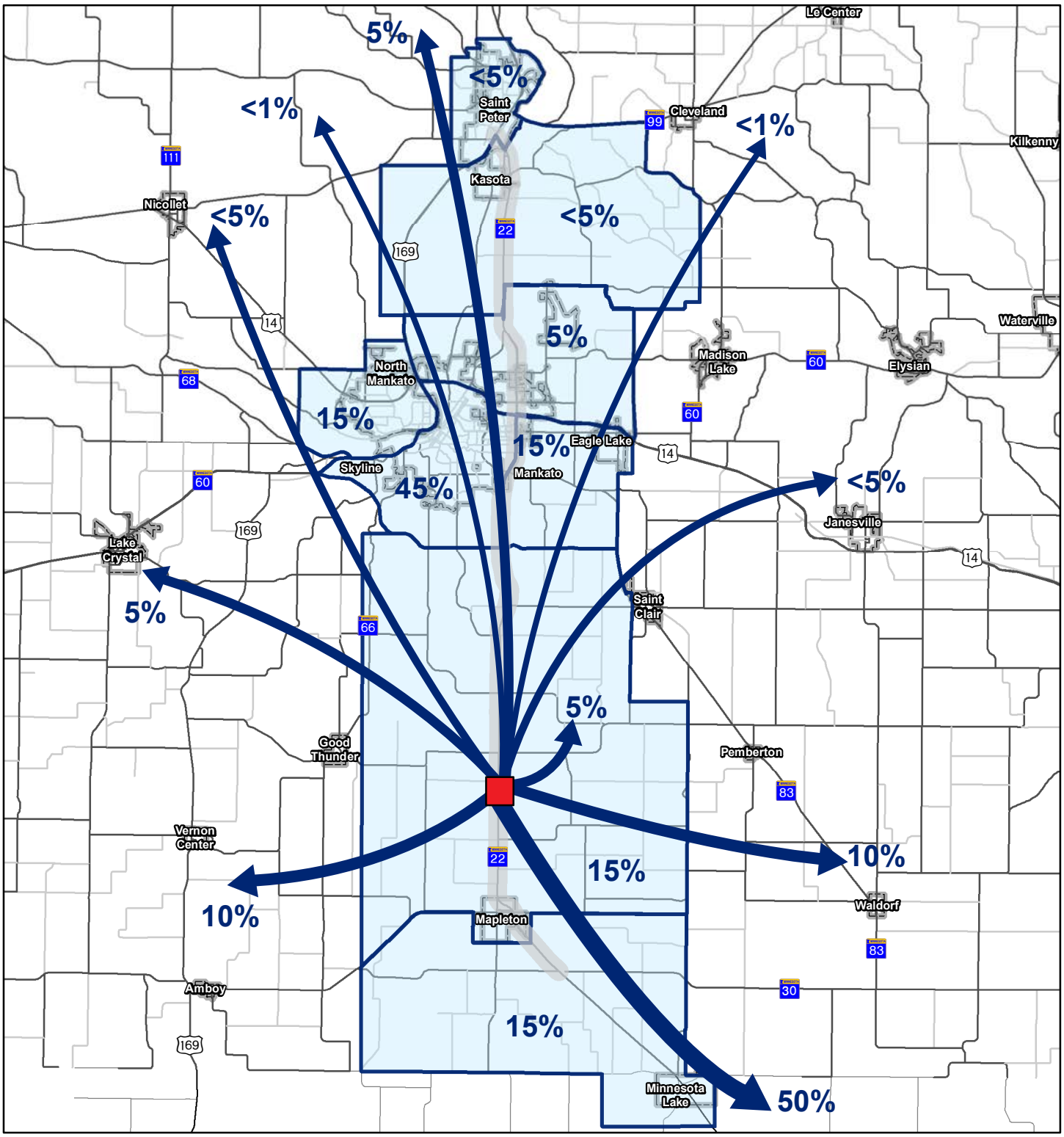
Origin and Destination Zone

% = Trips To or From Analysis Point

Regional to Regional (Pass Through) Trips = <5%

0 2 4 Miles

Figure 15. O-D Results (Segment 2 South End)



Origin and Destination Zones: Segment 3

Analysis Point

Origin and Destination Zone

% = Trips To or From Analysis Point

Regional to Regional (Pass Through) Trips = 10%

0 2 4 Miles

Figure 16. O-D Results (Segment 3)

Environmental and Cultural Constraints

This section documents potential environmental and cultural constraints along, and adjacent to, the study corridor. An in-depth social, economic and environmental resource analysis was not conducted as part of this effort. The purpose of this evaluation was to perform a preliminary inventory and assessment of potential impacts to guide the development of future alternative concepts. This impact assessment was generally based on environmental factors addressed in the environmental review process for highway projects and utilized available desktop resources including aerial photography, geographic information systems (GIS), local and regional planning documents, and other available resources. It is important to note that this analysis does not attempt to quantify specific project impacts. Additional social, economic and environmental analyses, including quantifying environmental impacts where necessary, will be completed for any proposed improvements reviewed under the National Environmental Policy Act (NEPA) and/or Minnesota Environmental Policy Act (MEPA).

Section 4(f) Resources

Section 4(f) provides protections for publicly owned park and recreational areas, wildlife and waterfowl refuges, and historical sites (in public and private ownership). Section 4(f) refers to the original section within the US Department of Transportation Act of 1966 that sets the requirements for consideration of these resources in transportation project development. Section 4(f) is implemented by Federal Highway Administration (FHWA) through regulations found at 23 CFR 774. Section 4(f) applies to all projects that receive funding from or require approval by an agency of the US Department of Transportation (US DOT), including FHWA. Section 4(f) requires avoidance unless there is no prudent and feasible alternative to the use. If avoidance is not possible, then Section 4(f) requires all possible planning to minimize harm to the resource. **Figure 17** through **Figure 20**, illustrate Section 4(f) resources in the study area, including parklands, historical sites, MnDNR water access sites, and State and local trails.

Riverside Nature Resource Area is a natural area identified in the City of Saint Peter's Park and Trail System Map (dated July 2004) (see **Figure 17**) This property may be subject to Section 4(f) protections based on the use of the property (e.g., if it is a publicly owned park and recreation area or a wildlife and waterfowl refuge). If the project is federally funded, this property may be subject to Section 4(f) protections and require consultation with MnDOT Office of Environmental Stewardship (OES) FHWA Minnesota Division office to determine if Section 4(f) resources are impacted by the project.

MnDNR snowmobile trails, State water trail and MnDNR water access sites are located within the study corridor. Additionally, MnDNR-owned forest land is also located in the vicinity of Segments 1 and 2 of the study corridor (see **Figure 17** and **Figure 18**). This land may be subject to Section 4(f) protections, depending upon the use of the property (e.g., recreational use versus timber management). Any determination regarding State forests and Section 4(f) involvement should be made in consultation with MnDOT OES and the FHWA Minnesota Division office.

Local parks and trail facilities are located near the study corridor, primarily within developed areas of the corridor including the Cities of Saint Peter, Mankato, and Mapleton. Section 4(f) protections may apply to these trail and park facilities based on the use of the properties.

Section 6(f) Resources

Section 6(f) of the Land and Water Conservation Act (LAWCON) requires that any lands acquired or developed with LAWCON funds be retained and used for outdoor recreational purposes into perpetuity. Lands subject to LAWCON protection cannot be converted to non-recreation uses unless replacement of land of at least equal fair market value and reasonably equivalent usefulness is provided. The Section 6(f) conversion process requires approvals from the MnDNR and the U.S. National Park Service (NPS). The MnDNR maintains a list of Section 6(f)-funded resources that was reviewed, with grant restriction requirements verified in coordination with the MnDNR. The following properties, which are in proximity to the study corridor, are subject to federal LAWCON restrictions:

- Sakatah Singing Hills State Trail – Blue Earth and Le Sueur Counties
- Kasota River Park – Le Sueur County

Further, Heritage Park in the City of Mapleton is subject to State grant restrictions. Similar conversion restrictions apply to State grant funded parks; however, approval by NPS is not required.

Section 106

MnDOT's Office of Environmental Stewardship Cultural Resources Unit (CRU) is responsible for reviewing trunk highway projects for potential impacts to historic properties pursuant to Section 106 of the National Historic Preservation Act of 1966, the Minnesota Historic Sites Act, the Field Archaeology Act of Minnesota, and the Private Cemeteries Act. For the purposes of this analysis, digital data was obtained from CRU to identify known historic properties within proximity to the study corridor. **Figure 17** through **Figure 20** depict known historic structures included in the inventory of National Register of Historic Places (NRHP) and historic features that have been determined eligible for listing in the NRHP. Historic places identified within the corridor include bridges, farmsteads, houses, churches, and other types of historic properties. No tribal lands were identified within proximity to the corridor based on available desktop resources. No formal cultural resource investigations or archaeological surveys were completed as part of this evaluation.

It is important to note that this does not mean that there are no historic or archaeological resources within the study area if they are not identified on **Figure 17** through **Figure 20**. Cultural resource investigations will be necessary by MnDOT CRU as part of any future environmental review process to determine if any historic or archaeological resources are present in the study area.

Minority and Low-Income Populations

Digital data from the American Community Survey (ACS) 2007 – 2011 five-year estimates published by the U.S. Census Bureau was evaluated to identify areas of proportionally higher low income and minority populations. **Figure 21** and **Figure 22** illustrate minority populations by block groups and the percent of low income populations within the study area. As shown, higher proportions of low-income populations are concentrated near the Cities of Mankato and Saint Peter. Similarly, block groups within, and near, the Cities of Mankato and Saint Peter contained higher percentages of minority populations.

As part of any future environmental review process, a formal environmental justice analysis will be required to identify potential adverse and disproportionate impacts to low income and minority populations.

Federal Threatened and Endangered Species

For this analysis, the IPaC project planning tool provided by the U.S. Fish and Wildlife Service (USFWS) was used to identify federally-listed threatened and endangered species that may be within, or near, the study area (see **Figure 23** through **Figure 26**). Federally-listed species identified from the IPaC search include:

- Northern long-eared bat (*Myotis septentrionalis*) – threatened
- Rusty patched bumble bee (*bombus affinis*) – endangered

The MnDNR maintains a list of all townships containing known northern long-eared bat roost trees and/or hibernacula. Hibernacula are habitats in which northern long-eared bats seek refuge during the winter, such as caves and mines. The most recent list, dated April 1, 2017, indicates that the study corridor intersects a township in Le Sueur and Nicollet Counties that contains hibernaculum (T1109N R26W). Under the USFWS final 4(d) rule for the northern long-eared bat, incidental takes caused by tree removal are prohibited under the following circumstances:

- If tree removal occurs within a ¼ mile of a known hibernaculum, at any time of the year; or,
- If tree removal cuts or destroys a known occupied maternity roost tree or any other trees within a 150-foot radius of the maternity roost tree during the pup season (June 1 through July 31).

Consultation with MnDOT OES wildlife ecologist would be completed as part of a future environmental review process. MnDOT OES would consult with the USFWS regarding tree clearing activities and the northern long-eared bat. Regardless of the funding source, all MnDOT trunk highway projects shall incorporate into the project planning process a November 1 to March 31, inclusive, limit on tree clearing unless otherwise authorized by MnDOT OES (Technical Memorandum No. 17-04-ENV-02; April 2, 2017; Tree Clearing Timing Requirement).

Effective March 21, 2017, the rusty patched bumble bee was listed as endangered under the Endangered Species Act. Based on U.S. Fish & Wildlife Service data, a high potential zone for encountering the rusty patched bumble bee is located within Segment 2 and Segment 3A of the study corridor (see **Figure 24** and **Figure 25**).

A future environmental review process would include a formal review of federally-listed species by MnDOT OES. MnDOT OES would determine if adverse effects would occur because of proposed improvements in the corridor and identify required conservation measures based on the regulations in place at the time that a future environmental review process is completed.

State Threatened and Endangered Species

The proposed project is also subject to state laws protecting threatened and endangered species. State-listed endangered and threatened species are subject to Minnesota's Endangered and Threatened Species Statutes, which protects species at risk of extinction. Species of Special Concern within Minnesota are not threatened or endangered, but are either extremely uncommon in Minnesota, or have unique habitat requirements that require special monitoring. Species defined as "watchlist species" are tracked, but have no legal protection status in Minnesota.

A preliminary review of rare plants, animals, native plant communities, and other rare features using GIS data in conjunction with the MnDNR Natural Heritage Information System (NHIS)[1]. The Natural Heritage data is provided by the MnDNR Division of Ecological and Water Resources and was current as of February 2016 (License Agreement 724). These data sets are not based on an exhaustive inventory of the state. The lack of data for any geographic area should not be construed to mean that no significant features are present. The following species occurrences are located within the vicinity of the study area:

- Black sandshell (*Ligumia recta*), invertebrate animal, species of special concern
- Eastern spotted skunk (*Spilogale putorius*), vertebrate animal, threatened species
- Elktoe (*Alasmidonta marginata*), invertebrate animal, threatened species
- Hair-like beak-rush (*Rhynchospora capillacea*), vascular plant, threatened species
- Rock pocketbook (*Arcidens confragosus*), invertebrate animal, endangered species
- Snow trillium (*Trillium nivale*), vascular plant, species of special concern
- Sullivant's milkweed (*Asclepias sullivantii*), vascular plant, threatened species
- Western foxsnake (*Pantherophis ramspotti*), invertebrate animal, watchlist species
- Yellow sandshell (*Lampsilis teres*), invertebrate animal, endangered species

[1] Copyright 2014 State of Minnesota, Department of Natural Resources

Black sandshell, elktoe, rock pocketbook and yellow sandshell are mussel species that inhabit the Minnesota River. Proposed improvements within the Highway 22 corridor may not directly affect the Minnesota River. However, mussels in the Minnesota River could be indirectly impacted by construction activities adjacent to the river (e.g., potential increase in sedimentation in the river during construction).

Eastern spotted skunks are generally found in open lands with sufficient cover such as thickets, brush, and riparian woodlands. In agricultural areas, they use buildings, corncribs, trash piles, rock piles, and haystacks for cover and den sites. Surveys conducted suggest that isolated populations remain in Minnesota. Available NHIS indicate that the eastern spotted skunk has not been observed near the study corridor in several decades.

Hair-like beak rush is a specialized vascular plant species largely restricted to calcareous fens. Based on available NHIS data, the population within the study area has not been recently observed and the wetland habitat in which it was observed has been disturbed.

Snow trillium typically occurs in hardwood forest habitats. In Minnesota, the largest populations of this species are concentrated in the lower reaches and tributaries of the Le Sueur and Blue Earth Rivers, the Minnesota River Valley near Mankato, and the Upper Cottonwood River in Lyons County.

Sullivant's milkweed historically inhabit tallgrass prairies. Due to habitat loss, most of the existing plant species occur on railroad rights-of-way. A review of available NHIS data indicates that populations of this species have been observed in strips of prairie habitat near the Highway 22 corridor.

Western fox snakes inhabit forest edges and are often found along forested edges of river habitats, including the Minnesota River. The Western foxsnake is a "watchlist species," consequently this species does not have special status in Minnesota.

Additionally, mapped Minnesota County Biological Survey (MCBS) sites of moderate biodiversity significance are in the vicinity of the study corridor (see **Figure 23** through **Figure 26**). Several native plant communities are also located in proximity to the study area including:

- Basswood – Bur Oak forest
- Sugar Maple – Basswood forest

Future coordination with the MnDNR would be necessary to identify any specific concerns related to state-listed threatened and endangered species, sites of biodiversity significance and native plant communities, including the consideration of conservation measures.

Wetlands and Aquatic Resources

Waters of the U.S. are regulated at the federal level by the US Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. 23 CFR 777 and Executive Order 11990 establish policy and procedures for the evaluation and mitigation of adverse environmental impacts to wetlands resulting from Federal-aid projects. At the state level, public waters are regulated by the MnDNR and wetlands are protected under the Wetland Conservation Act (WCA). These laws require "sequencing" – consideration of avoidance first, then identification of minimization measures, and finally mitigation for any potential unavoidable impacts.

Off-site data sources including the National Wetland Inventory (NWI), NRCS soil mapping and recent aerial photography were utilized to identify wetlands and aquatic resources in the study area (see **Figure 23** through **Figure 26**). A Level 2 (field) wetland delineation would be required to identify the boundaries of these resources and to identify any additional wetlands and aquatic resources that are not present in on-line mapping resources.

Figure 23 through **Figure 26** illustrate environmentally sensitive resources as identified in the Blue Earth County Land Use Plan (2018). Environmentally sensitive resources are defined as lakes, rivers, streams, wetlands and shorelands, steep slopes, floodplains, and wooded areas near these features, as well as areas with sensitive geology.

Potentially Contaminated Sites

Digital data from the Minnesota Pollution Control Agency (MPCA) *What's in My Neighborhood?* interactive mapping tool was reviewed for potential environmental hazards contamination sites within the study corridor. **Figure 23** through **Figure 26** identify locations of these potentially hazardous sites. Within the study corridor potentially hazardous sites included in the MPCA's database were categorized as:

- Feedlots
- Small hazardous waste generators
- Aboveground and underground tank sites
- Leak sites

Coordination with MnDOT's Contaminated Materials Management Team (CMMT) would be required during project development as part of a future environmental review process. This would include responses to the MnDOT early notification memorandum (ENM) and the MnDOT environmental due diligence (EDD) process. MnDOT CMMT staff would determine the need for contaminated materials investigations, determinations, response action plans, and contaminated materials management special provisions.

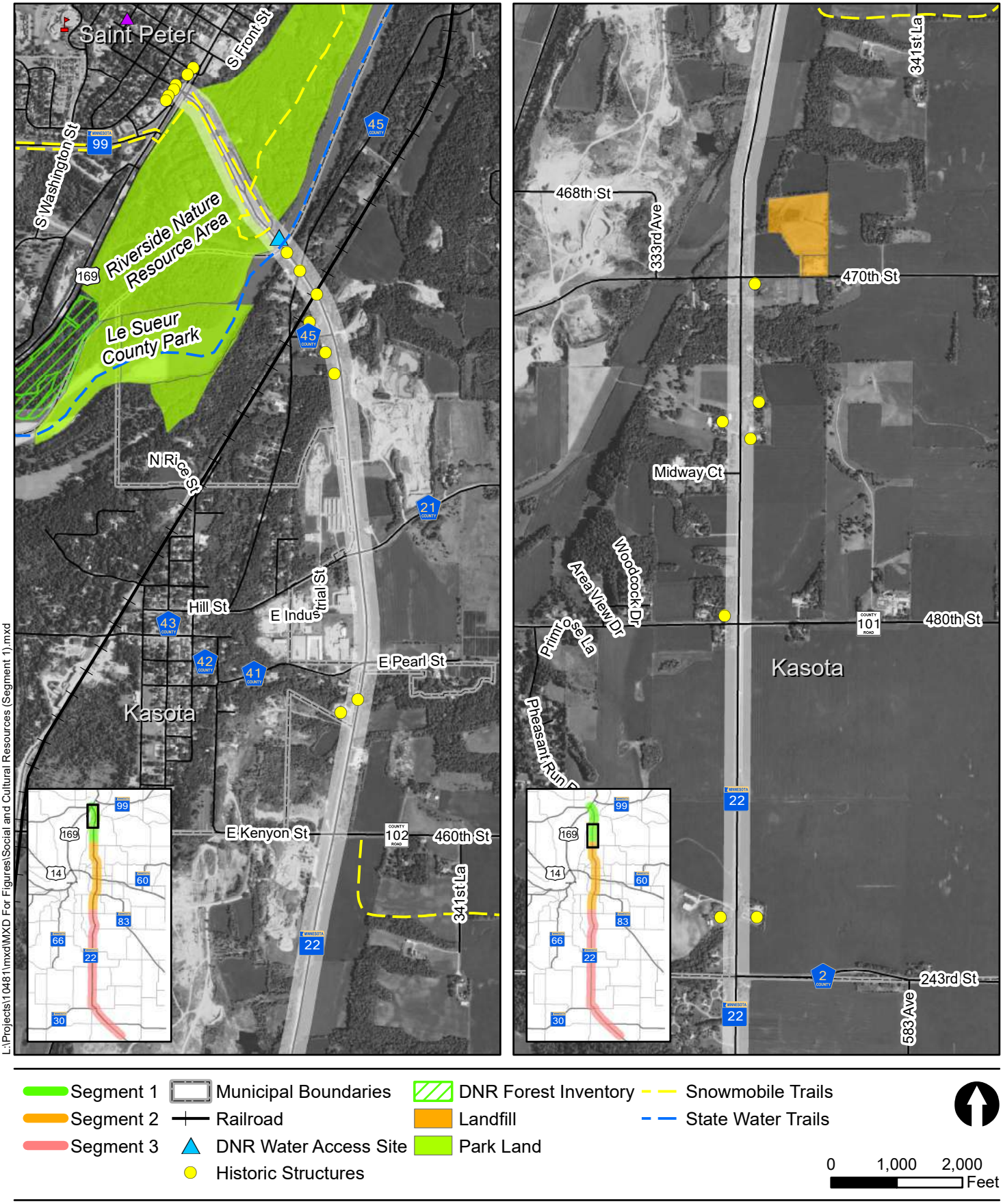
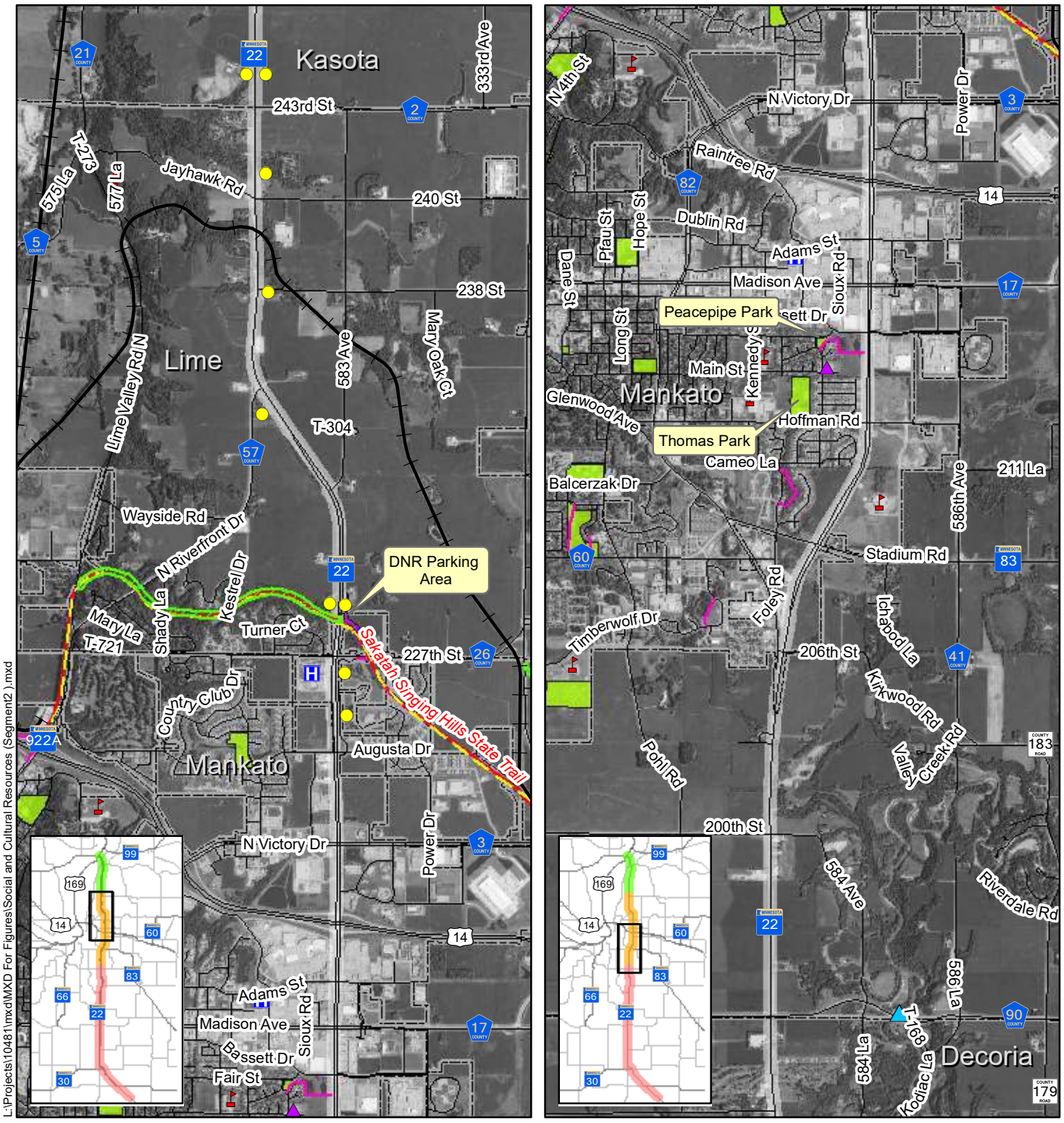


Figure 17. Social and Cultural Resources (Segment 1)



Segment 1
Segment 2
Segment 3
Municipal Boundaries
Railroad
Park Land
DNR Water Access Site
DNR Forest Inventory
DNR Parking Area
State Trails
Local Trails
Historic Structures
Church
Hospital
School
0 2,000 4,000 Feet

Figure 18. Social and Cultural Resources (Segment 2)

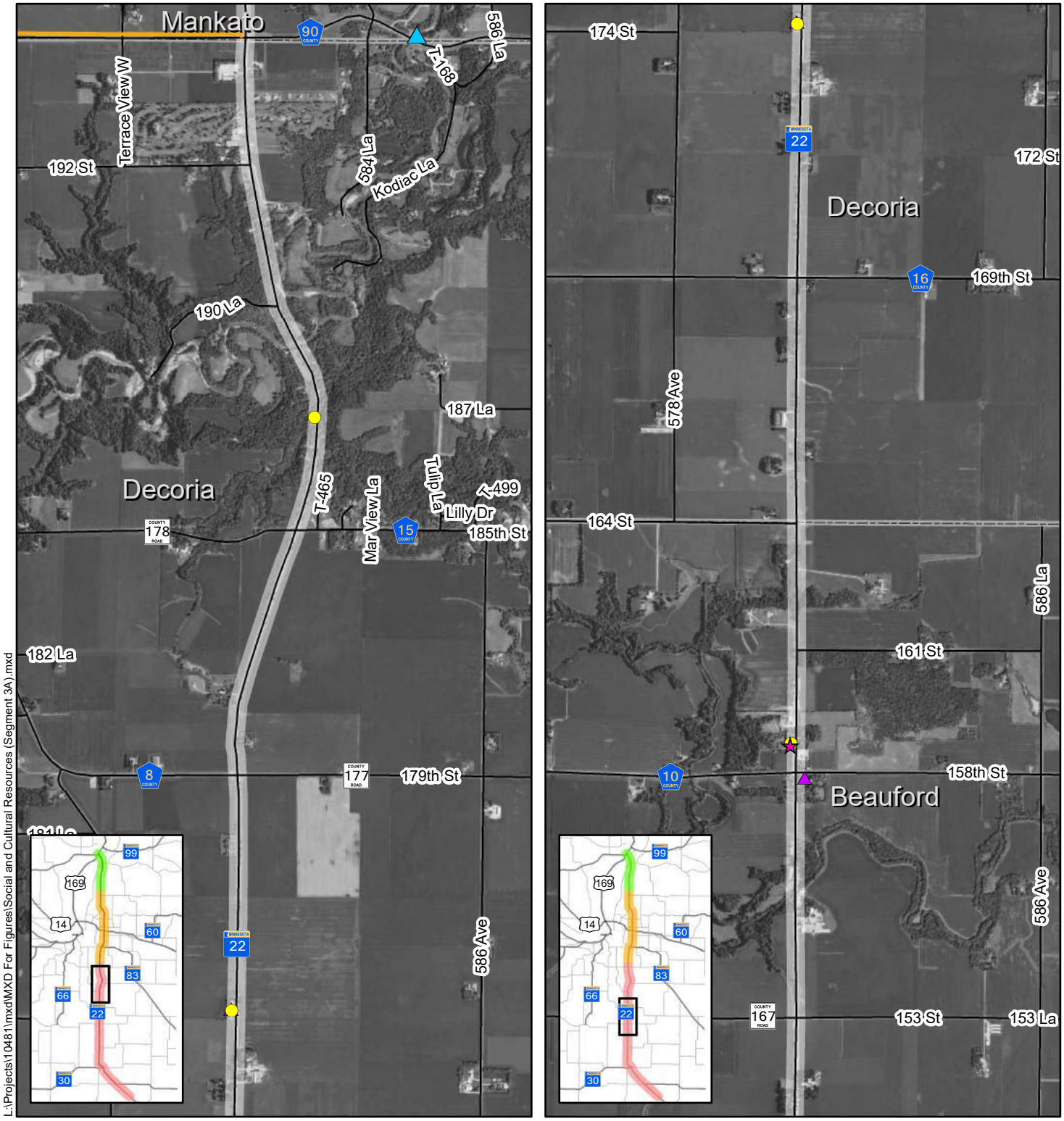


Figure 19. Social and Cultural Resources (Segment 3A)

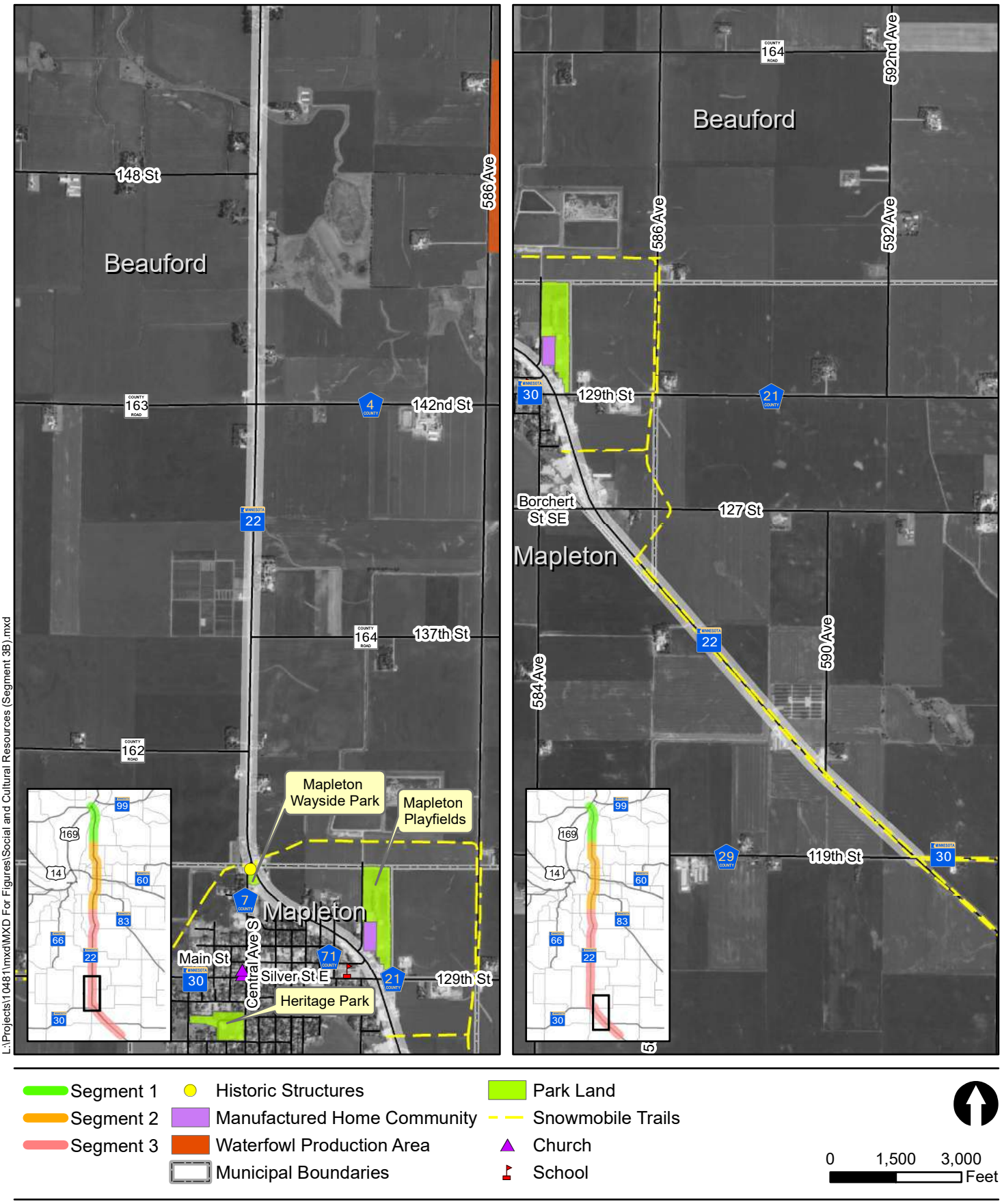


Figure 20. Social and Cultural Resources (Segment 3B)

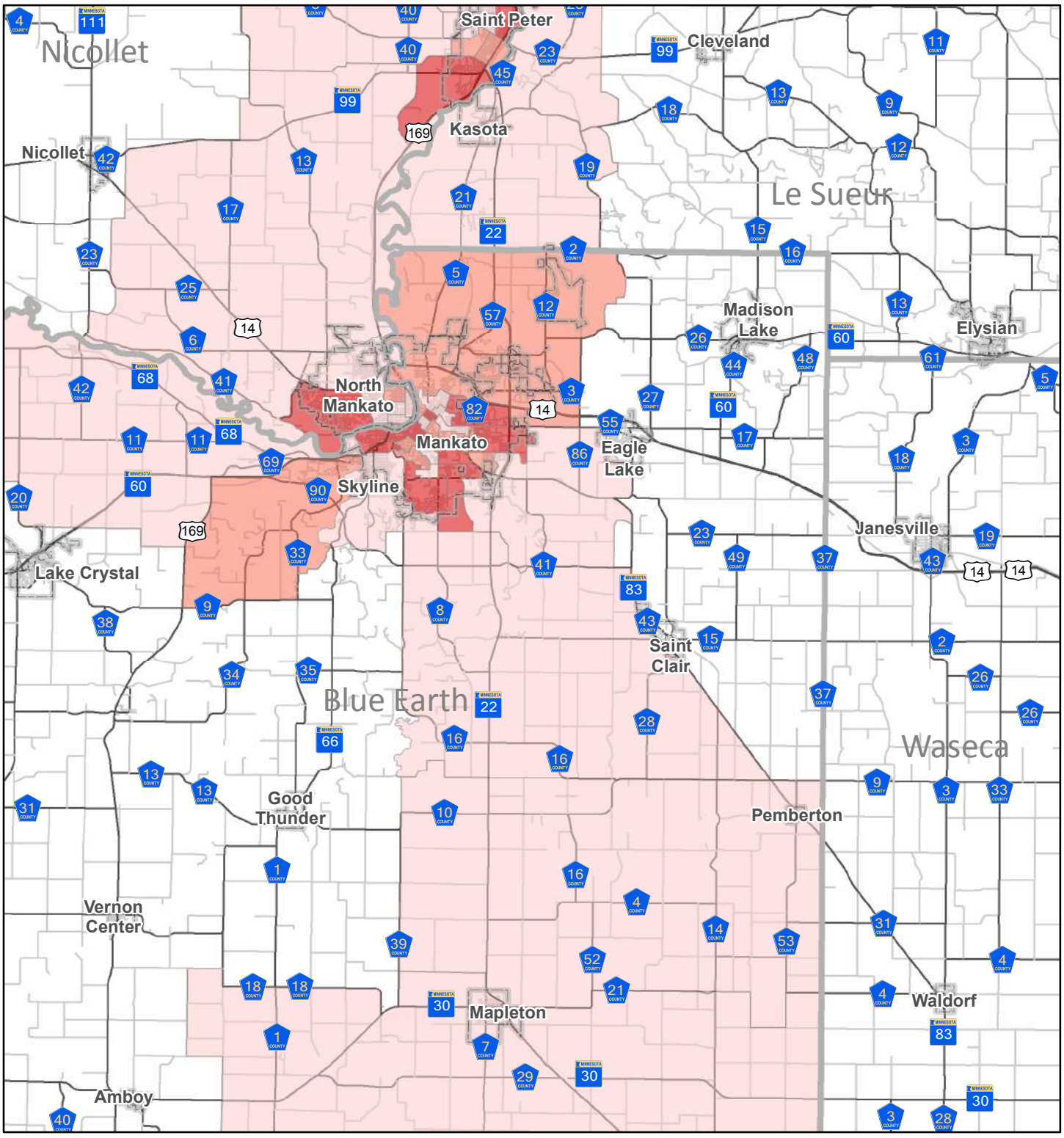


Figure 21. Percent of Minority Population by Block Group

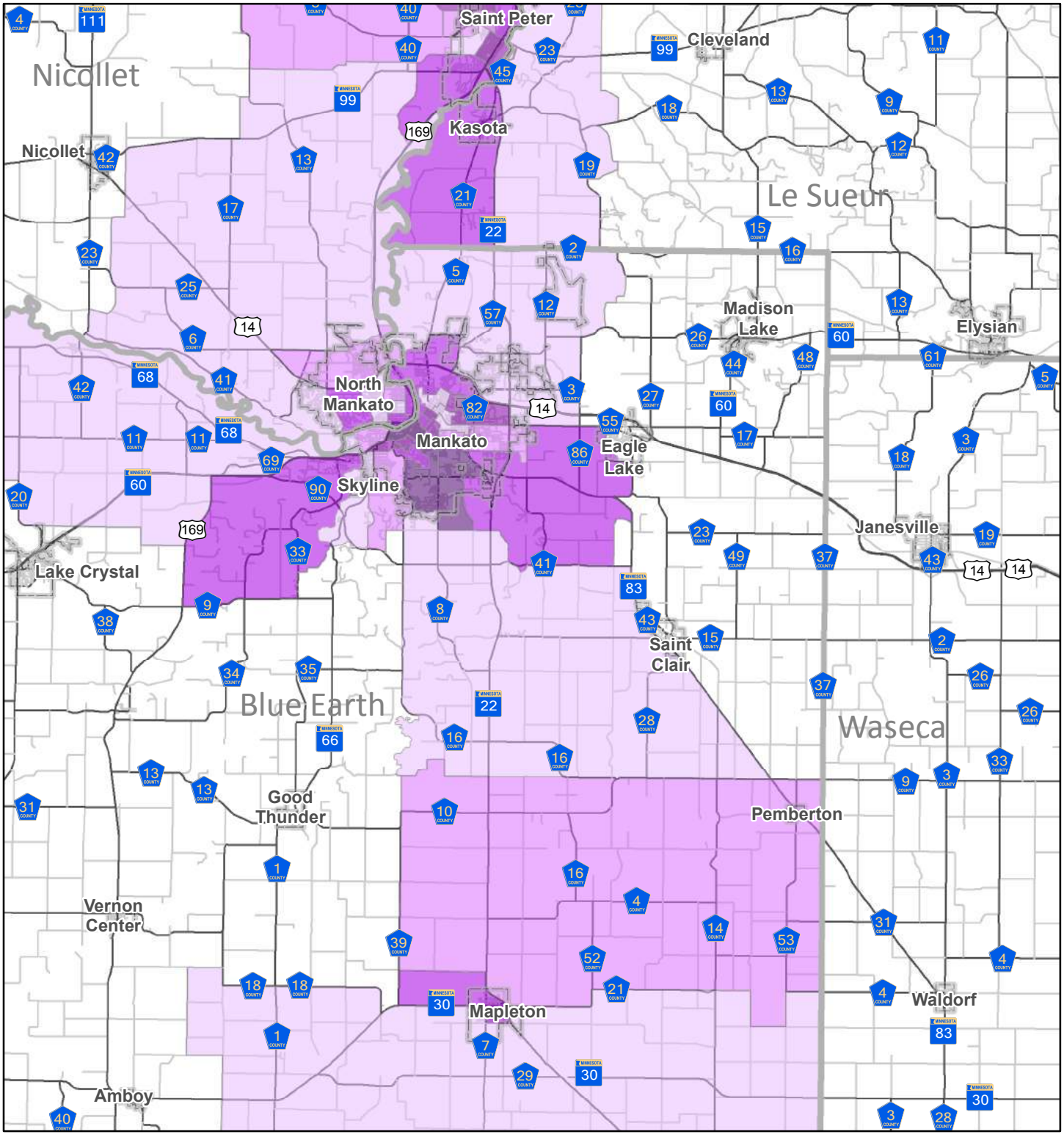
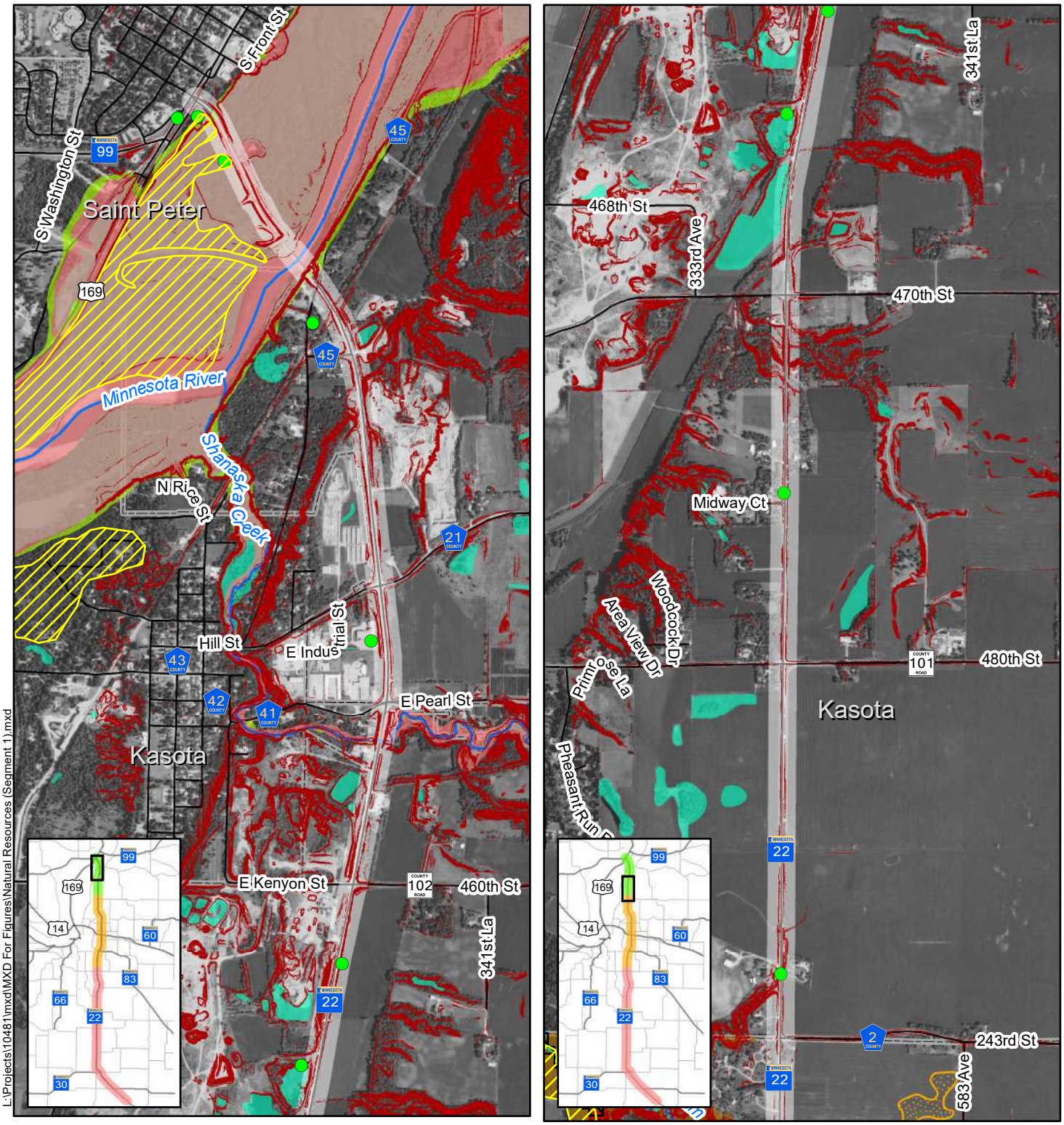


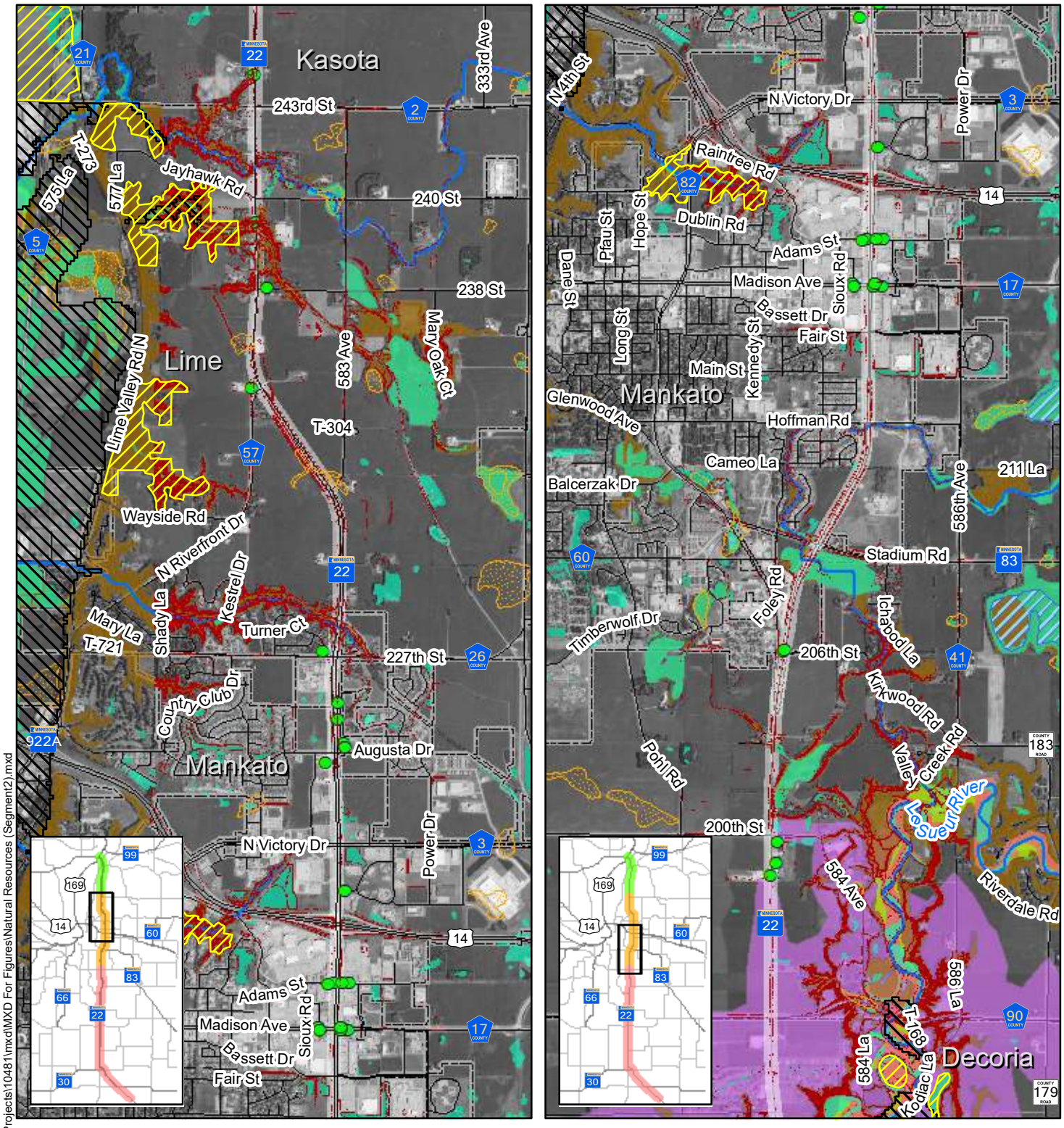
Figure 22. Percent of Households Below Poverty Thresholds by Block Group



Segment 1
Segment 2
Segment 3
Municipal Boundaries
DNR Public Watercourses
DNR Public Waters
100-year Floodplain
500-year Floodplain
National Wetland Inventory (NWI)
MPCA Potential Hazardous Material/ Waste Site
Muck Soils
Minnesota County Biological Survey (MCBS) Biodiversity Sites
Rusty Patched Bumble Bee High Potential Zone
Karst Bedrock (Blue Earth)
Environmentally Sensitive Corridor (Blue Earth)
Approximately >12% Slope

0 1,000 2,000 Feet

Figure 23. Natural Resources (Segment 1)

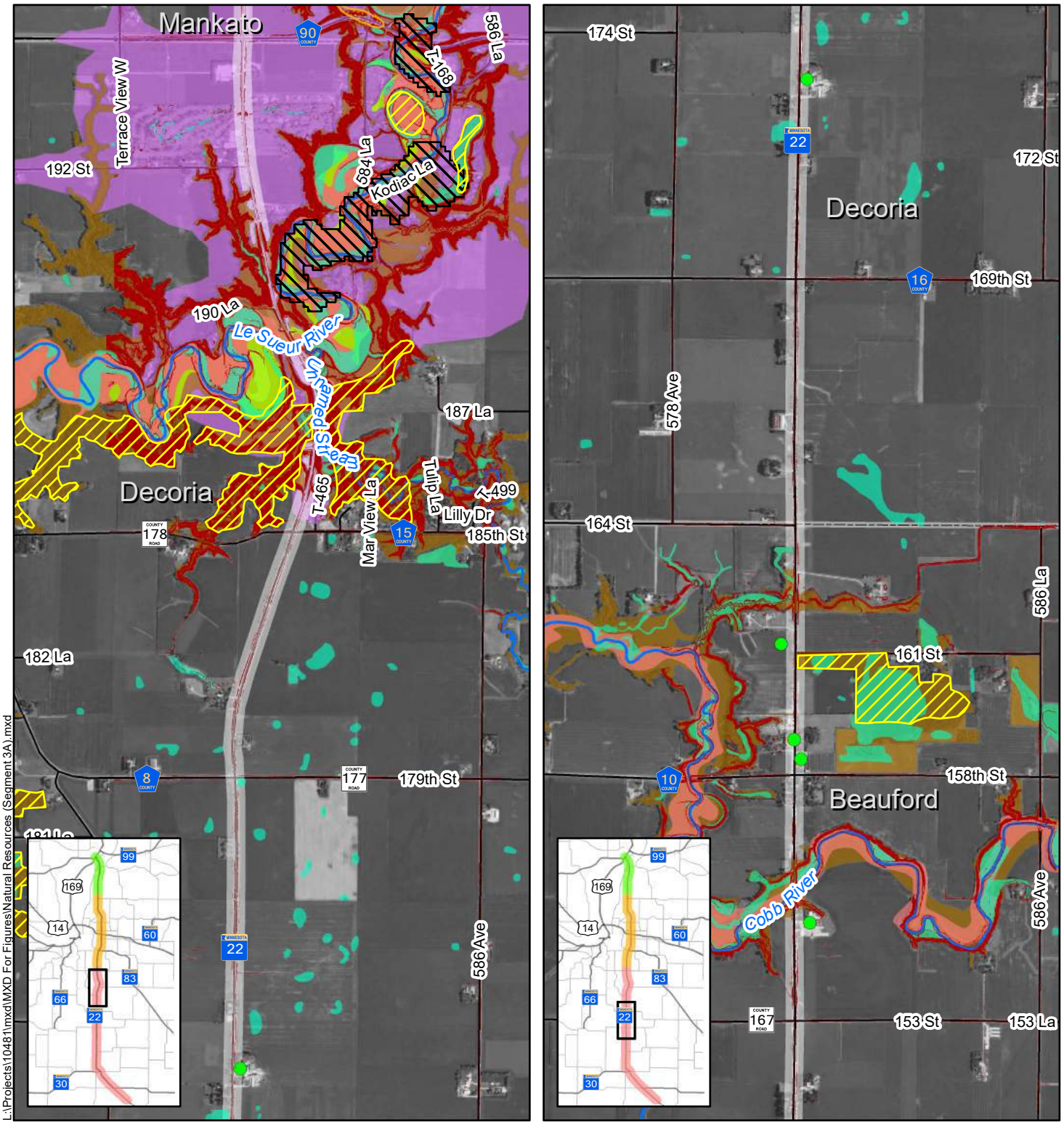


L:\Projects\10481\mxd\MXD For Figures\Natural Resources (Segment2).mxd

- Segment 1
- Segment 2
- Segment 3
- Municipal Boundaries
- DNR Public Watercourses
- DNR Public Waters
- 100-year Floodplain
- 500-year Floodplain
- National Wetland Inventory (NWI)
- MPCA Potential Hazardous Material/ Waste Site
- Muck Soils
- Minnesota County Biological Survey (MCBS) Biodiversity Sites
- Rusty Patched Bumble Bee High Potential Zone
- Karst Bedrock (Blue Earth)
- Environmentally Sensitive Corridor (Blue Earth)
- Approximately >12% Slope

0 2,000 4,000 Feet

Figure 24. Natural Resources (Segment 2)

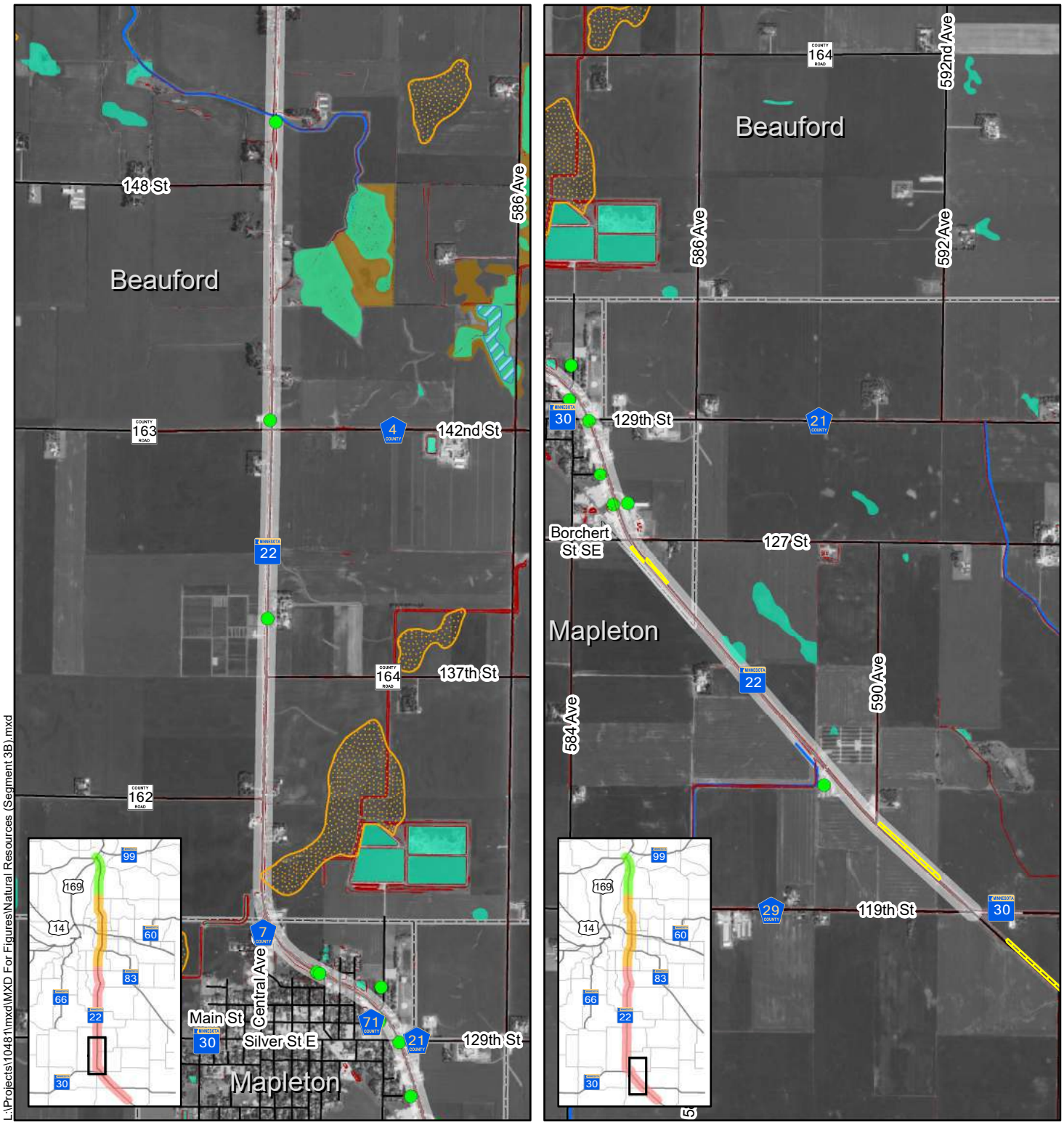


L:\Projects\10481\mxd\MXD For Figures\Natural Resources (Segment 3A).mxd

Segment 1
Segment 2
Segment 3
Municipal Boundaries
DNR Public Watercourses
DNR Public Waters
100-year Floodplain
500-year Floodplain
National Wetland Inventory (NWI)
MPCA Potential Hazardous Material/ Waste Site
Muck Soils
Minnesota County Biological Survey (MCBS) Biodiversity Sites
Rusty Patched Bumble Bee High Potential Zone
Karst Bedrock (Blue Earth)
Environmentally Sensitive Corridor (Blue Earth)
Approximately >12% Slope

0 1,500 3,000 Feet

Figure 25. Natural Resources (Segment 3A)



Segment 1
Segment 2
Segment 3
Municipal Boundaries
DNR Public Watercourses
DNR Public Waters
100-year Floodplain
500-year Floodplain
National Wetland Inventory (NWI)
MPCA Potential Hazardous Material/ Waste Site
Muck Soils
Minnesota County Biological Survey (MCBS) Biodiversity Sites
Rusty Patched Bumble Bee High Potential Zone
Karst Bedrock (Blue Earth)
Environmentally Sensistive Corridor (Blue Earth)
Approximately >12% Slope

0 1,500 3,000 Feet

Figure 26. Natural Resources (Segment 3B)

Safety Analysis

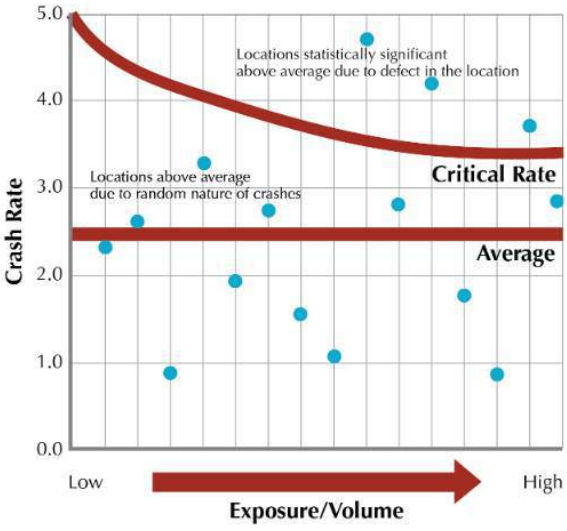
To identify potential traffic safety issues in the study area, five-year crash history (most recent/complete data set – 2011 to 2015) was obtained from the Minnesota Crash Mapping Analysis Tool (MnCMAT) and evaluated. To be consistent with the time-period crashes occurred, 2014 and 2015 Annual Average Daily Traffic (AADT) values were obtained from MnDOT and used for analysis. The safety analysis results were used to inform the corridor/intersection alternatives development process. Additionally, improvements were made along the corridor during the safety analysis period (e.g., roundabout construction). In some instances, this likely has a significant effect on how crashes currently occur at locations – which is noted for each respective site.

Intersection and segment crash rates were evaluated to determine if any identified crash issues are associated with intersection design/control or the overall cross-section of the roadway. Recall, the study area extent was split into three segments to capture the corridor context; this reflects the differences in existing typical cross section (i.e. two-lane vs. four-lane).

Critical Crash Rate Analysis

To identify areas with potential safety issues, the MnDOT critical crash rate analysis methodology was used. The critical crash rate analysis methodology is used to determine if crash rates are above a system-wide average simply due to the random nature of crashes or if design issues are contributing to elevated crash rates and a safety issue is indeed present. The methodology uses statistical models to identify a critical crash rate (CCR), which is a function of traffic volumes and system-wide crash rates. If an observed crash rate at a given location is higher than the critical crash rate, there is a statistically significant probability that a crash problem is present and is likely attributable to the design of the facility. The critical crash rate concept is illustrated in the graphic below – sourced from MnDOT.

Critical Crash Rate Concept



Results of the critical crash rate analyses are summarized in **Figure 27** through **Figure 30.** These figures show if study intersections and segments are below Minnesota statewide averages, above Minnesota statewide averages, or above the calculated critical crash rate.

Intersection Crash Analysis

Locations Above Critical Crash Rate

The intersections below had observed crash rates above the critical crash rate between 2011 and 2015, indicating a disproportionate number of crashes have taken place at these locations in the most recent five-year period. Detail analysis results for these intersections are shown in **Table 3**.

Segment 1: Highway 22 and US 169, Saint Peter

Current Traffic Control: Signal

This intersection had 39 reported crashes in the five-year data period; however, none of these crashes resulted in incapacitating injuries or fatalities. Twelve of these crashes were rear-end collisions, 12 were right-angle crashes, and nine were left-turn crashes. Left-turn crashes make up 23 percent of overall crashes, which is higher than the Minnesota statewide average of approximately eight percent.

Based on a review of contributing factors, 11 crashes are associated with the left-turning movement from US 169 to Highway 22 where the left-turning vehicle failed to yield. This could be attributable to delays for this movement, where p.m. peak hour left-turn delays were observed. This left turn currently operates with protected-permissive left-turn phasing. Converting this movement to protected-only left-turn phasing would potentially reduce crashes for this movement; this modification would have an impact on the overall intersection operations, as well as that of the adjacent signalized intersection of US 169 and Jefferson Avenue, which is only approximately 700 feet away.

Segment 2: Highway 22 and Augusta Drive, Mankato

Current Traffic Control: Minor Approach Two-Way Stop Control

Fifteen crashes were reported at this intersection in the five-year data period, with 11 of these being right-angle crashes. One crash resulted in an incapacitating injury. Right-angle crashes are likely associated with poor gap availability for minor approach vehicles during high volume time periods. Based on 48 hours of traffic data that were collected in March 2017, a signal is warranted at this location based on Warrant 1B (eight-hour volume - interruption of continuous traffic), Warrant 2 (four-hour volume), and Warrant 3 (peak hour volume). A traffic signal would reduce angle crash potential; however, it would potentially increase rear-end crashes. Other alternatives will also be studied in the subsequent alternatives analysis phase of this corridor study.

A 2015 ICE report for the Augusta Drive intersection recommended a roundabout as a long-term improvement, with conversion to a reduced conflict intersection (also known as a J-turn) as a short-term, interim improvement. The reduced conflict intersection would prohibit through and left-turn movements for traffic on Augusta Drive, requiring these vehicles to make a right turn and a subsequent downstream U-turn to continue in the desired travel direction.

Segment 2: Highway 22 and Adams Street, Mankato

Current Traffic Control: Roundabout

This intersection was converted from signal control to multilane roundabout control in 2014. 111 crashes were reported during the time that crash data is readily available for this intersection (year 2014-2015) – none of which resulted in incapacitating injuries or fatalities. The five-year crash history indicates 39 crashes were rear-end crashes, 30 were right-angle crashes, and 32 were sideswipe crashes. Rear-end and angle crashes are common at signals, and sideswipe crashes are common at multilane roundabouts; therefore, these patterns are not atypical given the varying traffic control at this location during the period reviewed.

There were three times the number crashes in 2015 than there were in 2013, likely attributable to drivers not yet being accustomed to roundabout operations in this area. It is noteworthy that only one crash in 2015 resulted in a possible injury, with the other 42 reported crashes resulting in property damage. Crash rates should be continuously monitored at this location moving forward until more data is available to form an opinion or determination of proper crash rate.

Segment 2: Highway 22 and CSAH 17 (Madison Avenue), Mankato

Current Traffic Control: Roundabout

During the study period 144 crashes were reported, with 45 rear-end crashes, 46 right-angle crashes, and 31 sideswipe crashes. **Like Adams Street, this intersection was converted from signal control to roundabout control in 2014**, so the common crash types at this location are not atypical given the varying traffic control during the study period. This location also experienced an increase in crashes after roundabout installation, with over three times the number of crashes reported in 2015 compared to 2013. Eight of the 63 crashes in 2015 resulted in minor injuries or possible injuries; however, no serious injuries were reported. Crash rates should be monitored to see if the crash rate decreases over time.

Segment 2: Highway 22 and Bassett Drive, Mankato

Current Traffic Control: Signal

In the study period 46 crashes were reported, with 21 being rear-end crashes. These rear-end crashes make up about 45 percent of total intersection crashes, which is in line with Minnesota statewide averages. Fourteen of these rear-end crashes were on the Highway 22 approaches, with eight in the southbound direction. Nine crashes resulted in minor injuries or possible injuries; however, no crashes resulted in serious injuries.

Table 3 – Summary of Intersections Above Statewide Critical Crash Rate

Intersection	Control	Total Crashes	Critical Crash Rate*	Observed Crash Rate*	Critical Index	Most Common Crash Type	Note
US 169	Signal	39	0.65	0.85	1.31	Rear end, right-angle, left-turn	
Augusta Drive	Minor Approach TWSC	15	0.51	0.51	1.00	Right-angle	Future roundabout recommended in 2015 ICE report, with interim J-turn
Adams Street	Roundabout	111	1.00	2.09	2.09	Rear-end, right-angle, sideswipe	Converted from signal to roundabout in 2014
CSAH 17 (Madison Avenue)	Roundabout	144	1.00	2.66	2.66	Rear-end, right-angle, sideswipe	Converted from signal to roundabout in 2014
Bassett Drive	Signal	46	0.83	1.23	1.48	Rear-end, right-angle, sideswipe	

* Crashes per million entering vehicles

Locations Above System Average Crash Rate

While critical crash rate analysis did not identify the following locations as having crash rates above the critical crash rate, these locations did have crash rates above the Minnesota statewide average crash rate for similar locations. Having a crash rate was above the statewide average crash rate does not necessarily indicate a safety concern but rather that these locations should continue to be monitored for changes in crash frequency. Note that this analysis does not include any intersections with crash frequencies of less than one crash per year (South Victory Drive/206th Street in Mankato in Segment 2, CSAH 15/185th Street in Segment 3, CSAH 7 (Central Avenue) in Mapleton in Segment 3, and the south junction of Highway 30/CSAH 29 all had fewer than one crash per year reported). Detailed analysis results for these intersections are shown in **Table 4**.

In Segment 2 in Mankato, rear-end crashes make up 41 percent of crashes at CSAH 3 (North Victory Drive), 46 percent of crashes at Hoffman Road, and 38 percent of crashes at Highway 83/CSAH 60 (Stadium Road), which is in line with Minnesota statewide averages. Traffic operations analysis did not indicate major congestion issues at these intersections; however, alternatives analysis will evaluate options to improve traffic flow that would potentially reduce rear-end crashes.

In Segment 2 in Mankato, rear end crashes are not overrepresented on any approach of CSAH 3 (North Victory Drive), but at Hoffman Road seven of the 11 rear-end crashes were in the northbound direction.

In Segment 2 in Mankato, at Highway 83/CSAH 60 (Stadium Road), five of 10 rear-end crashes were in the northbound direction. No clear pattern was observed for the remaining rear-end crashes. This is the first signal for vehicles travelling northbound into Mankato, therefore some drivers may not expect the signal, especially those unfamiliar with the area. There are advance-warning beacons and pavement markings on the north and south intersection approaches; however, if rear-end collisions continue to be an issue, further improvements should be considered.

Table 4 – Summary of Intersections Above Statewide Average

Intersection	Location	Control	Average Crash Rate for Similar Locations*	Observed Crash Rate*	Most Common Crash Type	Notes
CSAH 21	Segment 1	Minor Approach TWSC	0.25	0.28	Head-on (3 of 5)	Skewed intersection
470th Street (TWP 140)	Segment 1	Minor Approach TWSC	0.25	0.43	Rear-end (5 of 6)	No left-turn lanes on Highway 22
CR 101 (480th Street)	Segment 1	Minor Approach TWSC	0.25	0.6	Rear-end (6 of 9)	Left turn lanes installed on Highway 22 in 2015
CSAH 2	Segment 1 and 2	Minor Approach TWSC	0.25	0.34	Rear-end (3 of 5)	SB bypass lane, but no SB left-turn lane on Highway 22
CSAH 57 (North Riverfront Drive)	Segment 2, Mankato	Minor Approach TWSC	0.25	0.41	Run-off-the-road (6 of 7)	Horizontal curvature on north approach of intersection; lighting present at intersection but not upstream or downstream of intersection
CSAH 3 (North Victory Drive)	Segment 2, Mankato	Signal	0.52	0.66	Rear-end (11 of 27)	
Hoffman Road	Segment 2, Mankato	Signal	0.52	0.76	Rear-end (12 of 26)	
Highway 83/ CSAH 60 (Stadium Road)	Segment 2, Mankato	Signal	0.52	0.86	Rear-end (10 of 24)	First signal entering Mankato from the south

* Crashes per million entering vehicles

Corridor Crash Analysis

Corridor crash rates were also studied to identify safety concerns that are not isolated at study intersections identified above. The crash rates included intersection crashes along the corridor. These crash rates were compared to MnDOT average crash rates with intersection crashes included for similar corridors. Having an observed crash rate along a given corridor that is higher than the critical crash rate indicates that there is a statistically significant probability that a crash problem is present and is likely attributable to the design of the facility. Having a crash rate along a given corridor that is above the statewide average crash rate does not necessarily indicate a safety concern but rather that these locations should continue to be monitored for changes in crash frequency.

Rural Segments

Segment 1: US 169 to CSAH 2

The crash rate on this segment is below both the state average and critical crash rate. Rear-end crashes and run-off-the-road type crashes are the most common types reported, each having 21 crashes reported out of 77 total crashes on the segment. Run-off-the road type crashes are common on rural high-speed segments, especially given some of the horizontal and vertical roadway curvature that is present. This segment of the corridor had centerline and shoulder rumble strips installed in

late 2015, as a mitigation for run-off-the-road type crashes, which is likely not reflected in the safety analysis results for this study. Rear-end crashes are less common on rural segments and could be indicative of operational issues associated with high volumes as well potential access management issues that can be addressed in the alternatives analysis. Recently installed left-turn lanes at County Road 102 (460th Street) and County Road 101 (480th Street) mitigate rear-end crash potential since slow moving or stopped left-turning vehicles are removed from the high-speed through traffic stream.

Segment 2: CSAH 2 to CSAH 57 (North Riverfront Drive)

The crash rate on this segment exceeds the critical crash rate, with run-off-the-road type crashes and rear-end crashes being the most represented of the 35 reported crashes. Roadway curvature north of CSAH 57 (North Riverfront Drive) may be contributing to run-off-the-road crashes. This segment of the corridor had centerline and shoulder rumble strips installed in late 2015, as a mitigation for run-off-the-road type crashes, which is likely not reflected in the safety analysis results for this study. High traffic volumes and higher access density and associated turning movements on this segment could be contributing to rear-end crashes, with 20 access points present on this 1.5-mile sub-segment. Access spacing along the corridor is addressed in greater detail in a later section of this report.

Based on local media reports, a fatal head-on collision occurred near the intersection of CSAH 57 (North Riverfront Drive) in March 2016; this crash is not in the MnDOT database therefore several details are unknown.

Segment 2: South Victory Drive/206th Street to CSAH 90

This segment has a crash rate above the statewide average for similar facilities, but not above the critical crash rate. Right-angle crashes are the most represented crash type on this segment, with 14 of 31 crashes being reported as right-angle crashes. There are 13 access points on this mile-long sub-segment, which could be contributing to crashes on this segment.

There were two fatal collisions reported on this segment, one being a right-angle collision involving a motorcycle at South Victory Drive/206th Street and the other being a head-on collision with a heavy truck near Maple Hill Road (between South Victory Drive/206th Street and 200th Street just south of Mankato). The right-angle crash involved a distracted driver, and the head-on crash involved aggressive driving. As such, it does not appear that roadway design was the contributing factor to these fatal crashes.

Segment 3: CSAH 90 to Highway 30/County CSAH 29

The segment crash rate was above the statewide average, but not above the critical crash rate. Of the 100 reported crashes, run-off-the road crashes were the most represented with 36 crashes, followed by 20 right-angle crashes. There is a concentration of run-off-the-road type crashes on the curved segment near CSAH 15/185th Street, where 15 of the 36 run-off-the road crashes were reported. This curved section is approximately two miles long, or just over 10 percent of the segment length but 42 percent of run-off-the-road crashes occurred here. This segment of the corridor had centerline and shoulder rumble strips installed in 2017 and 2018, as a mitigation for run-off-the-road type crashes, which is not reflected in the safety analysis results for this study. Right-angle crashes could be a result of higher access density south of Mankato. On average, there are about 10 access points per mile south of Mankato.

Based on local media reports, a fatal head-on collision occurred between County Roads 8 and 16 in September 2017; this crash is not in the MnDOT database therefore several details are unknown.

Urban Segment

Segment 2: CSAH 57 (North Riverfront Drive) to South Victory Drive/206th Street

The urban sub-segment through Mankato exceeds the critical crash rate, with 425 crashes being reported in the study period. Rear-end crashes (166 crashes) and right-angle crashes (114 crashes) were the most represented crashes in this segment. Since 61 percent of crashes on this segment occurred at the intersections of Adams Street and CSAH 17 (Madison Avenue) alone, crash rates should be monitored to evaluate whether crash rates are improving at these locations over time. Since roundabouts mitigate both rear-end and angle crashes, a crash improvement can be reasonably expected once drivers are fully familiar with the roundabout operations at these two intersections.

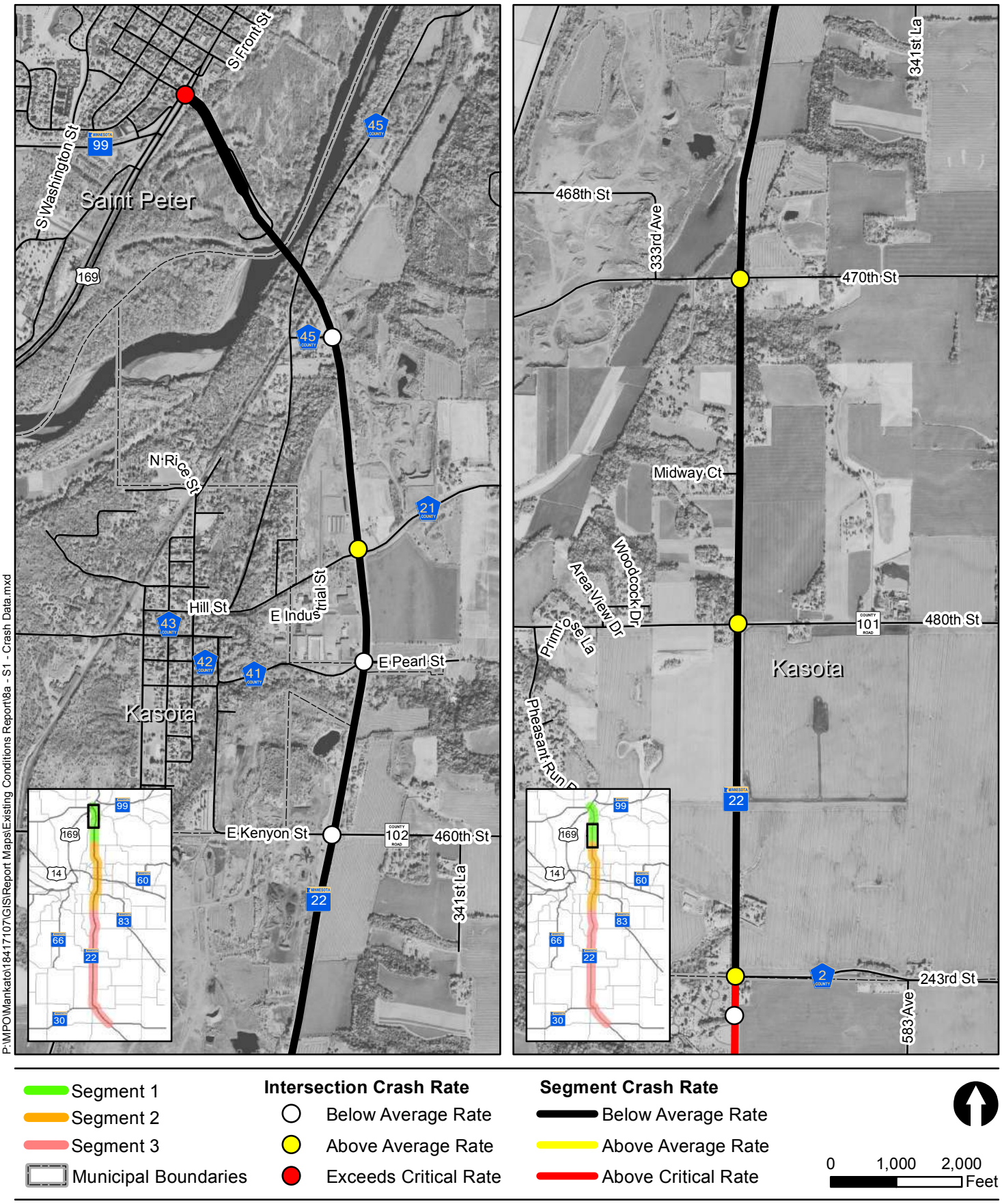
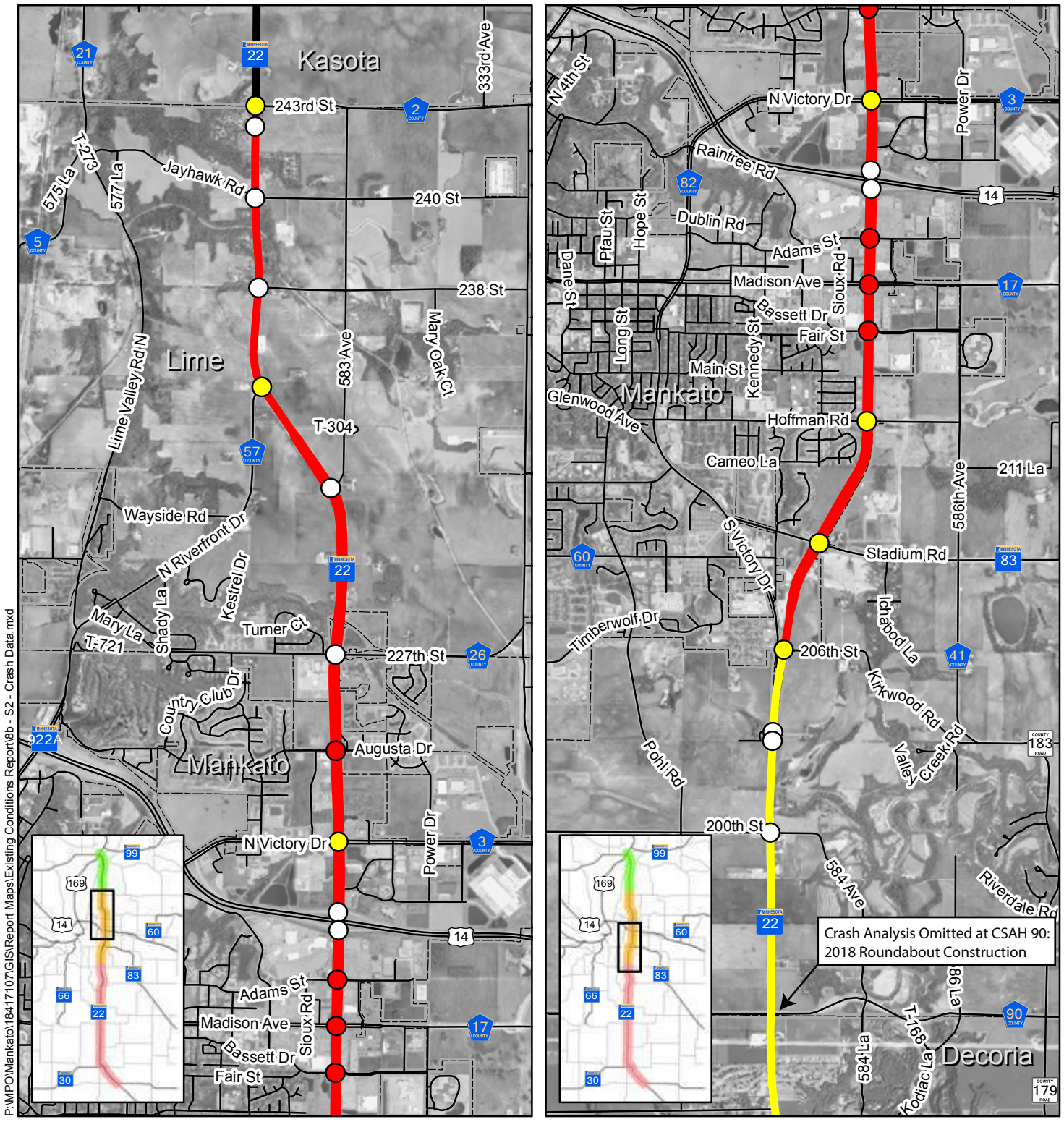


Figure 27. Crash Data (Segment 1)



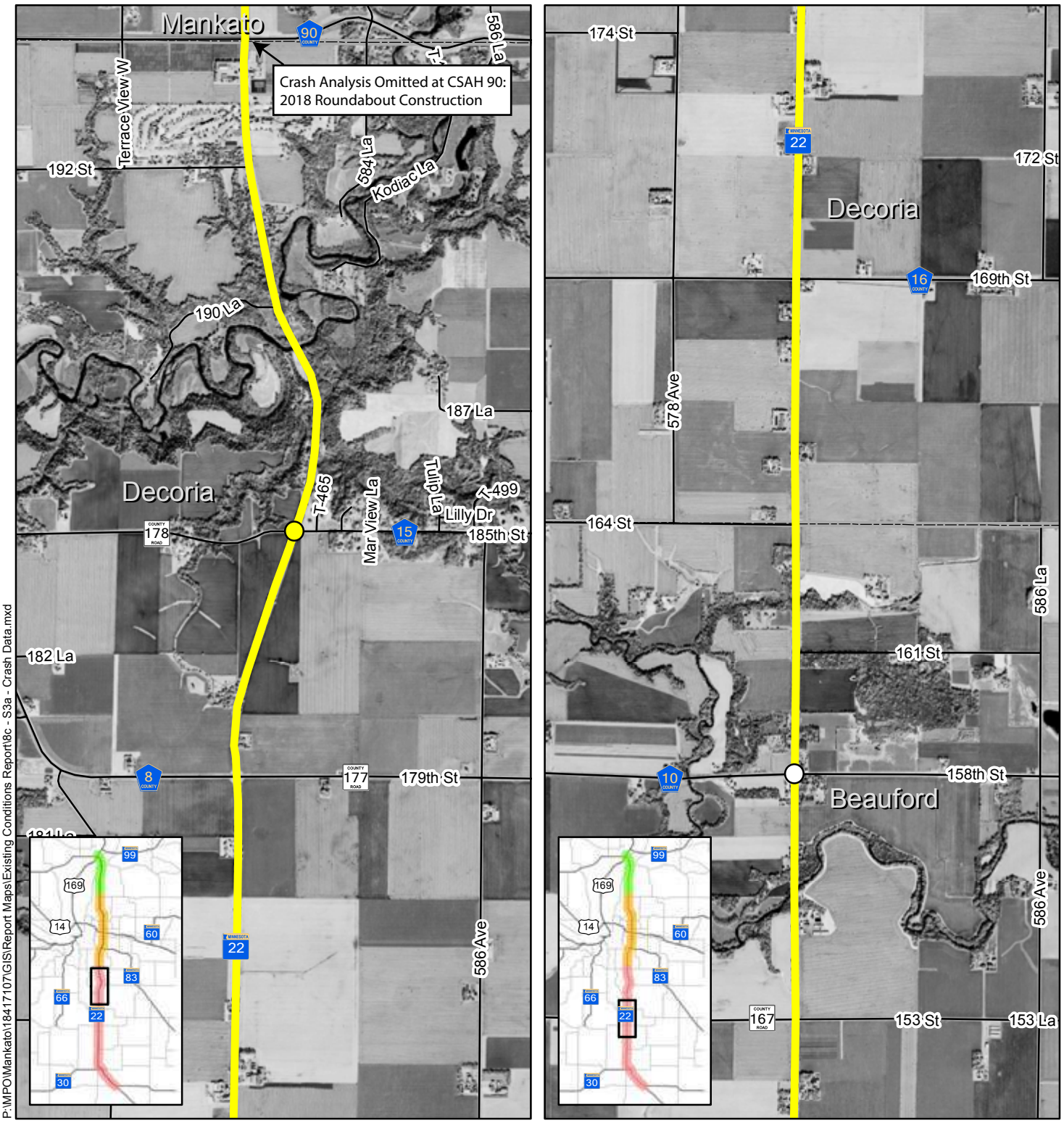
Segment 1
Segment 2
Segment 3
Municipal Boundaries

Intersection Crash Rate
Below Average Rate
Above Average Rate
Exceeds Critical Rate

Segment Crash Rate
Below Average Rate
Above Average Rate
Above Critical Rate

0 2,000 4,000 Feet

Figure 28. Crash Data (Segment 2)



Segment 1
Segment 2
Segment 3
Municipal Boundaries

Intersection Crash Rate
Below Average Rate
Above Average Rate
Exceeds Critical Rate

Segment Crash Rate
Below Average Rate
Above Average Rate
Above Critical Rate

0 1,500 3,000 Feet

Figure 29. Crash Data (Segment 3A)

Segment 1
Segment 2
Segment 3
Municipal Boundaries

Intersection Crash Rate
Below Average Rate
Above Average Rate
Exceeds Critical Rate

Segment Crash Rate
Below Average Rate
Above Average Rate
Above Critical Rate

0 1,500 3,000 Feet

Figure 30. Crash Data (Segment 3B)

Access

Proper access spacing along roadways promotes better traffic flow and results in lower potential for vehicle collisions. Research documented in NCHRP Report #420 found that on average, each access along a corridor increases crash potential by four percent and decreases corridor travel speeds by 0.25 miles per hour. Since operational and safety benefits are associated with proper access control, MnDOT has developed and published access spacing recommendations for routes on their system.

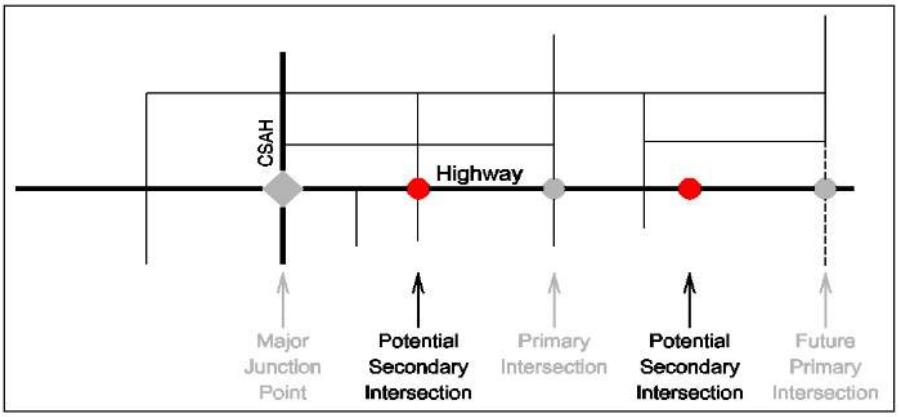
Between US 169 and US 14, Highway 22 is classified as a non-interregional principal arterial (MnDOT access category 4). South of US 14, Highway 22 is classified as a non-interregional minor arterial (MnDOT access category 5). In the study area, the corridor is further categorized as a rural facility or an urban/urbanizing facility. See **Figure 31** for access categorization throughout the study area.

Within the project area, MnDOT has recommended the following street spacing:

- Category 4A – Rural Principal Arterial
    - 1 mile spacing between primary full-movement intersections
    - 1/2 mile spacing between secondary intersections
    - Private driveways are permitted if no reasonable alternative exists. On 55 mph roadways, driveways should be at least 100 feet apart.
- Category 4B – Urban/Urbanizing Principal Arterial
    - 1/2 mile spacing between primary full-movement intersections
    - 1/4 mile spacing between secondary intersections
    - 1/2 mile spacing between signals
    - Private driveways are permitted if no reasonable alternative exists, but MnDOT prefers the development of a supporting roadway network that is more conducive to private access.
- Category 5A – Rural Minor Arterial
    - 1/2 mile spacing between primary full-movement intersections
    - 1/4 mile spacing between secondary intersections
    - Private driveways are permitted if no reasonable alternative exists. On 55 mph roadways, driveways should be at least 100 feet apart.
- Category 5B – Urban/Urbanizing Minor Arterial
    - 1/4 mile spacing between primary full-movement intersections
    - 1/8 mile spacing between secondary intersections
    - 1/4 mile spacing between signals

- Private driveways are permitted if no reasonable alternative exists, but MnDOT prefers the development of a supporting roadway network that is more conducive to private access.

Access Spacing Concepts (Source: MnDOT)



MAPO has also established access management guidelines for the segment of Highway 22 within its planning area. Access spacing guidelines are consistent with MnDOT guidelines listed above.

An inventory of accesses by type is provided in **Figure 32** through **Figure 35**. Additional supporting data from this analysis can be found in **Appendix C.**

Existing Public Access Spacing

Segment 1: US 169 to Le Sueur CSAH 45, Saint Peter – Urban Principal Arterial

There are no public accesses on this 0.8-mile sub-segment; therefore, this segment is within the MnDOT-preferred access density of four accesses per mile.

Segment 1 and 2: Le Sueur CSAH 45 to Blue Earth CSAH 26 (227th Street) - Rural Principal Arterial

While most of this sub-segment has public access spacing above the preferred two accesses per mile, cross-streets with more than 1,000 Average Daily Traffic (ADT) are spaced at least 1.5 miles apart from each other. The densest public access spacing on this segment is 3.9 accesses per mile between Blue Earth CSAH 2 and Blue Earth CSAH 57 (North Riverfront Drive).

Segment 2: CSAH 26 to US 14, Mankato - Urban Principal Arterial

There are 5.5 accesses per mile within this sub-segment. While higher than the preferred four accesses per mile, full-movement accesses are no closer than 0.5 miles from one another between CSAH 26 (227th Street) and CSAH 3 (North Victory Drive). The signals at CSAH 3 (North Victory Drive) and the north US 14 ramps are 0.4 miles from one another, and the signals at the US 14 interchange are 500 feet from one another.

Segment 2 and 3: US 14 (Mankato) to 200th Street - Urban Minor Arterial

Other than the portion between US 14 and Bassett Drive, urban access spacing is four accesses per mile or less, which is the preferred access spacing for primary full-movement intersections. Between US 14 and Bassett drive, there are 4.8 accesses per mile, with all accesses under signal or roundabout control. All signal controlled or roundabout controlled intersections are spaced at least one-quarter of a mile from each other.

Segment 3: 200th Street to 134th Street (Mapleton) – Rural Minor Arterial

Between Mankato and Mapleton, there are no more than three public accesses per mile, compared to the MnDOT preference of four primary full-movement accesses per mile. Most of this segment has two or fewer public accesses per mile. Between CSAH 90 and Mapleton, all cross-streets carry less than 1,000 ADT.

Segment 3: 134th Street to South Mapleton Limit – Urban Minor Arterial

There is an average of 3.7 public accesses per mile through Mapleton, with denser spacing between 4th Avenue NE and the north junction of Highway 30, where accesses are spaced between 280 and 700 feet from one another.

Segment 3: South Mapleton Limit to Highway 30/CSAH 29 – Rural Minor Arterial

Between Mapleton and the south junction of Highway 30, there are 1.2 accesses per mile, lower than the MnDOT-preferred eight accesses per mile.

Table 5 – Access Spacing Summary

Segment	MnDOT Access Category	Length (Mi)	Public Accesses	Public Accesses/ Mile	Preferred Public Accesses/ Mile	Total Accesses*	Total Accesses /Mile	Preferred Total Accesses /Mile
US 169 to CSAH 45	4B - Urbanizing	0.8	2	2.4	4	4	4.9	4
CSAH 45 to CSAH 26 (227th Street)	4A – Rural	7.6	16	2.1	2	59	7.8	100' Private Access Spacing
CSAH 26 (227th Street) to US 14	4B - Urbanizing	1.5	8	5.5	4	9	6.2	4
US 14 to 200th Street	5B - Urbanizing	3.7	12	3.3	8	14	3.8	8
200th Street to 134th Street	5A - Rural	12.6	17	1.3	4	126	10.0	100' Private Access Spacing
134th Street to South Mapleton Limit	5B - Urbanizing	2.2	8	3.7	8	35	16.1	8
South Mapleton Limit to Highway 30/ CSAH 29	5A - Rural	1.7	2	1.2	4	6	3.6	100' Private Access Spacing

* Includes private driveways

Note: Red cells indicate public accesses per mile that exceed MnDOT guidelines.

Private Driveways

Given the rural nature of the Highway 22 corridor north and south of Mankato, there are many private accesses, with most being residential. One exception to this is the segment between the north junction of Highway 30/CSAH 21 (Silver Street W) and Borchert Street SE/127th Street (TWP 49), which has predominantly business accesses on each side of the corridor.

Locations with the highest access density are (includes both public and private accesses – listed north to south):

- 470th Street (TWP 140) to County Road 101 (480th Street): 10 accesses in one mile
- CSAH 2 to CSAH 57 (North Riverfront Drive): 20 access points in 1.5 miles
- 200th Street to CSAH 90: 13 accesses in one mile
- CSAH 90 to CSAH 15 (185th Street): 23 accesses in two miles
- 164th Street to 153rd Street: 26 accesses in two miles
- 134th Street to South Mapleton City Limits: 35 accesses in 2.2 miles

Higher access density in high speed rural areas can increase crash potential, especially rear-end crash potential since turn lanes are typically not present for private accesses. Opportunities should be pursued to reduce existing access density in these areas, while also ensuring steps are taken to mitigate the impacts of any new, functionally necessary, accesses.

Potential Access Modifications

As part of alternatives analysis, potential access revisions will be considered. This could involve removing redundant access points, by sharing access points between adjacent properties, or by realigning access points to align with access points on the opposite side of the roadway.

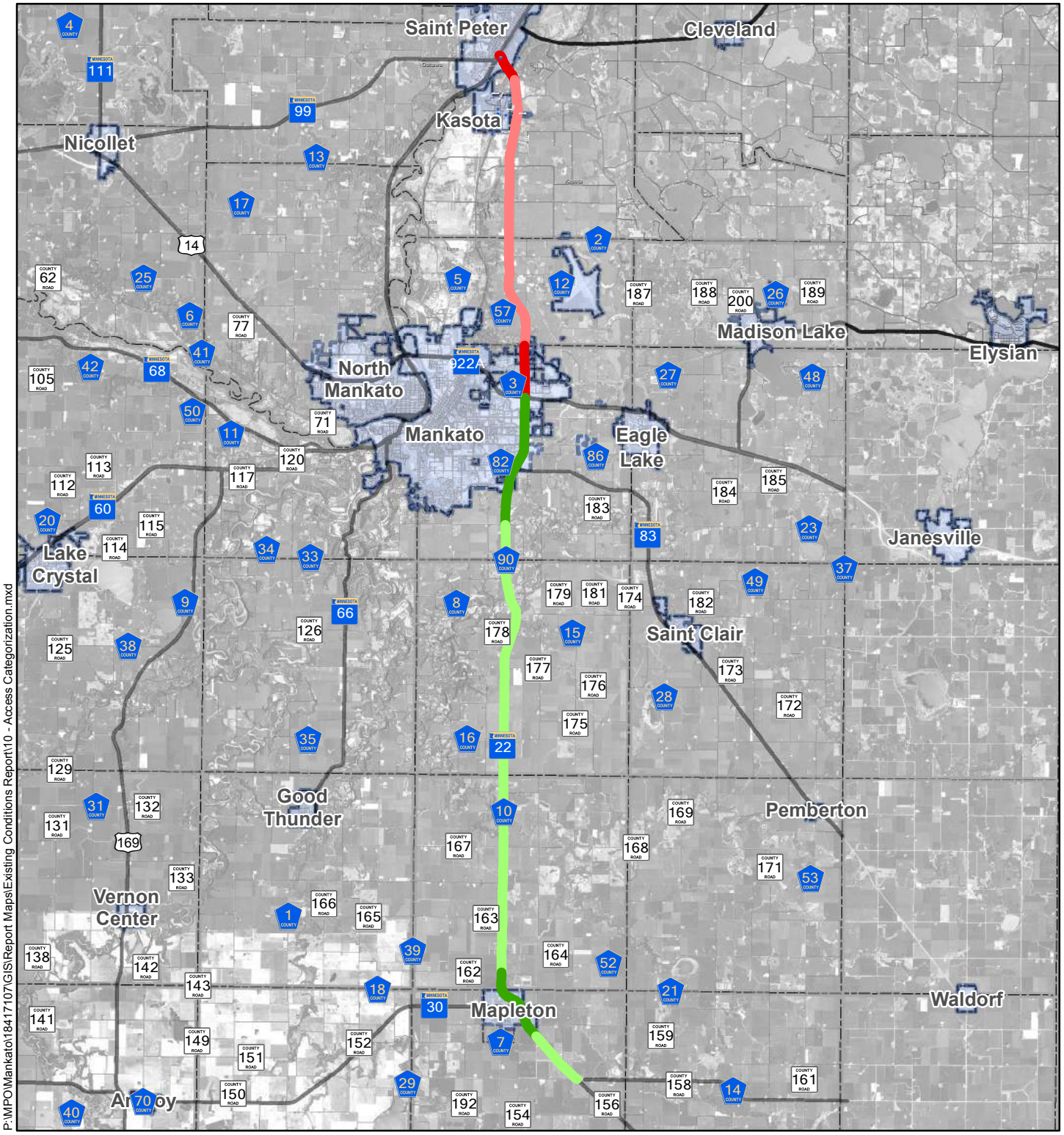


Figure 31. MnDOT Access Categorizaton

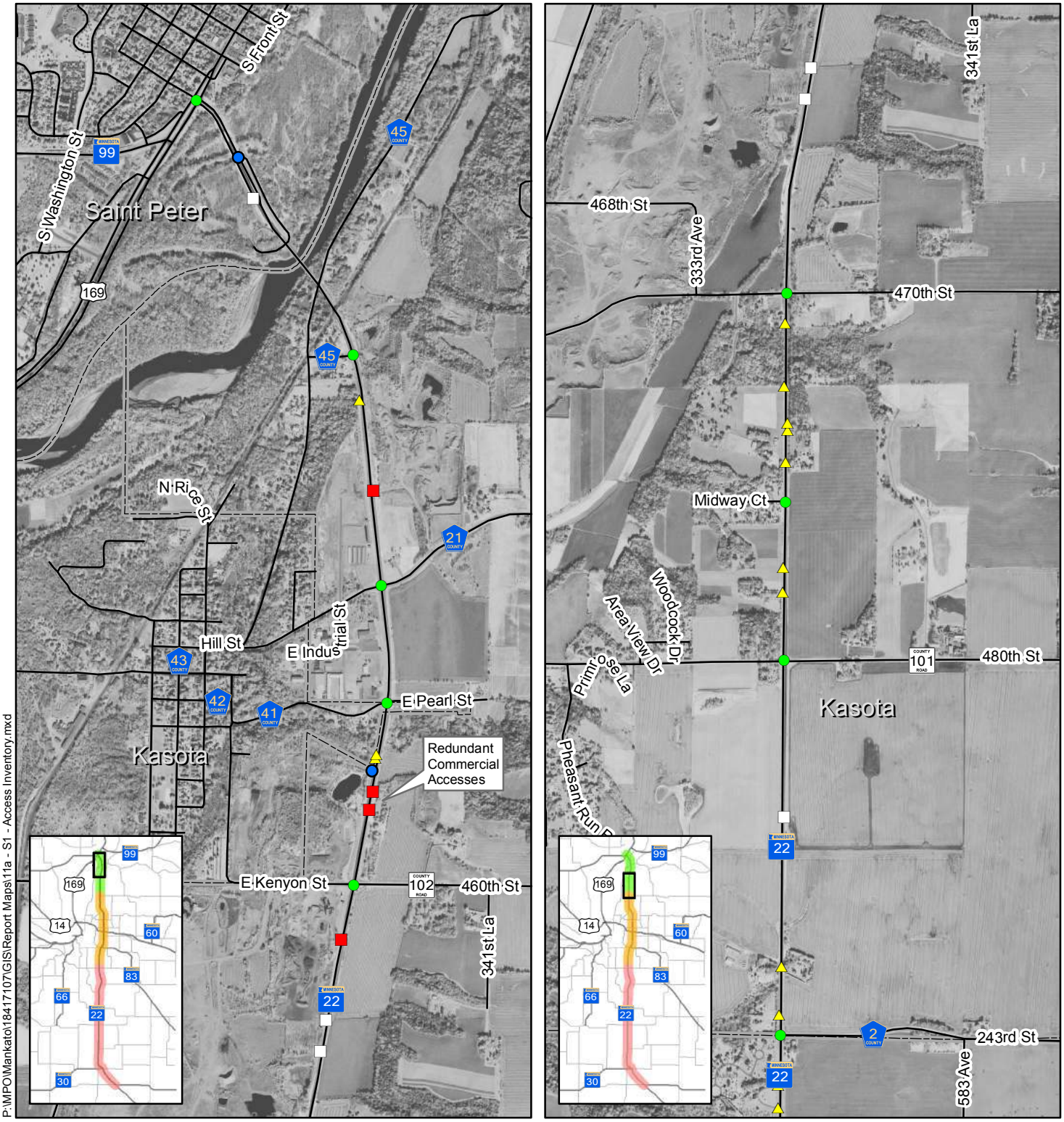


Figure 32. Access Inventory (Segment 1)

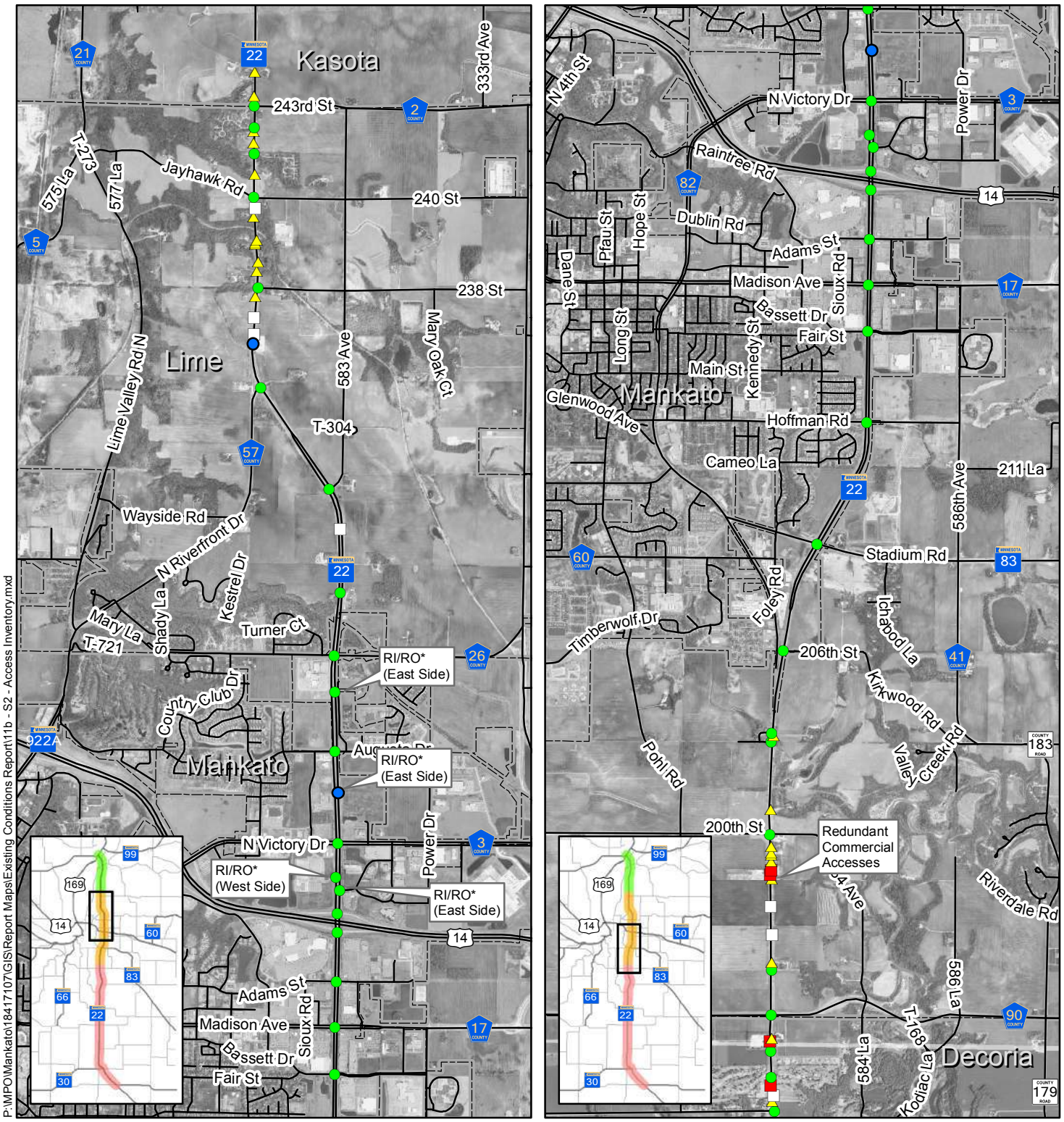


Figure 33. Access Inventory (Segment 2)

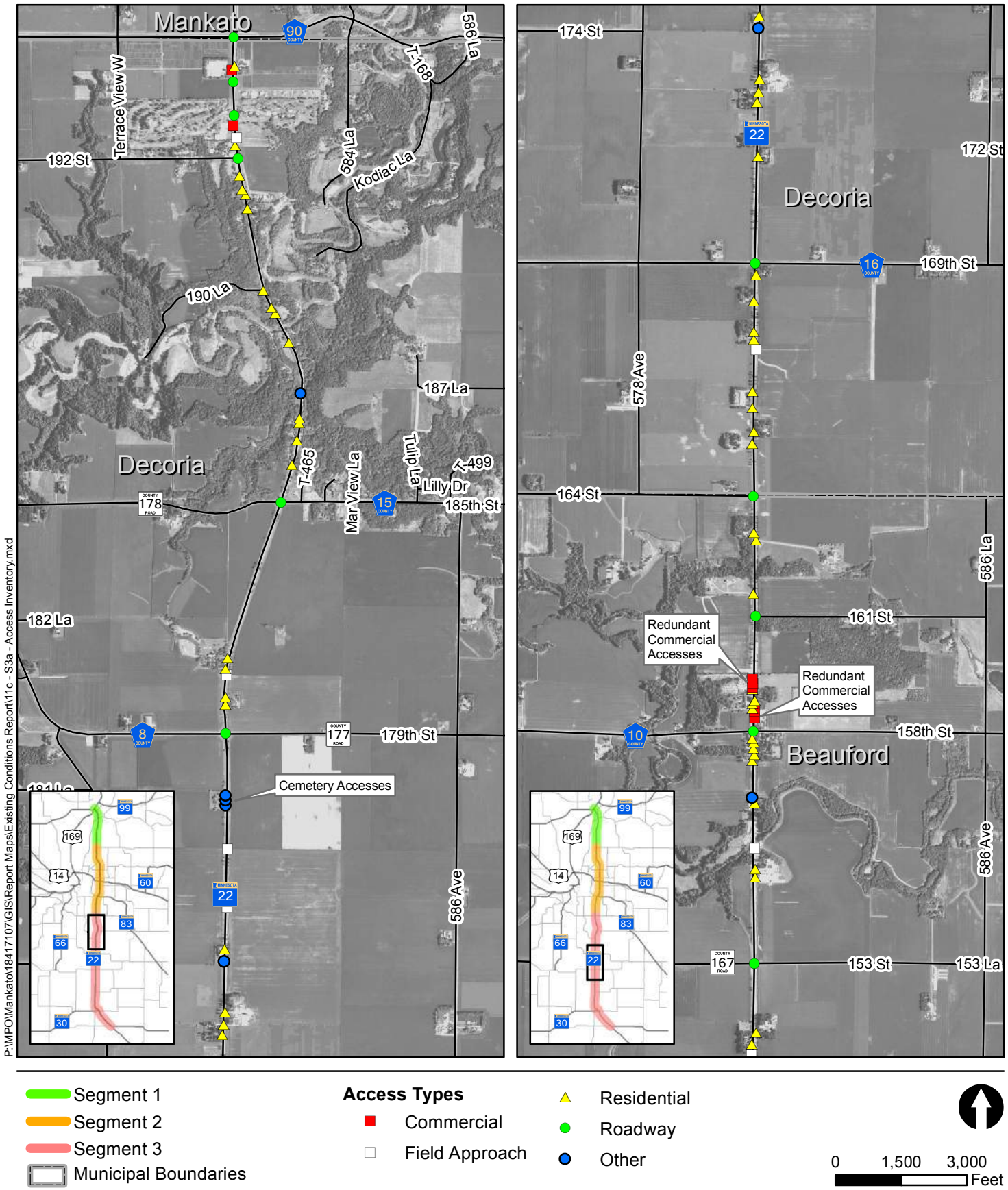


Figure 34. Access Inventory (Segment 3A)

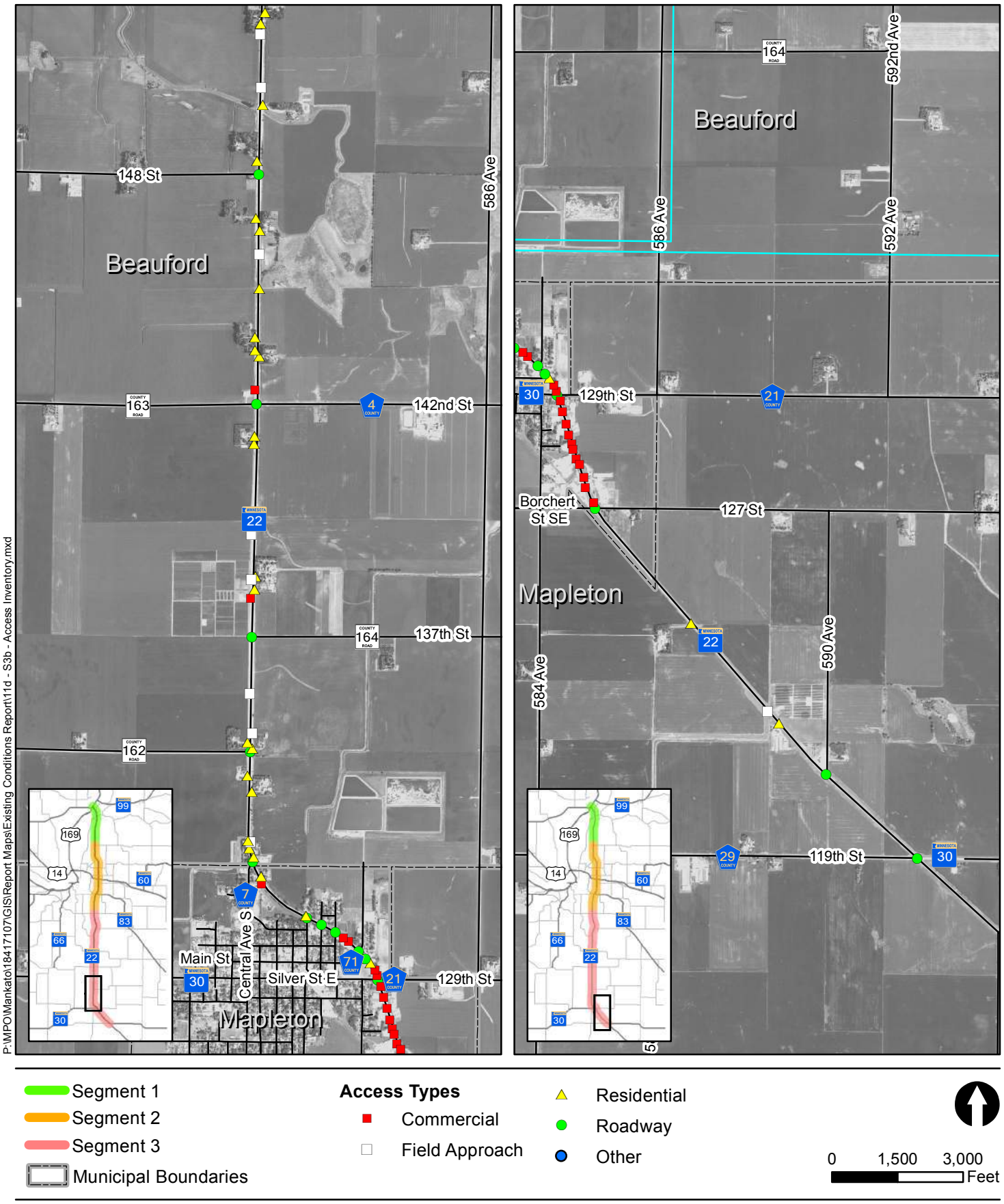


Figure 35. Access Inventory (Segment 3B)

Existing Traffic Analysis

The following summarizes the results of the existing conditions traffic operations analyses.

General Corridor Characteristics

Segment 1 between US 169 and CSAH 2 is generally a two-lane rural section with a 55-mph speed limit. Starting north of CSAH 45 and ending south of Pearl Street, there are two southbound lanes and one northbound lane. There is rolling hill terrain on the north end of the segment, becoming flatter to the south toward Mankato.

Segment 1 Southbound at CSAH 21 (227th Street)

In Segment 2, Highway 22 is a two-lane rural segment with a 55-mph speed limit on the north end of this segment and a two-lane rural segment with a 60-mph speed limit on the south end of this segment. The cross section is expanded to a four-lane 45-mph section with two lanes in each direction between 583rd Avenue and South Victory Drive/206th Street. The terrain is generally flat in this segment.

Segment 2 in Mankato at US 14

In Segment 3, Highway 22 is generally a two-lane rural section with a 60-mph speed limit. There are two alternating short 2+1 truck climbing lane segments (two lanes in one direction and one lane in the opposite direction) between CSAH 90 and CSAH 15/185th Street. There is some rolling hill terrain in the north part of the segment, with terrain becoming flatter to the south toward Mapleton.

Segment 3 North of Mapleton

The existing roadway sections in the study area can be seen in **Figure 36** through **Figure 39.**

Study Intersections

Traffic operations and crash history were studied in detail for the following intersections:

- US 169 – Signalized
- CSAH 45
- CSAH 21
- East Pearl Street
- County Road 102 (460th Street)
- 470th Street (TWP 140)
- County Road 101 (480th Street)
- CSAH 2
- Pheasant Drive
- Jayhawk Road/240th Street
- 238th Street
- CSAH 57 (North Riverfront Drive)
- 583rd Avenue
- CSAH 26 (227th Street) – **Signalized**
- Augusta Drive
- CSAH 3 (North Victory Drive) – **Signalized**
- US 14 WB – Signalized
- US 14 EB – Signalized
- Adams Street – **Roundabout**
- CSAH 17 (Madison Avenue) – **Roundabout**
- Bassett Drive – **Signalized**
- Hoffman Road – **Signalized**
- Highway 83/CSAH 60 (Stadium Road) – **Signalized**
- South Victory Drive/206th Street
- North Maple Hill Road
- South Maple Hill Road
- 200th Street
- CSAH 15 (185th Street)
- CSAH 10
- CSAH 7 (Central Avenue)
- North Junction Highway 30/ CSAH 21
- South Junction Highway 30/CSAH 29

Unless noted in the list of intersections above, all study intersections have minor approach stop control. No all-way stop control is present on Highway 22 throughout the study area. The study intersections and traffic control at these intersections can be seen in **Figure 36** through **Figure 39.** Study intersection lane configurations can be seen **Figure 40** through **Figure 43.**

Intersection Control Evaluation (ICE)

Intersection Control Evaluation (ICE) Reports are being developed for the following intersections to establish traffic control recommendations for future consideration:

- Segment 1 - CSAH 21 - Kasota
- Segment 1 - County Road 101 (480th Street)
- Segment 2 - CSAH 57 (North Riverfront Drive) - Mankato
- Segment 2 - CSAH 26 (227th Street) - Mankato
- Segment 2 - CSAH 3 (North Victory Drive) - Mankato
- Segment 2 - Bassett Drive - Mankato
- Segment 3 - CSAH 7 (Central Avenue) - Mapleton
- Segment 3 - North Junction Highway 30/ CSAH 21 - Mapleton

ICE reports were completed in 2015 at the following intersections:

- Segment 2 and 3 - CSAH 90 - Mankato – roundabout constructed in 2018
- Segment 2 - Highway 83/CSAH 60 (Stadium Road) - Mankato – roundabout recommended for long-term improvement
- Segment 2 - Hoffman Road – Mankato - roundabout recommended for long-term improvement
- Segment 2 - Augusta Drive – Mankato - roundabout recommended for long-term improvement

Recommendations from previously completed ICE reports will be considered as part of the alternatives analysis phase of this corridor study.

Existing Traffic Volumes and Operations

Existing traffic data was collected over a 48-hour period throughout the study area in March 2017. This 2017 data was supplemented with additional 48-hour period data collected in November 2016. 2016 data was available for the following intersections:

- CSAH 26 (227th Street)
- Bassett Drive
- Hoffman Road
- Highway 83/CSAH 60 (Stadium Road)

All traffic analysis was completed with the respective traffic data "smoothed" to align with adjacent intersections from varying time periods.

Highway 99 Detour

When traffic data was collected in March 2017 there was an active Highway 99 detour related to the Minnesota River bridge closure. This detour utilized CSAH 21 and Highway 22, adding traffic to these roadways compared to typical traffic conditions. The detour route can be seen below.

Highway 99 Detour

Source: MnDOT

During the 2017 detour on Highway 99, ADT on CSAH 21 increased from 2,200 (most recent count in 2013) to 5,100 in 2017. Since available 2017 data reflects atypical traffic conditions due to the Highway 99 detour, traffic volumes under typical operating conditions were estimated to be used in subsequent traffic analysis.

The following assumptions were made to estimate typical traffic conditions in the study area:

- The Highway 99 detour added 2,900 ADT to CSAH 21:
  - 2017 ADT (during detour) = 5,100
  - 2013 ADT (most recent ADT available from MnDOT data) = 2,200
    - Added volume with detour → 5,100 – 2,200 = 2,900
  - No growth assumed between 2013 and 2017 volumes under typical conditions
    - Growth rates used for 2030 and 2045 traffic projections assume 2.5 percent annual growth (discussed in greater detail in a later section)
      - 2.5 percent annual growth between 2013 and 2017 would add approximately 228 vehicles, or 22 peak hour vehicles (10 to 15 vehicles in each direction).
- Based on 2017 48-hour counts, 9.9 percent of daily traffic on CSAH 21 occurred in both a.m. and p.m. peak hours

    - Therefore, it is assumed that 287 additional a.m. and p.m. peak hour vehicles were turning to or from CSAH 21 during 2017 detour operations
        - 2,900 x 0.099 = 287
- The 287-additional a.m. and p.m. peak hour turning movements to or from CSAH 21 during the detour were moved from the east CSAH 21 approach at Highway 22 and rerouted to instead use the Highway 99 bridge across the Minnesota River.
    - Additional a.m. and p.m. peak hour turning movements to or from CSAH 21 during the detour were rerouted proportionally from CSAH 21 to Highway 99 based on 2017 turning movements at the intersection Highway 22 and CSAH 21.
- Based on engineering judgement, it was assumed that 50 percent of vehicles that were rerouted to use the Highway 99 Minnesota River bridge are destined for locations northeast of the US 169/Highway 22 intersection and 50 percent of vehicles are destined for locations southeast of the US 169/Highway 22 intersection
    - In the study area, left or right-turning volumes were only adjusted at the Highway 22 intersections with CSAH 21 and US 169. At the CSAH 45 intersection, all volume changes were made as northbound or southbound through movements
- Counts were **not adjusted** at any intersections south of CSAH 21 as these intersections were not part of the Highway 99 detour route.

Daily traffic volumes after adjusting to reflect typical operating conditions at applicable locations can be seen in **Figure 44** through **Figure 47.** Note that MnDOT seasonal adjustment factors were also applied to daily volumes to best approximate AADT. Peak hour traffic volumes in the a.m. peak hour and the p.m. peak hour can be found in **Appendix D**. Unadjusted counts at applicable locations are also shown in these figures for reference purposes. Note that **adjusted counts** were used for traffic analyses throughout.

Daily Traffic Volumes

Between Saint Peter and Mankato, Highway 22 volumes for 2017 range from 10,300 ADT to 12,300 ADT, with the higher volumes being seen at the intersection with US 169 in Saint Peter. On average heavy commercial vehicle traffic is approximately five percent of daily traffic on this segment. During the mid-morning (9 a.m. to 11 a.m.) truck traffic can reach upwards of 10 percent of the traffic stream through this area.

Through Mankato city limits the ADT for 2017 is around 9,000 north of CSAH 26 (227th Street), 15,600 north of US 14, 24,500 just south of US 14, and 7,300 near South Victory Drive/206th Street. Approximately five percent of daily traffic on this segment is truck traffic.

South of Mankato the ADT for 2017 is 5,000 north of County Road 15, 4,400 north of Mapleton, and around 2,500 through Mapleton. Truck traffic makes up a higher proportion of daily volume on

this segment, with truck percentages ranging between eight and 15 percent of daily traffic, with higher percentages through Mapleton.

High Volume Intersections

There are several intersections along the corridor with relatively high traffic volumes, and subsequently high turning volumes during peak hours. Notable high turning movements include:

- **US 169**: 545 westbound left turns and 539 northbound right turns in the a.m. peak hour. 653 westbound left turns and 609 northbound right turns in the p.m. peak hour.
- **CSAH 3 (North Victory Drive)**: 255 westbound left turns and 221 northbound left turns in the p.m. peak hour.
- **US 14 Interchange:** 246 eastbound left turns and 325 eastbound right turns at the south ramps and 211 northbound left turns at the north ramps in the a.m. peak hour. 340 northbound left turns at the north ramps and 466 eastbound right turns at the south ramps in the p.m. peak hour.
- **Adams Street:** 336 southbound right turns, 259 southbound left turns, 392 westbound right turns, and 292 eastbound left turns in the p.m. peak hour.
- **CSAH 17 (Madison Avenue):** 315 southbound right turns and 278 eastbound left turns in p.m. peak hour.
- **Highway 83/CSAH 60 (Stadium Road)**: 430 southbound right turns and 288 eastbound left turns in p.m. peak hour. 210 southbound right turns and 244 eastbound left turn in a.m. peak hour.

Low Volume Intersections

Just as there are several intersections with high volumes, many of the study intersections have low volumes. Study intersections with minor approach volumes under 500 vehicles per day include:

- East Pearl Street
- County Road 102 (460th Street)
- 470th Street (TWP 140)
- Pheasant Drive
- 240th Street
- 238th Street
- 583rd Avenue
- North and South Maple Hill Road
- 200th Street
- South Junction Highway 30/ CSAH 29

Study intersections with minor approach volumes between 500 and 1,000 vehicles per day are:

- County Road 101 (480th Street)
- CSAH 15/185th Street
- CSAH 10

Historic Traffic Data

Daily traffic data along Highway 22 between 2009 and 2017 was reviewed to understand traffic changes over time. Even after removing estimated detour-related traffic between US 169 and CSAH 21, 2017 volumes are 60 percent higher on this segment when compared to 2009 volumes. This traffic increase could be attributed to drivers getting accustomed to using Highway 22 when it was the designated detour route during the US 169 construction closure between Mankato and Saint Peter in the summer of 2016.

Between CSAH 17 (Madison Avenue) and CSAH 57 (North Riverfront Drive) in the urbanized part of Mankato, traffic has increased by approximately 10 percent since 2009. Locations south of Bassett Drive through Mapleton have seen traffic remain relatively constant or decrease since 2009 (20 percent decrease in daily traffic volumes in Mapleton since 2009). See **Table 6**.

Table 6 – Historic Traffic Data (2009-2017)

Location	2017 ADT (unadjusted)	2017 ADT (seasonal adj. factor)	2016 ADT	2015 ADT	2013 ADT	2011 ADT	2009 ADT
South of US 169	13,300	12,300	-	-	8,300	7,900	8,300
North of CR 102 (460th Street)	11,000	10,300	-	7,500	8,700	8,300	8,600
North of CSAH 57 (North Riverfront Drive)	12,000	11,200	-	7,500	9,100	9,700	10,100
North of CSAH 26 (227th Street)	9,800	9,100	11,400	-	8,500	9,000	9,300
North of CSAH 3 (North Victory Drive)	13,800	12,800	-	-	12,300	12,900	12,000
South of CSAH 3 (North Victory Drive)	16,800	15,600	-	-	14,600	15,300	15,200
North of CSAH 17 (Madison Avenue)	20,500	19,100	-	-	18,600	19,400	19,100
North of Bassett Drive	16,800	15,600	17,650	-	16,000	15,700	16,500
North of Highway 83/CSAH 60 (Stadium Road)	15,580	14,500	-	-	13,000	12,500	12,400
South of Highway 83/CSAH 60 (Stadium Road)	6,600	6,100	7,150	-	6,800	7,200	7,500
South of S Victory Drive/206th Street	7,800	7,300	-	-	8,000	7,800	8,000
North of CSAH 15	5,400	5,000	-	5,300	5,200	5,100	5,400
South of CSAH 7 (Central Avenue)	2,600	2,400	-	-	3,100	2,900	3,100
South of CSAH 21	3,000	2,800	-	3,350	3,650	3,550	3,800
Highway 30/CSAH 21	2,500	2,300	-	2,450	2,700	2,850	3,150
Highway 30/CSAH 29	2,300	2,100	-	2,300	2,500	2,800	3,000

Peak Hour Directional Distribution

On Highway 22 north and south of Mankato, traffic generally travels toward Mankato in the a.m. peak hour and away from Mankato during the p.m. peak hour.

Between US 169 and CSAH 21, there is roughly an even directional split in both peak hours. Closer to the northern part of urbanized area of Mankato, between 60 and 65 percent of traffic is travelling southbound toward Mankato in the morning, and 55 to 60 percent is travelling northbound in the evening. A more dramatic directional split is seen between Mankato and Mapleton, with between 70 and 80 percent of traffic heading northbound toward Mankato in the morning and between 65 and 70 percent travelling southbound out of Mankato in the evening.

Some directional imbalance is seen in the urbanized section of Mankato in peak hours, however not to the degree seen on rural segments north and south of the city. Between CSAH 3 (North Victory Drive) and Bassett Drive, around 55 percent of traffic is travelling southbound in the morning, with the same split seen northbound in the evening.

Peak Hour Intersection Levels of Service

Peak hour traffic volumes were used to perform a.m. and p.m. peak hour intersection capacity analysis throughout the study area. Capacity analysis was performed based on the intersection level of service (LOS) methodology from the *Highway Capacity Manual*. Level of services are letter grades given to roadway infrastructure to describe the quality of traffic operations on a given facility. The intersection level of service for this study was based on the amount of control delay experienced at the intersection.

Control delay for intersections in Segment 1 and Segment 3 was calculated using Synchro 9/SimTraffic software. For the urban intersections of Segment 2, Vissim was used (CSAH 26, Augusta Drive, North Victory Drive, US 14 interchange, Adams Street, Madison Avenue, Bassett Drive, and Hoffman Road. The remainder of intersections in Segment 2 were analyzed using Synchro/SimTraffic.

Level of service thresholds per the 2010 *Highway Capacity Manual* are shown in the table below. Based on MnDOT policy, LOS E or worse is considered deficient. Intersections where the volume exceeded the intersection capacity is also considered deficient.

Table 7 – Highway Capacity Manual Level of Service Thresholds

Control Delay (sec/veh)		Volume < Capacity	Volume > Capacity
Unsignalized	Signalized		
≤ 10	≤ 10	A	F
> 10-15	> 10-20	B	F
> 15-25	> 20-35	C	F
> 25-35	> 35-55	D	F
> 35-50	> 55-80	E	F
> 50	> 80	F	F

Results from a.m. and p.m. peak hour level of service analysis can be seen in **Figure 40** through **Figure 43**.

Level of Service Summary

All study intersections currently operate at intersection LOS C or better during the a.m. and p.m. peak hours, except for the intersection with Adams Street (LOS D in p.m. peak). Below is further discussion of unsignalized and signalized intersection operations.

Unsignalized Intersections

The only unsignalized intersections with modelled approach delays reaching LOS C or worse are the intersections with CSAH 21 in Kasota and Augusta Drive in Mankato.

At CSAH 21, the eastbound approach operates at LOS C in the p.m. peak hour due to high through volumes on Highway 22. High Highway 22 volumes with only one northbound lane (two southbound lanes) limits gap availability.

At Augusta Drive, high volumes on Highway 22 resulted in limited available gaps for minor approach vehicles turning onto Highway 22 or trying to cross Highway 22. This resulted in a p.m. peak LOS D for the westbound approach at the intersection.

At Adams Street, p.m. peak modelling indicates intersection LOS D, with LOS F on the eastbound and westbound approaches.

Signalized Intersections

Approach LOS D or LOS E occurs during peak hours at the following intersections that were not discussed above:

- **US 169**: Westbound approach (Southbound US 169) LOS D in p.m. peak hour
- **CSAH 26 (227th Street)**: Westbound approach LOS D in a.m. and p.m. peak hours
- **CSAH 3 (North Victory Drive)**: Westbound approach LOS D in a.m. and p.m. peak hours and eastbound LOS D in p.m. peak hour
- **Hoffman Road**: Eastbound approach LOS E in a.m. peak hour and LOS D in p.m. peak hour. Westbound approach LOS D in the a.m. and p.m. peak hours (Note: at Hoffman Road the p.m. peak hour did not correlate with the p.m. peak hour for nearby school traffic)
- **Highway 83/CSAH 60 (Stadium Road)**: Both the eastbound and westbound approaches operate at LOS D in the a.m. peak hour. Eastbound approach LOS E in p.m. peak hour.

Additional Haefner Drive Analysis

Additional capacity analysis was performed for potential roundabouts at the intersections of CSAH 17 (Madison Avenue) and Adams Street with Haefner Drive. This analysis used intersection counts from previous roundabout analyses at Haefner Drive and Madison Avenue (November 2016 counts) and Haefner Drive and Adams Street (2011 counts). Volume balancing using 2017 counts at Highway 22 was performed to estimate 2017 counts at the Haefner Drive locations.

Modelling indicates that operations and queues between Highway 22 and Haefner Drive should not impact a roundabout at Haefner Drive and Madison Avenue, but some queue spillback issues are expected to impact Haefner Drive and Adams Street by 2030. 2030 average p.m. peak westbound queues at TH 22 and Adams Street are expected to nearly reach Haefner Drive, with 2045 p.m. peak westbound queues spilling back through Haefner Drive.

A 2x1 roundabout is expected to operate without deficiencies at Haefner Drive and Madison Avenue through 2045, but 2045 queue spillback issues from the TH 22/Adams Street roundabout is expected to result in p.m. peak LOS F at a 2x1 roundabout at Haefner Drive/Adams Street.

Corridor Level of Service

In addition to intersection level of service analysis, corridor level of service analysis was performed to evaluate operations along the corridor in general.

For the rural two-lane segments, the two-lane highway level of service concept from the *Highway Capacity Manual* was used. This assigns a level of service based on the amount of time a vehicle spends following another vehicle. For the urban segment, arterial level of service was determined, also using concepts from the *Highway Capacity Manual.*

Two-Lane Segments

Between US 169 and CSAH 57 (North Riverfront Drive), corridor LOS D is generally experienced during both peak hours. LOS E is experienced in the a.m. peak for a short segment south of CSAH 2 until the section expands to four lanes at CSAH 57 (North Riverfront Drive).

South of Mankato, the corridor generally operates at LOS D or better in both peaks. While this segment is generally low volume (under 5,500 vehicles per day), over 70 percent of volume is travelling in the peak direction during peak hours, resulting in increased time spent following vehicles.

The segment through Mapleton city limits operates at LOS C, with through volumes not causing delays to side-street traffic, even during peak hours.

Urban Segment

The urban four-lane section operates at LOS C or better throughout the day, which is consistent with intersection operations in the urban area. This indicates the existing four-lane section provides sufficient capacity under existing traffic volumes.

Queuing Issues

Some modelled peak hour queue spillback was observed, with specific instances summarized in **Table 8** below. Examples of queue spillback include when turning movement queues exceed the available turn lane length or when through movement queues block access to adjacent turn lanes. Queue spillback increases rear-end crash potential and can increase delays.

Table 8 – Queuing Issues

Location	Time Period	Movement	Modelled 95th Percentile Queue Length*	Issue	Storage Length
US 169	P.M. Peak	WB Left Turn (SB US 169 to SB Highway 22)	511' (370' Average Queue)	WB Left-Turn Queue Exceeds Storage	380' Left-Turn Lane
CSAH 3 (North Victory Drive)	P.M. Peak	EB Left Turn	377'	EB Left-Turn Queue Exceeds Storage	240' Left-Turn Lane
	P.M. Peak	WB Left Turn	427'	WB Left-Turn Queue Exceeds Storage	240' Left-Turn Lanes
Adams Street	P.M. Peak	EB Approach	972'	Modelled Queue Extends to Sioux Road	-
	P.M. Peak	WB Approach	598'	Modelled Queue Extends to Haefner Drive	-
Bassett Drive	A.M. Peak	EB Through	350'	EB Through Queue Blocks Adjacent Left-Turn Lane	110' Left-Turn Lane, 200' Right-Turn Lane
	A.M. Peak	WB Through	153'	WB Through Queue Blocks Adjacent Turn Lanes	125' Right and Left-Turn Lanes
	P.M. Peak	EB Through	173'	EB Through Queue Blocks Adjacent Left-Turn Lane	110' Left-Turn Lane, 200' Right-Turn Lane
	P.M. Peak	EB Left Turn	129'	EB Left-Turn Queue	110' Left-Turn Lane
	P.M. Peak	WB Through	280'	WB Through Queue Blocks Adjacent Turn Lanes	125' Right and Left-Turn Lanes
	P.M. Peak	WB Left Turn	271'	WB Left-Turn Queue	125' Left-Turn Lane
Highway 83/CSAH 60 (Stadium Road)	A.M. Peak	EB Left Turn	282'	EB Left-Turn Queue Exceeds Storage	210' Left-Turn Lane
	A.M. Peak	WB Through	256'	WB Through Queue Blocks Adjacent Turn Lanes	210' Right and Left-Turn Lane
	P.M. Peak	EB Left Turn	389' (223' Average Queue)	EB Left-Turn Queue Exceeds Storage	210' Left-Turn Lane

* Unless noted average modelled queue lengths do not exceed available storage or block adjacent turn lanes

Traffic Control

Traffic Control Warrant Analysis

After a review of traffic data and peak hour traffic operations, it was determined that traffic control through the study area for existing traffic volumes is generally adequate. Minor approach volumes are generally low (less than 50 vehicles in peak hours) for side-street stop-controlled intersections along the Highway 22 corridor, resulting in acceptable existing operations.

The two intersections of Highway 22 with CSAH 21 in Kasota and Augusta Drive in Mankato are the only two intersections with minor approach peak hour delays at LOS C or worse. Signal warrant analysis was performed at these two intersections using the methodology from the *Minnesota Manual on Uniform Traffic Control Devices (MnMUTCD)* to assess if traffic control improvements are warranted.

Augusta Drive: Using 2017 traffic data, a signal is warranted at this intersection. A signal is warranted based on Warrant 1B (eight-hour volume – interruption of continuous traffic), Warrant 2 (four-hour volume), and Warrant 3 (peak-hour volume). While a traffic signal is warranted at this intersection, a signal might not be the best solution which is why the 2015 ICE report for this intersection recommended a roundabout as the long-term improvement, rather than a signal.

CSAH 21: A signal is not warranted under existing traffic volumes. Six hours meet volume thresholds for Warrant 1B (eight-hour volume – interruption of continuous traffic) and two hours meet volume warrants for Warrant 2 (four-hour volume). Note that this analysis is based on estimated volumes after considering Highway 99 detour modifications; a signal is also not warranted with elevated detour-condition traffic volumes. A traffic signal is warranted, however, by year 2030 as noted in the Future Traffic Analysis section below.

Potential traffic control options will be discussed in greater detail as part of the ICE Report prepared for this intersection.

Flashing Yellow Arrow Signal Head (Source: University of Minnesota)

Flashing Yellow Arrow

MnDOT has converted many of its signals to flashing yellow arrow (FYA) signal heads for permissive left-turn signals. FYA operations provide additional flexibility in signal phasing. With FYA, protected-only left turn phasing can be used during peak traffic conditions and protected/permitted or permitted-only phasing can be used during lower volume periods. Another benefit of FYA is that permitted left turns can run adjacent to a through movement that has a red signal indication.

The only study intersections with protected/permitted left turn operations without flashing yellow arrow signal heads are US 169 (US 169 southbound to Highway 22 southbound) and CSAH 26 (227th Street) (minor approaches), where five-section signal heads are still in use.

Signal Interconnect

Signals currently run "free" on Highway 22, meaning there is no communication with adjacent signals for coordination purposes. Adjacent signals on Highway 22 can be interconnected and coordinated to improve traffic flow to provide a series of green indications for through movements

at multiple traffic signals. Proper coordination of traffic signals reduces the number of stops on a corridor, reducing delay as well as crash potential associated with frequent stops.

Federal Highway Administration (FHWA) guidance states that operational benefits are typically provided when signals within ¾ mile of one another are coordinated, and signals within ½ mile of one another should be coordinated, unless different cycle lengths are required at intersections. The impact from signal interconnect/coordination will be studied through the alternatives analysis portion of this study.

With existing signal spacing, interconnect could be considered for the following segments:

- CSAH 3 (North Victory Drive) through US 14 interchange
- Bassett Drive through Highway 83/CSAH 60 (Stadium Road)

Traffic Forecasts

Traffic forecasts were prepared using a "historic growth analysis" methodology for the Highway 22 corridor study area, versus developing a travel demand forecast model. This is the same methodology used for the MAPO LRTP, which was completed in October 2015. The forecasted growth factors developed for the MAPO LRTP utilized demographic data and current trends (land use growth, employment, etc.), as well as data from previously completed studies and information from anticipated developments and economic development plans, to gain a greater understanding of local traffic trends. To maintain consistency, the majority of the traffic forecasts previously published in the MAPO LRTP were used for the Highway 22 corridor (Segment 2). Through discussions with the Technical Advisory Committee (TAC) it was determined that some adjustments would be made to previously published forecasts in Segment 2. For Segments 1 and 3 traffic forecasts were developed using the methodology previously published in the MAPO LRTP with additional input from the TAC incorporated as well. Using this methodology, AADT projections were developed and posted for two target periods (years 2030 and 2045) to identify future capacity or system deficiencies within the study area. It should be noted that based on discussions with the Highway 22 Corridor Study TAC the 2045 traffic projections documented in this report reflect an aggressive growth scenario. As such, if less intense development occurs in the area than assumed for the 2045 traffic projections, 2030 traffic projections presented in this document could approximate 2045 projections in a more moderate growth scenario.

Traffic Forecasting Methodology

The following is a summary of the traffic forecasting methodology used for the Highway 22 Corridor Study.

Historic Traffic Data

Historic AADT volumes for the years 1992 through 2015 were reviewed for all MnDOT count locations. As noted above, daily traffic volumes for 2017 were generated for Highway 22 based on the traffic counts obtained by MnDOT. Thus, with traffic volumes from 1992 through 2017, growth rates were reviewed and analyzed to identify short-term and long-term trends. To eliminate irregular growth trends, outliers and anomalies were identified and removed to produce a more representative historical growth rate. It was during this phase of the analysis that volumes, which may have been impacted by construction or recent developments, were flagged to indicate changes in historical growth patterns.

Demographic Data, Historical Growth Trends and Development Assumptions

A review of demographic data, historic growth trends, and planned developments was completed. The future development anticipated in Segments 1 and 3 is not expected to have a significant influence on future traffic volumes overall. However, growth anticipated within and adjacent to Segment 2 is fairly-significant and likely to affect traffic growth along Highway 22 within Segment 1 and 3 as travelers use the corridor to reach local and regional zones.

Land use changes were identified through a review of previously completed studies (e.g., MATAPS 2010, the Greater East Mankato Alternative Urban Area Review (AUAR), Intersection Control Evaluation (ICE) reports, MAPO LRTP). All land use impacts were classified by intensity to characterize the potential influence on future traffic volumes. While the land uses were not specifically used to generate traffic volume, then distributed to the roadway; their potential influence on future traffic volumes is captured with the resultant growth rates that are applied.

Another method applied to evaluate historical traffic growth was the summarization of traffic volumes, broken into seven distinct groups (e.g., <1,000, 1,000-2,499, 2,500-4,999, 5,000-7,499, 7,500-9,999, 10,000-15,000, and >15,000). This approach provided allowable growth rates for each volume group. This approach prevents a low-volume roadway with a higher projected growth rate to be treated the same as a higher-volume roadway with the same rate (see examples below). While the relative growth is similar on an annual basis, the total magnitude of growth over the target periods differs dramatically.

Example 1
A roadway with 500 AADT at 3 percent annual growth for 30 years results in a projected volume of ~ 1,215 AADT.

Example 2
A roadway with 10,000 AADT at 3 percent annual growth for 30 years results in a projected volume of ~ 24,275 AADT.

Forecast Methods

Four forecasting methods were utilized during the development of the traffic projections, including: linear regression, compound growth rate, one percent annual growth and 2.5 percent annual growth. Each method was developed to provide a range of projected volumes to address the study area's unique development patterns. The linear regression and compound growth rate method relied on historical growth rates, whereas the one percent and 2.5 percent growth methods represent static growth rates. In locations where development patterns indicate a higher or lower growth rate, manual adjustments were necessary (resulting in alternative growth rates – i.e., 1.25 percent, 1.5 percent).

Forecasted Volumes for Consistency between Segments

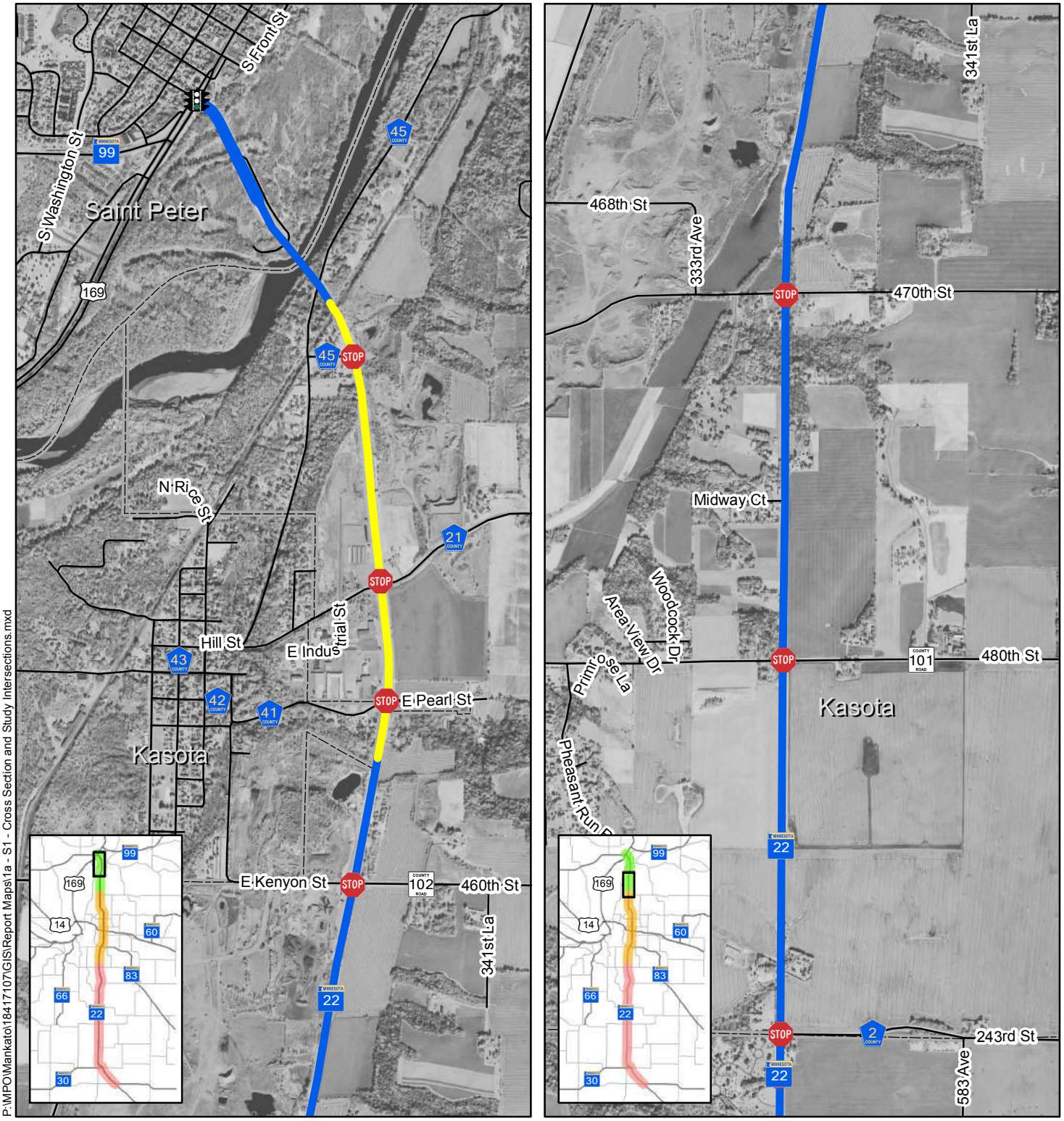
Newly forecasted volumes produced in Segments 1 and 3 were compared to previously published forecast volumes in the MAPO 2045 Transportation Plan. This was done to check for inconsistencies along the corridor. Wherever possible, projections between adjacent or nearby count locations, with similar characteristics, were coordinated for consistency. Additionally, input from the TAC was obtained and forecasted volumes were adjusted accordingly to project future volumes that are reasonable considering all factors – i.e., demographic growth trends, historical growth, land use changes, etc.

Traffic Forecast Results

Following the completion of this analysis, year 2030 and 2045 traffic forecasts were established for the Highway 22 corridor as well as major intersecting roadways within the study area. A summary of the historical volumes, forecast growth methods, and selected growth rate for each roadway segment is attached in **Appendix D**. Forecasts for interim year 2030 were developed using a linear interpolation between the existing volume and the resultant year 2045 volume. The forecast daily traffic volumes for 2030 and 2045 are shown in **Figure 44** through **Figure 47** for the entire study area.

Peak hour turning movements for 2030 and 2045 a.m. and p.m. peak hour conditions were estimated based on daily traffic projections using the method described in *NCHRP Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. Some post-processing adjustments were made using engineering judgement to better balance volumes between study intersections.

Forecasted a.m. and p.m. peak hour turning movement counts for the years 2030 and 2045 are shown in **Appendix D.**



P:\MPO\Mankato\18417107\GIS\Report Maps\1a - S1 - Cross Section and Study Intersections.mxd

Segment 1
Segment 2
Segment 3
Municipal Boundaries

Study Intersections
STOP TWSC
Roundabout
Signal

Existing Cross Section
1 SB + 2 NB
2 Lanes
2 SB + 1 NB
4 Lanes

0 1,000 2,000 Feet

Figure 36. Existing Cross Section and Traffic Control (Segment 1)

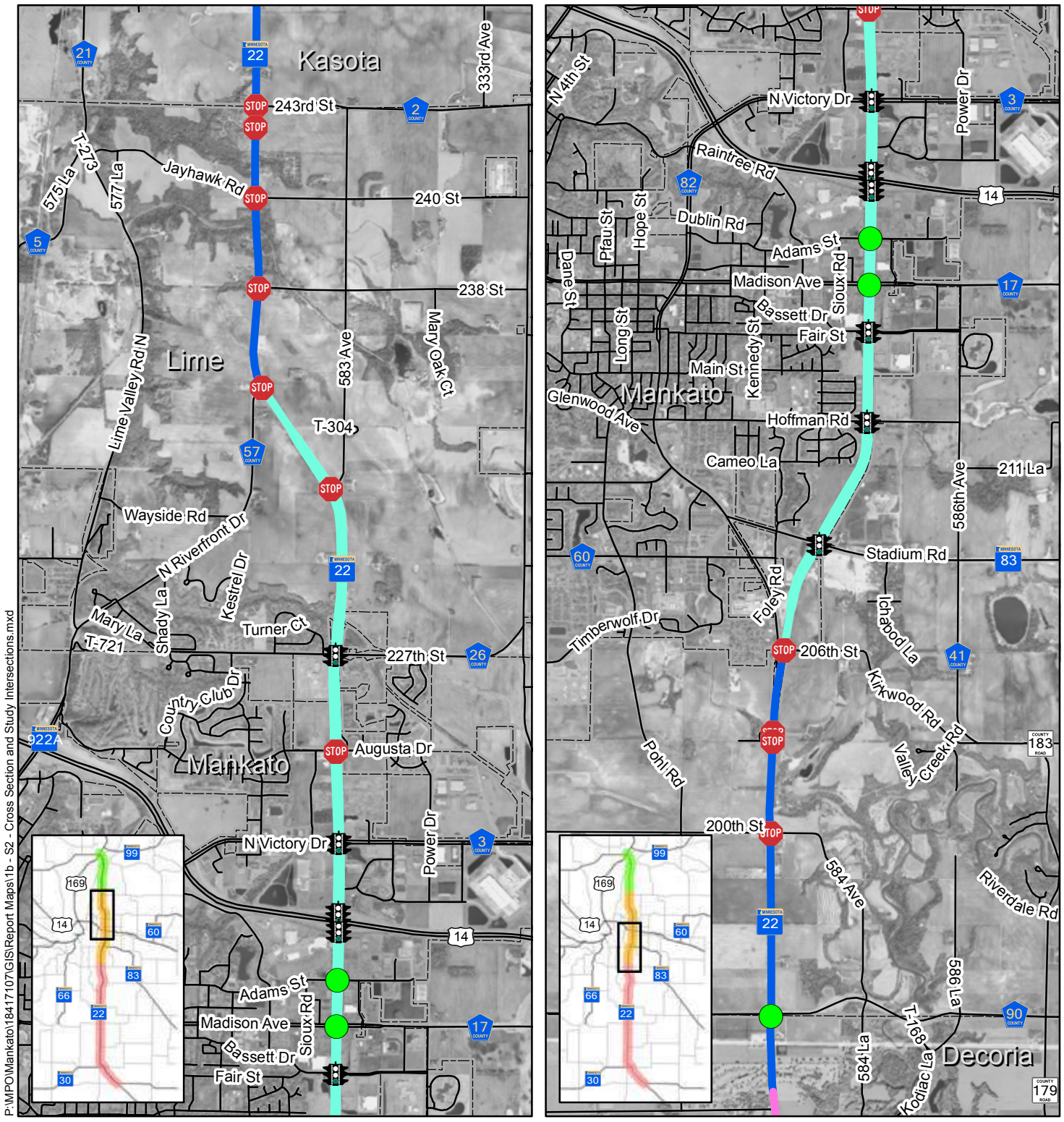


Figure 37. Existing Cross Section and Traffic Control (Segment 2)

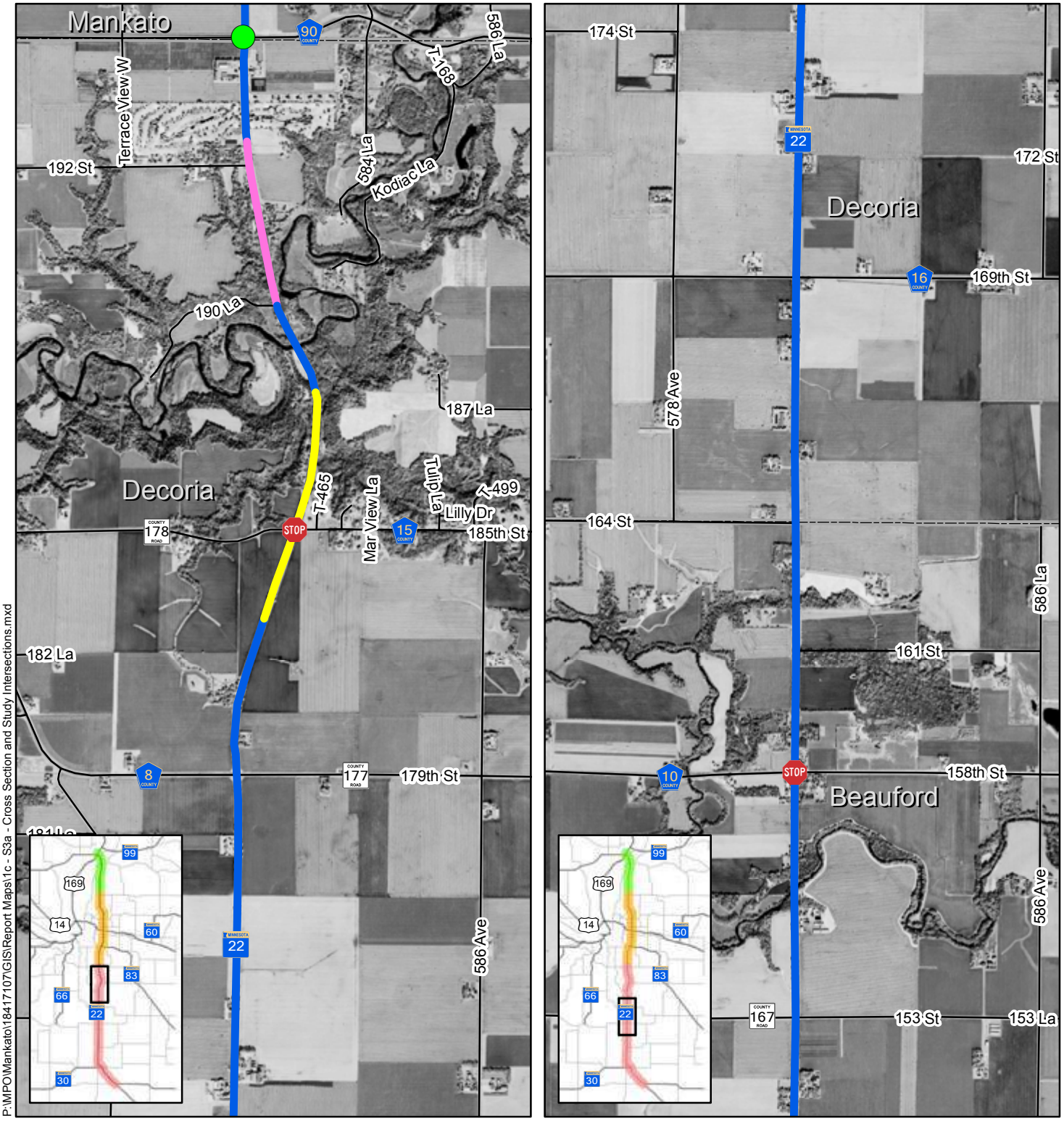


Figure 38. Existing Cross Section and Traffic Control (Segment 3A)

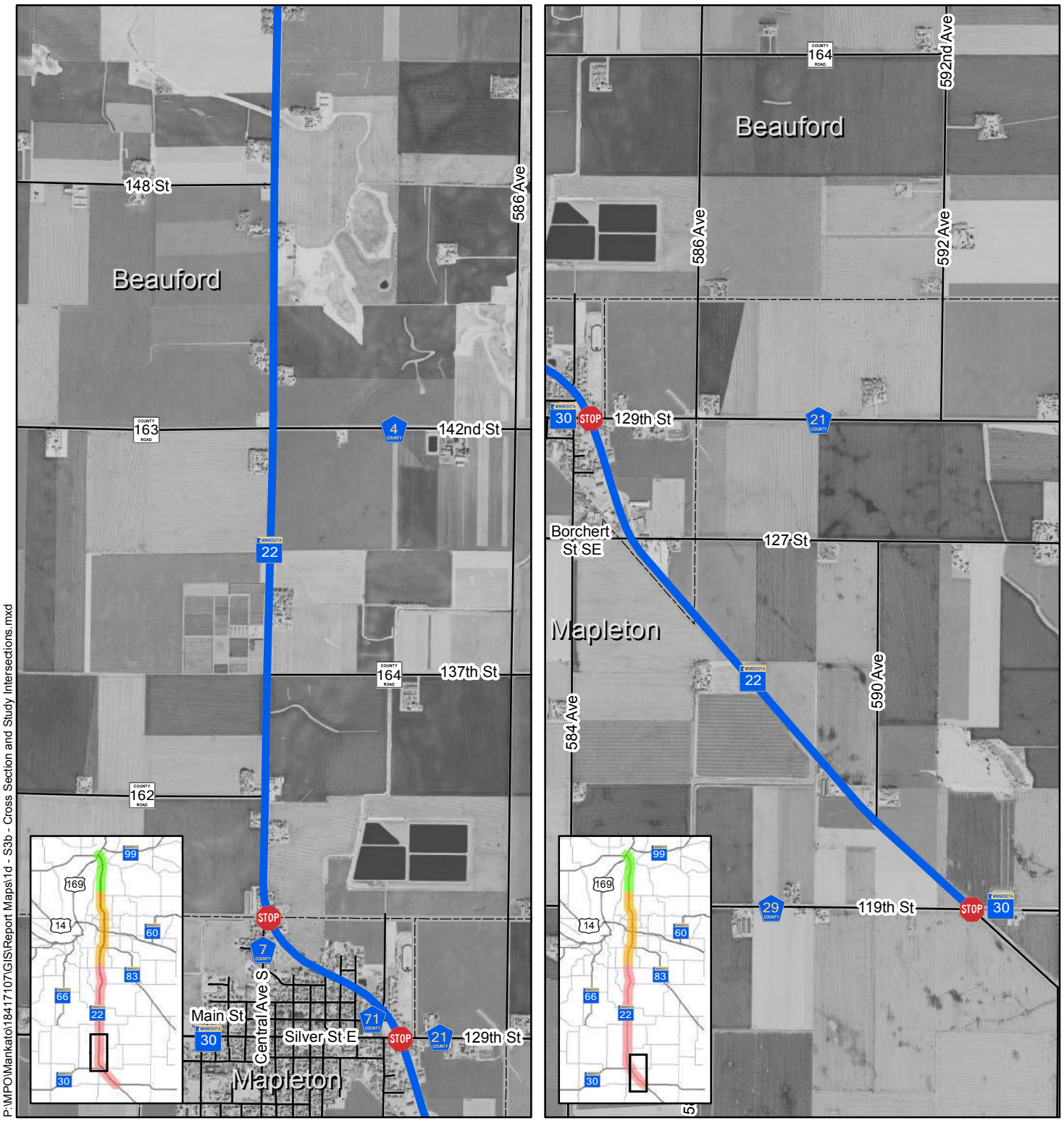
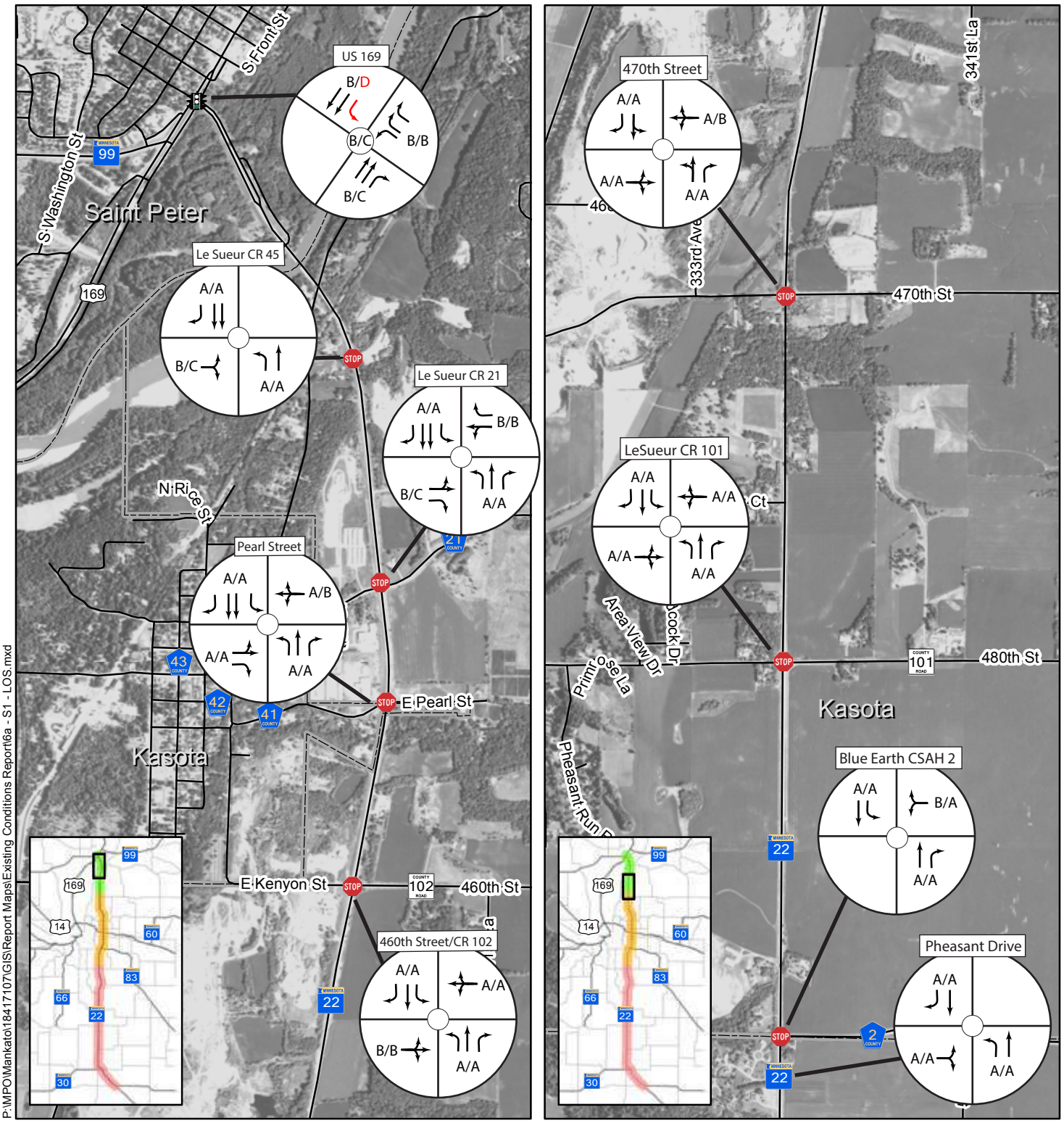


Figure 39. Existing Cross Section and Traffic Control (Segment 3B)



P:\MPO\Mankato\18417107\GIS\Report Maps\Existing Conditions Report\6a - S1 - LOS.mxd

Segment 1
Segment 2
Segment 3
Municipal Boundaries

Study Intersections

TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

Modelled Queue Spillback Events (In Either Peak)

0 1,000 2,000 Feet

Figure 40. Existing A.M. and P.M. Peak Hour Level of Service (Segment 1)

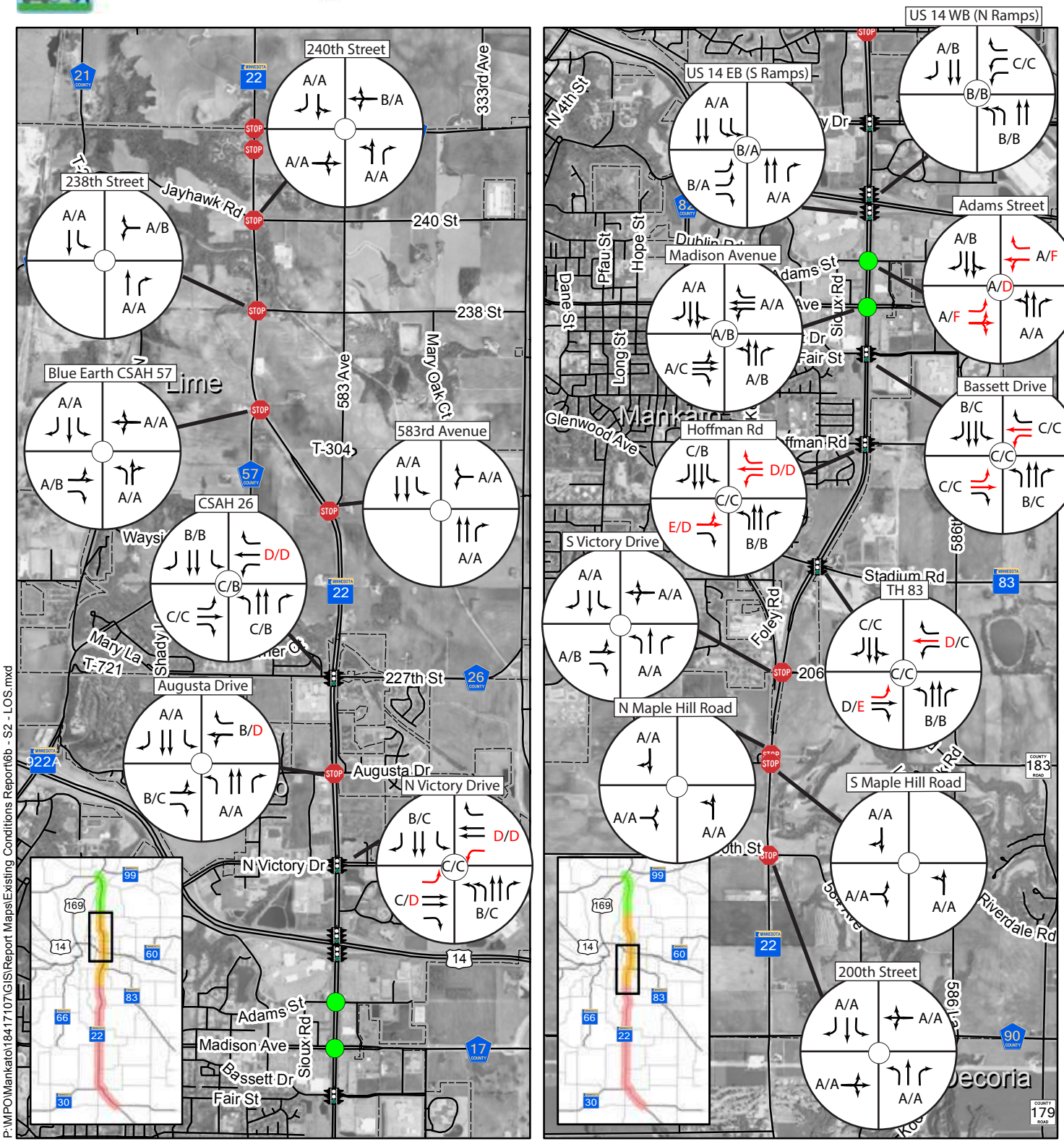
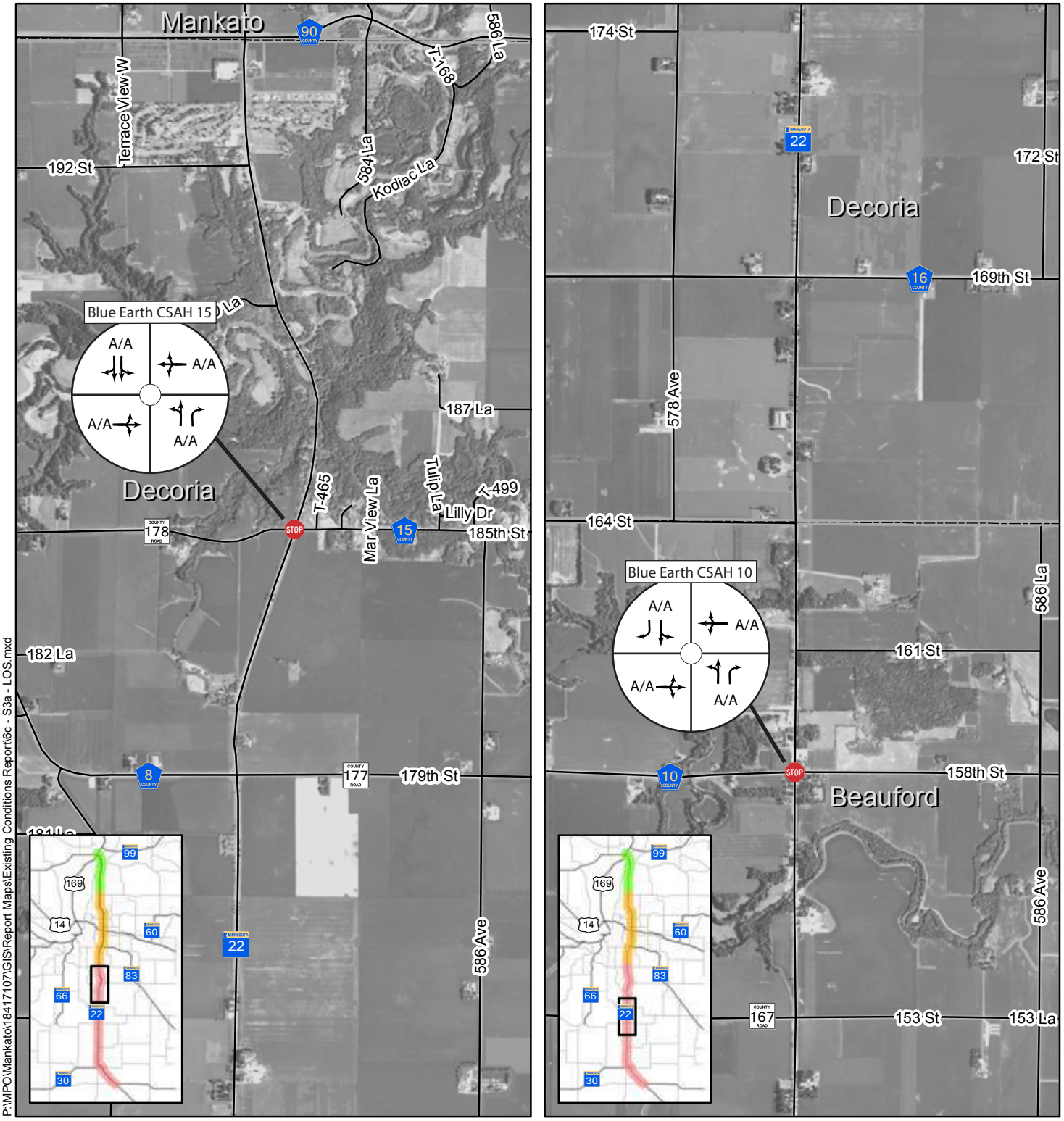


Figure 41. Existing A.M. and P.M. Peak Hour Level of Service (Segment 2)



Segment 1
Segment 2
Segment 3
Municipal Boundaries

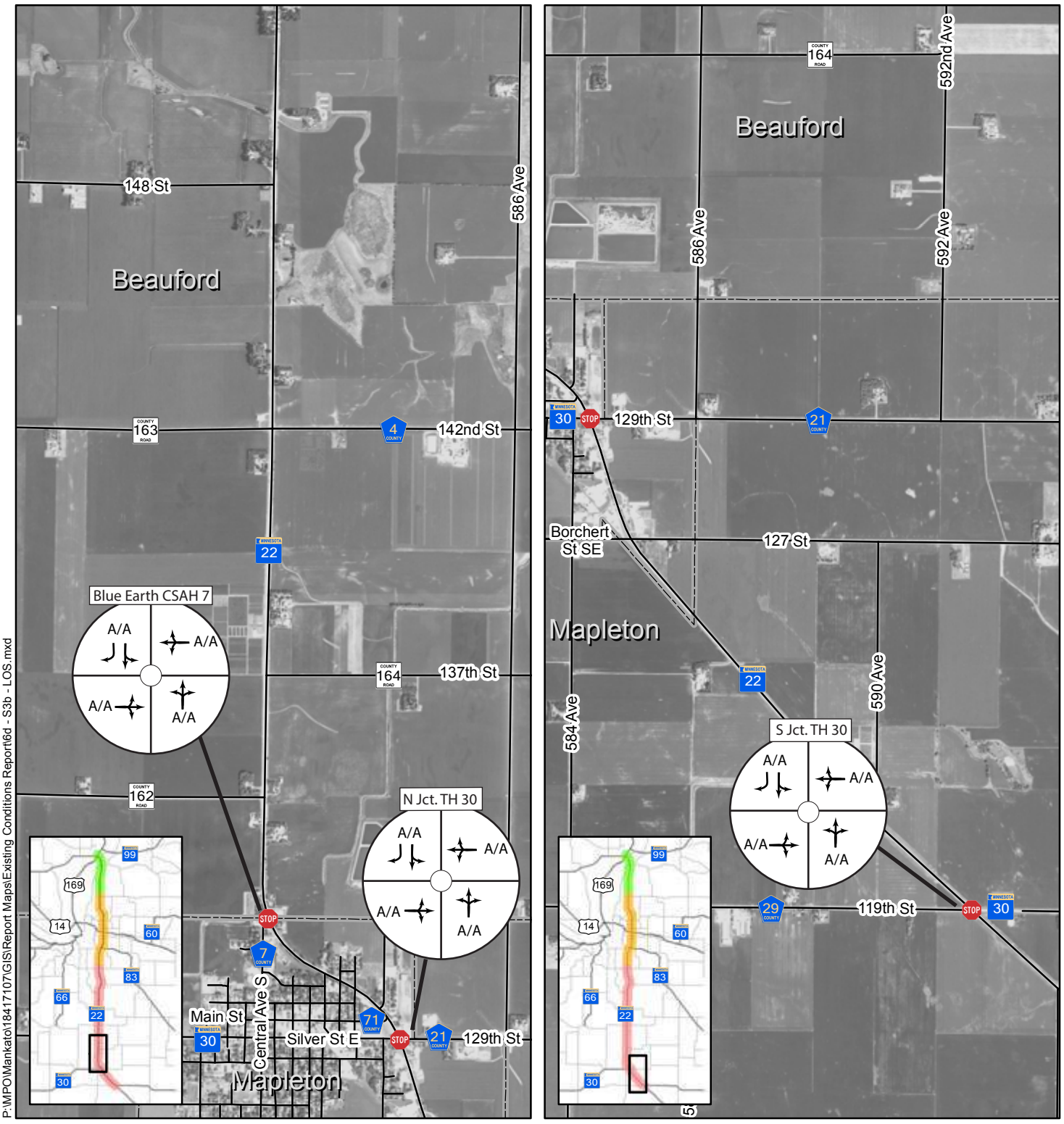
Study Intersections

TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

0 1,500 3,000 Feet

Figure 42. Existing A.M. and P.M. Peak Hour Level of Service (Segment 3A)



Segment 1
Segment 2
Segment 3
Municipal Boundaries

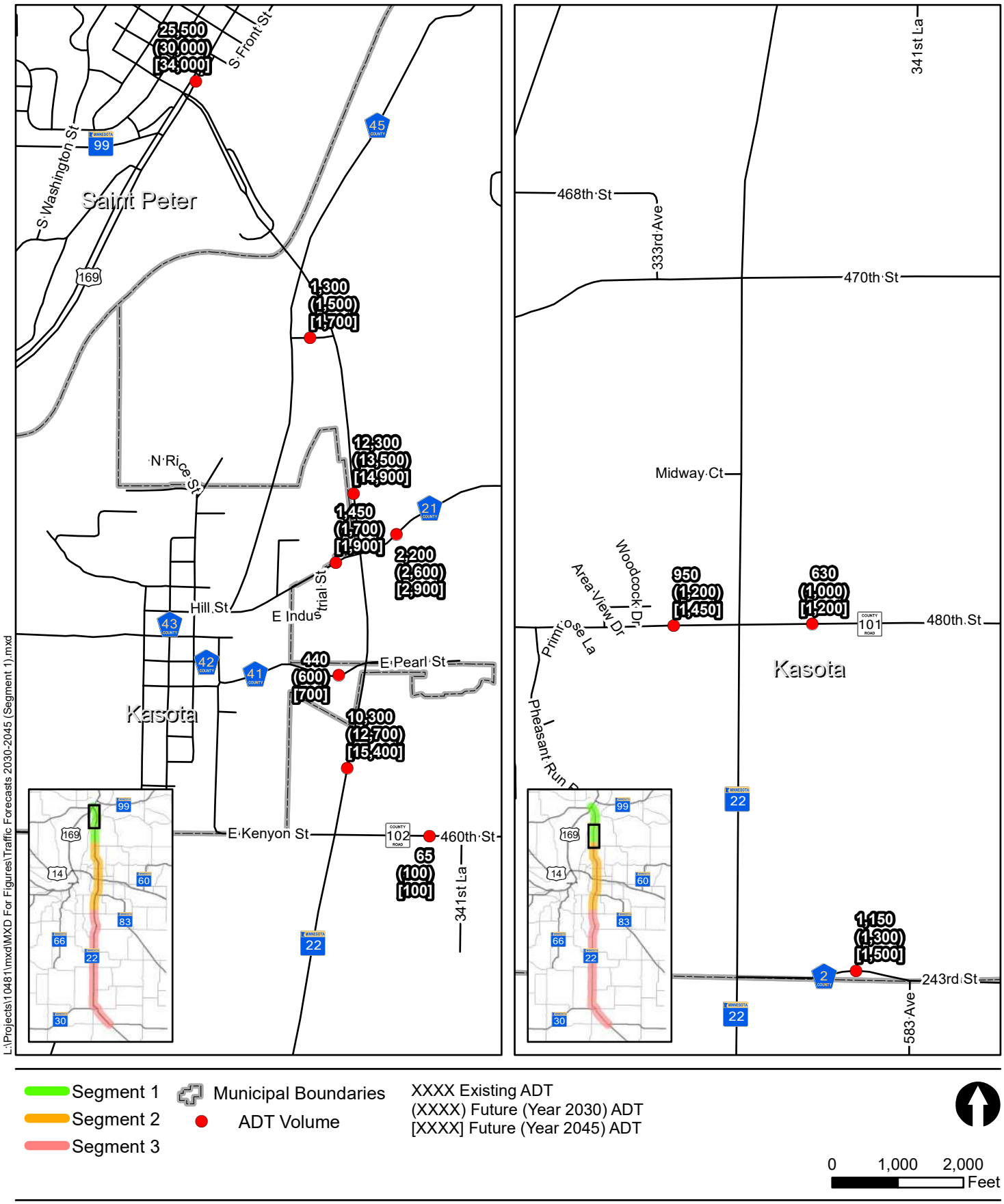
Study Intersections

TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

0 1,500 3,000
Feet

Figure 43. Existing A.M. and P.M. Peak Hour Level of Service (Segment 3B)



Segment 1
Segment 2
Segment 3

Municipal Boundaries
ADT Volume

XXXX Existing ADT
(XXXX) Future (Year 2030) ADT
[XXXX] Future (Year 2045) ADT

0 1,000 2,000
Feet

Figure 44. Segment 1 - Existing and Future (Year 2030 & 2045) Annual Daily Traffic (ADT)

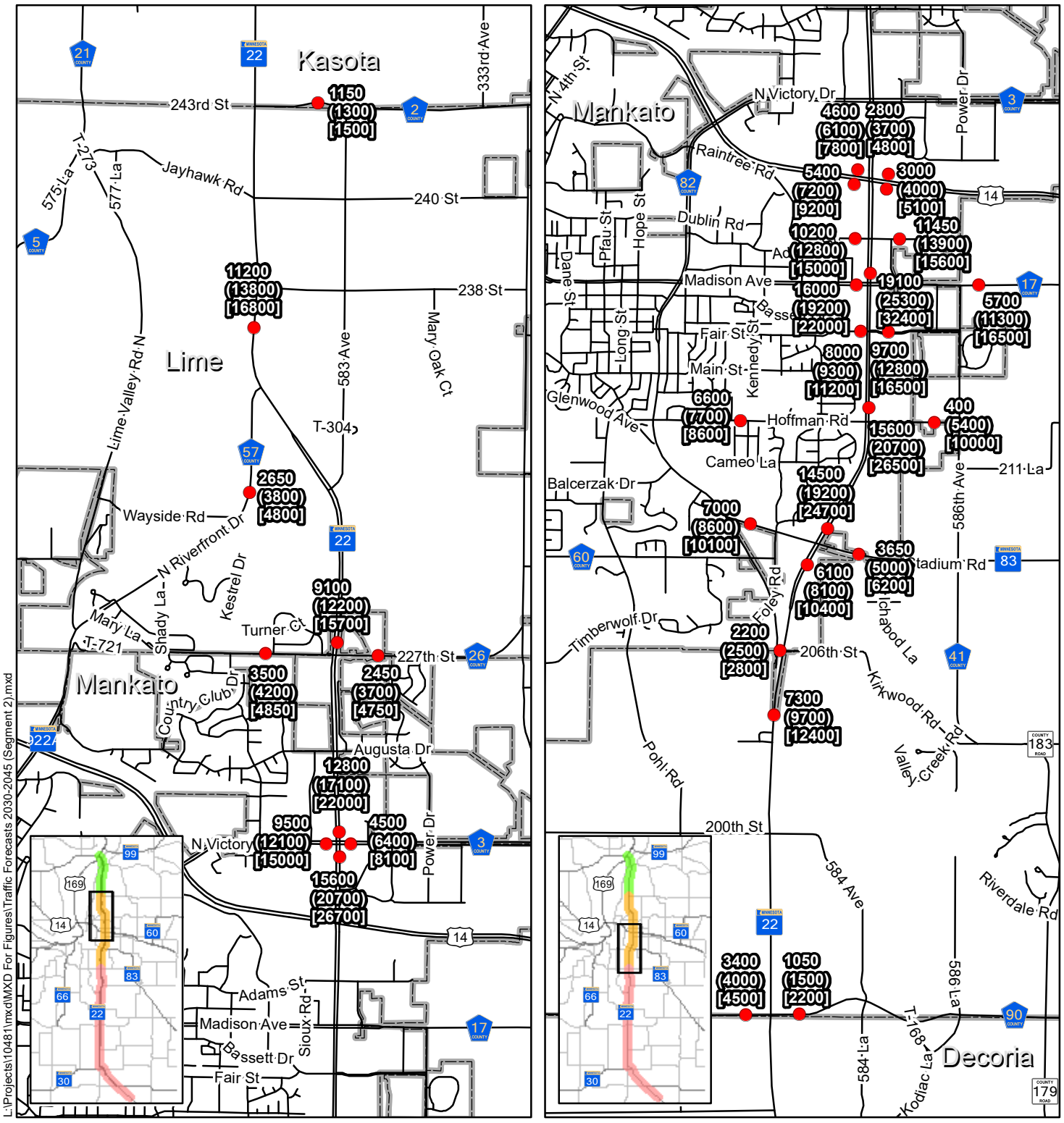


Figure 45. Segment 2 - Existing and Future (Year 2030 & 2045) Annual Daily Traffic (ADT)

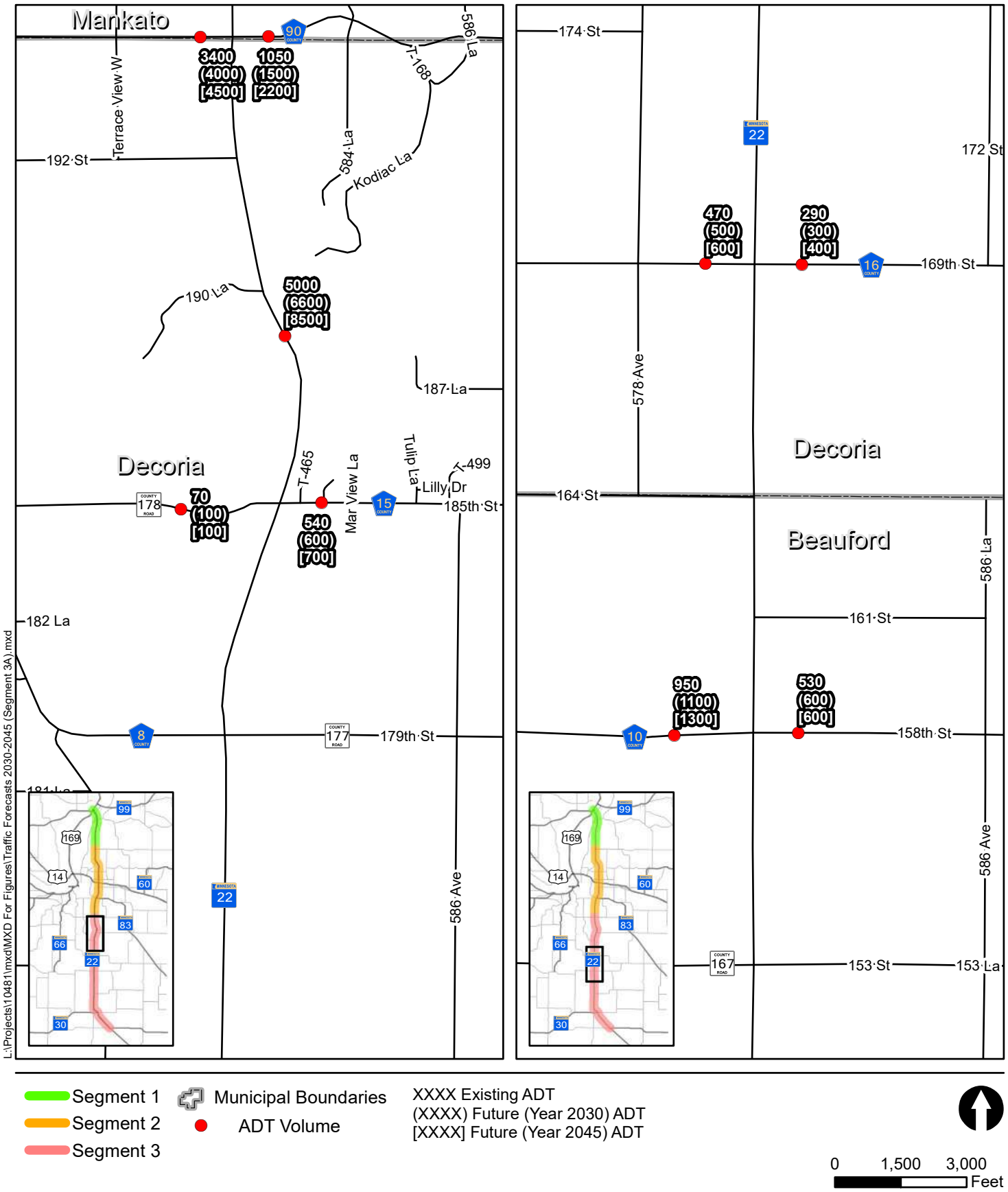


Figure 46. Segment 3A - Existing and Future (Year 2030 & 2045) Annual Daily Traffic (ADT)

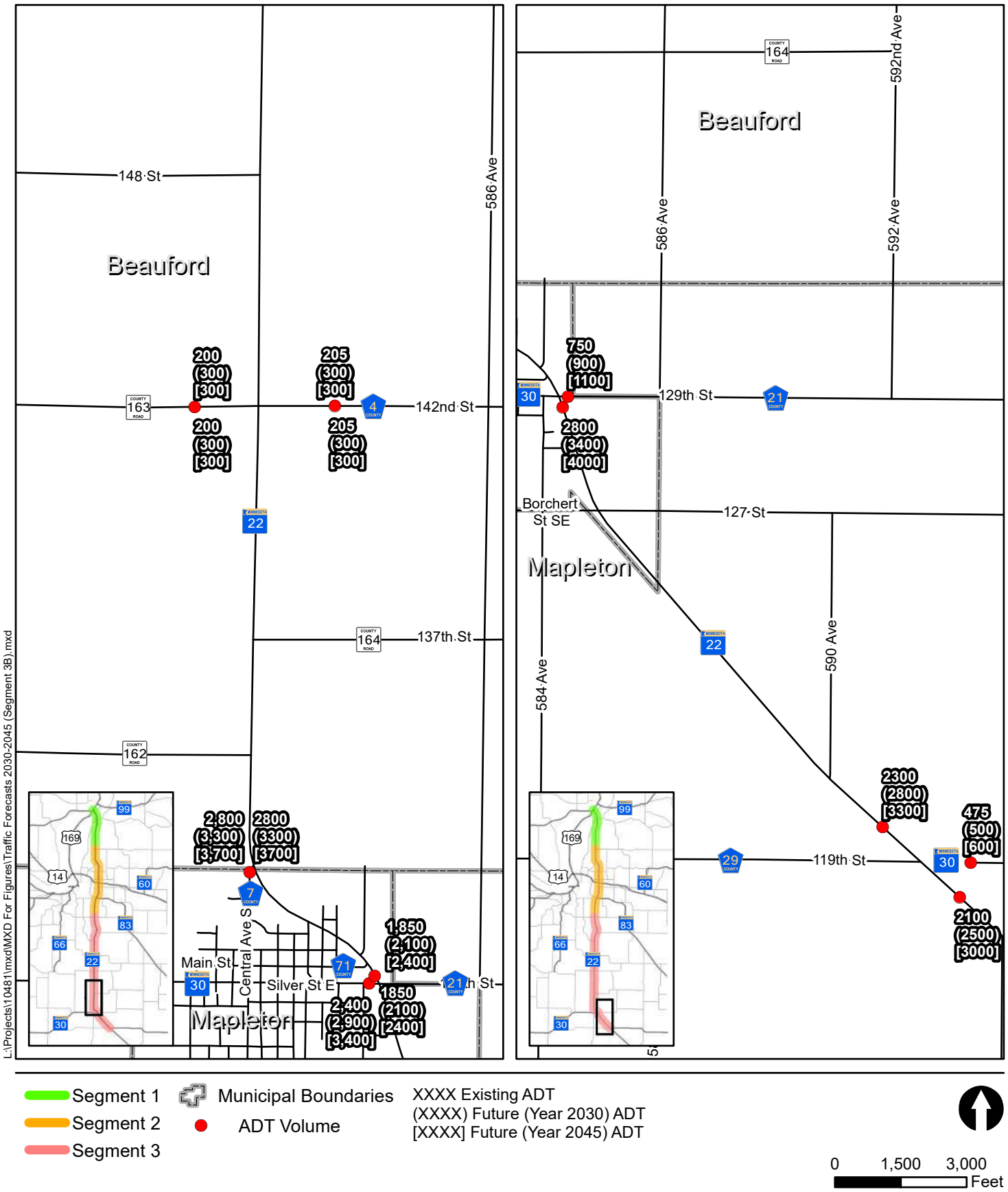


Figure 47. Segment 3B - Existing and Future (Year 2030 & 2045) Annual Daily Traffic (ADT)

Future Traffic Analysis

Traffic operations were evaluated under year 2030 and 2045 peak hour traffic conditions. For the "No Build" scenario analysis, all existing traffic control was maintained; however, signal timings were optimized, and minor approach protected/permitted phasing was assumed in the a.m. peak, mid-day off-peak, and p.m. peak periods at both Bassett Drive and Hoffman Road. For the overnight period, minor approaches were assumed to operate with permitted-only left turns at both Bassett Drive and Hoffman Road. The traffic analysis results shown below for Segments 2 and 3 do not include the improvements on Highway 22 as part of the recent construction in 2017 and 2018.

Traffic operations were evaluated using the Synchro 9/SimTraffic software at all locations except the roundabouts at Adams Street and Madison Avenue, which were analyzed using the HCS7 software.

Estimated year 2030 and 2045 a.m. and p.m. peak hour levels of service can be seen in **Figure 48** through **Figure 55**.

Intersection Levels of Service

The sections below discuss locations with expected operational deficiencies (LOS E or worse) or near-deficiencies (LOS D). All other locations are expected to operate at LOS C or better through year 2045.

Segment 1

Deficiencies by Year 2045

Through year 2030, all locations on Segment 1 are expected to operate at LOS C or better. Under year 2045 conditions some deficiencies are expected.

- **CSAH 45** – existing two-way stop control
    - LOS E is expected on the stop-controlled eastbound approach in the 2045 a.m. and p.m. peak hours
    - A traffic signal is not expected to be warranted through year 2045
- **CSAH 21** – existing two-way stop control
    - LOS D is expected on the stop-controlled approaches during year 2045 a.m. and p.m. peak hours
    - A traffic signal is expected to be warranted by year 2030
- **County Road 101 (480th Street)** – existing two-way stop control
    - LOS D is expected on the stop-controlled approaches during the year 2045 p.m. peak hour
    - A traffic signal is not expected to be warranted through year 2045
- **CSAH 2 –** existing two-way stop control

- LOS D is expected on the stop-controlled westbound approach in the year 2045 a.m. peak hour
- A traffic signal is not expected to be warranted through year 2045

Segment 2

Deficiencies by Year 2030

- **CSAH 2 –** existing two-way stop control
  - LOS D is expected on the stop-controlled westbound approach in the year 2045 a.m. peak hour
- **Augusta Drive** – existing two-way stop control
  - LOS F is expected on the stop-controlled approaches in the year 2030 a.m. and p.m. peak hours
  - A traffic signal is warranted under existing conditions
  - Current plan is for implementation of a roundabout, with interim reduced conflict configuration (J-turn)
- **CSAH 3 (North Victory Drive)** – existing traffic signal
  - Overall intersection LOS D is expected in the year 2030 p.m. peak hour
    - Approach LOS D on the northbound, eastbound, and westbound approaches
- **Adams Street** – currently a multilane roundabout
  - Overall intersection LOS F is expected in the year 2030 p.m. peak hour
    - Approach LOS F on eastbound and westbound approaches
    - Over 4,300 p.m. peak hour total entering vehicles expected by year 2030, increasing to over 5,200 entering vehicles by year 2045
- **CSAH 57 (North Riverfront Drive)**– existing two-way stop control
  - LOS D is expected on the stop-controlled eastbound approach in the year 2030 p.m. peak hour
  - A traffic signal is warranted under existing conditions
- **CSAH 17 (Madison Avenue)** – currently a multilane roundabout
  - Overall intersection LOS E is expected in year 2030 p.m. peak hour
    - Approach LOS F on the eastbound approach
    - Over 3,900 p.m. peak hour total entering vehicles expected by year 2030, 4,800 p.m. peak entering vehicles by 2045.

Deficiencies by Year 2045

- **CSAH 57 (North Riverfront Drive)**– existing two-way stop control

    - LOS E and LOS F are expected on the stop-controlled eastbound approach in the year 2045 a.m. and p.m. peak hours, respectively
- **Bassett Drive –** existing traffic signal
    - Overall intersection LOS D is expected in the year 2045 p.m. peak hour
        - Westbound LOS F and eastbound approach LOS D
        - There are estimated to be over 1,000 southbound through vehicles and 230 southbound left-turning vehicles by year 2045
- **South Victory Drive/206th Street** – existing two-way stop control
    - LOS D is expected by year 2045 on the stop-controlled eastbound approach during the p.m. peak hour
        - Predominantly minor approach right turns onto Highway 22

Segment 3

All study intersections within Segment 3 are expected to operate acceptably through year 2045, with no minor approach operating worse than LOS C.

Queuing Issues

Several locations throughout the corridor have queue lengths that extend beyond available storage distances. This includes both storage lengths being exceeded by queues in turn lanes and turn lanes being blocked by through queues. **Table 9** below shows the earliest year where queue spillback issues are expected.

Table 9 – Queue Spillback Issues

Intersection	Approach											
	EB			WB			NB			SB		
	LT Queue	Thru Queue	RT Queue	LT Queue	Thru Queue	RT Queue	LT Queue	Thru Queue	RT Queue	LT Queue	Thru Queue	RT Queue
US 169		2030 AM/PM		Existing PM	2030 AM							
CSAH 57 (North Riverfront Drive)	2045 PM											
Augusta Drive	2030 AM/PM		2030 AM/PM	2030 AM/PM		2030 AM/PM	2045 PM					
CSAH 3 (North Victory Drive)	Existing PM			Existing PM				2030 AM/PM			2045 PM	
US 14 North Ramp							2045 AM/PM					
US 14 South Ramp											2030 AM	
Adams Street	Existing PM			Existing PM								
CSAH 17 (Madison Avenue)	2030 PM											
Bassett Drive	Existing PM	Existing PM		Existing PM	Existing PM							
Hoffman Road								2045 AM/PM		2030 AM	2030 PM	
Highway 83/CSAH 60 (Stadium Road)	Existing AM/PM	2030 PM			Existing AM							

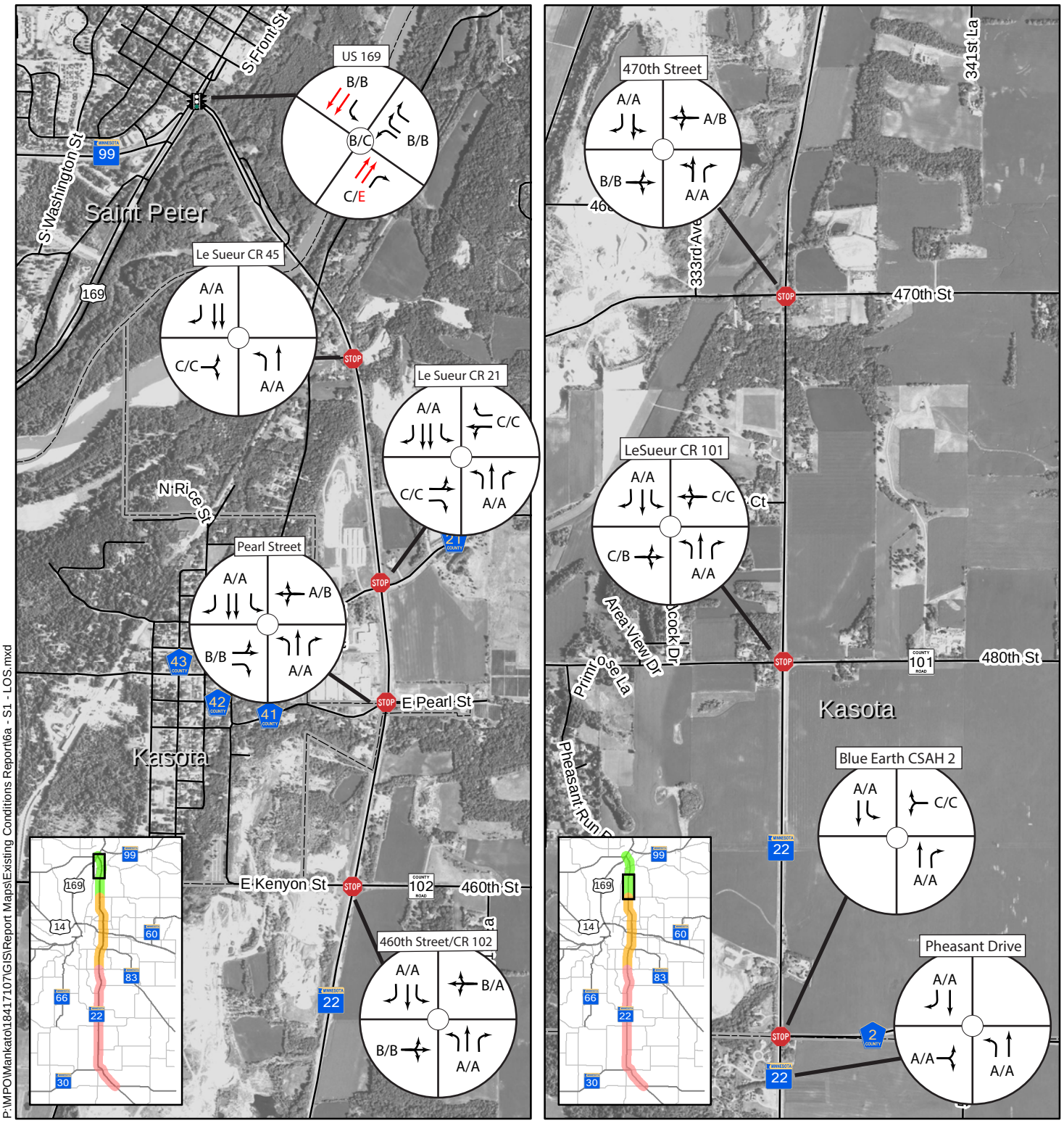
Note: Table shows the earliest time where queue spillback issues are expected or are currently existing by movement.

Corridor Operations

Corridor levels of service for the study segments were evaluated using concepts from the *Highway Capacity Manual* to quantify expected traffic operations along the Highway 22 corridor rather than just intersections. **Table 10** below provides a summary of the corridor LOS by segment.

Table 10 – Corridor LOS

Seg	2030 Conditions			2045 Conditions			Notes
	Projected 2030 ADT	Expected 2030 Corridor LOS		Projected 2045 ADT	Expected 2045 Corridor LOS		
1	12,700 - 13,500	AM Peak	LOS D/E (LOS E between CSAH 21 and US 169)	14,900 - 15,400	AM Peak	LOS E	Limited passing opportunities, directional flows up to 950 veh/hour by 2045. High future mainline volumes cause side street delays at CSAH 45, CSAH 21, CR 101 (480th Street), and CSAH 2.
		PM Peak	LOS E		PM Peak	LOS E	
2	8,100 - 25,300 Lowest volumes at CSAH 3 (North Victory Drive) Highest volumes near CSAH 17 (Madison Avenue)	AM Peak	LOS C on 4-lane segment in urbanized Mankato LOS E on 2-lane segments north and south of urbanized Mankato	10,400 - 32,400 Lowest volumes at S Victory Dr Highest volumes near CSAH 17 (Madison Ave)	AM Peak	LOS C on four-lane segment in urbanized Mankato LOS E on two-lane segments north and south of urbanized Mankato	PM peak hour congestion is expected between US 14 and Bassett Drive (Corridor LOS D by 2030, LOS F by 2045). Corridor LOS C is expected on the remaining portions of the four-lane urban segment though 2045. High directional flows on two-lane segments result in Corridor LOS E
		PM Peak	LOS C/D on 4-lane segment in urbanized Mankato LOS E on 2-lane segments north and south of urbanized Mankato		PM Peak	LOS C/F on four-lane segment in urbanized Mankato LOS E on two-lane segments north and south of urbanized Mankato	
3	2,500 - 9,700 Lowest volumes south of Mapleton Highest volumes near 200th Street	AM Peak	LOS E between Mankato and CSAH 15 LOS C/D between CSAH 15 and CSAH 7 (Central Avenue) LOS C through Mapleton	3,000 - 12,400 Lowest volumes south of Mapleton Highest volumes near 200th St	AM Peak	LOS E between Mankato and CSAH 15 LOS D between CSAH 15 and CSAH 7 (Central Avenue) LOS C through Mapleton	High directional flows result in corridor LOS D/E, but intersection analysis does not indicate LOS issues for side street approaches.
		PM Peak	LOS D between Mankato and CSAH 15 LOS C between CSAH 15 and CSAH 7 (Central Avenue) LOS C through Mapleton		PM Peak	LOS E between Mankato and CSAH 15 LOS D between CSAH 15 and CSAH 7 (Central Avenue) LOS C through Mapleton	



P:\MPO\Mankato\18417107\GIS\Report Maps\Existing Conditions Report\6a - S1 - LOS.mxd

Segment 1
Segment 2
Segment 3
Municipal Boundaries

Study Intersections

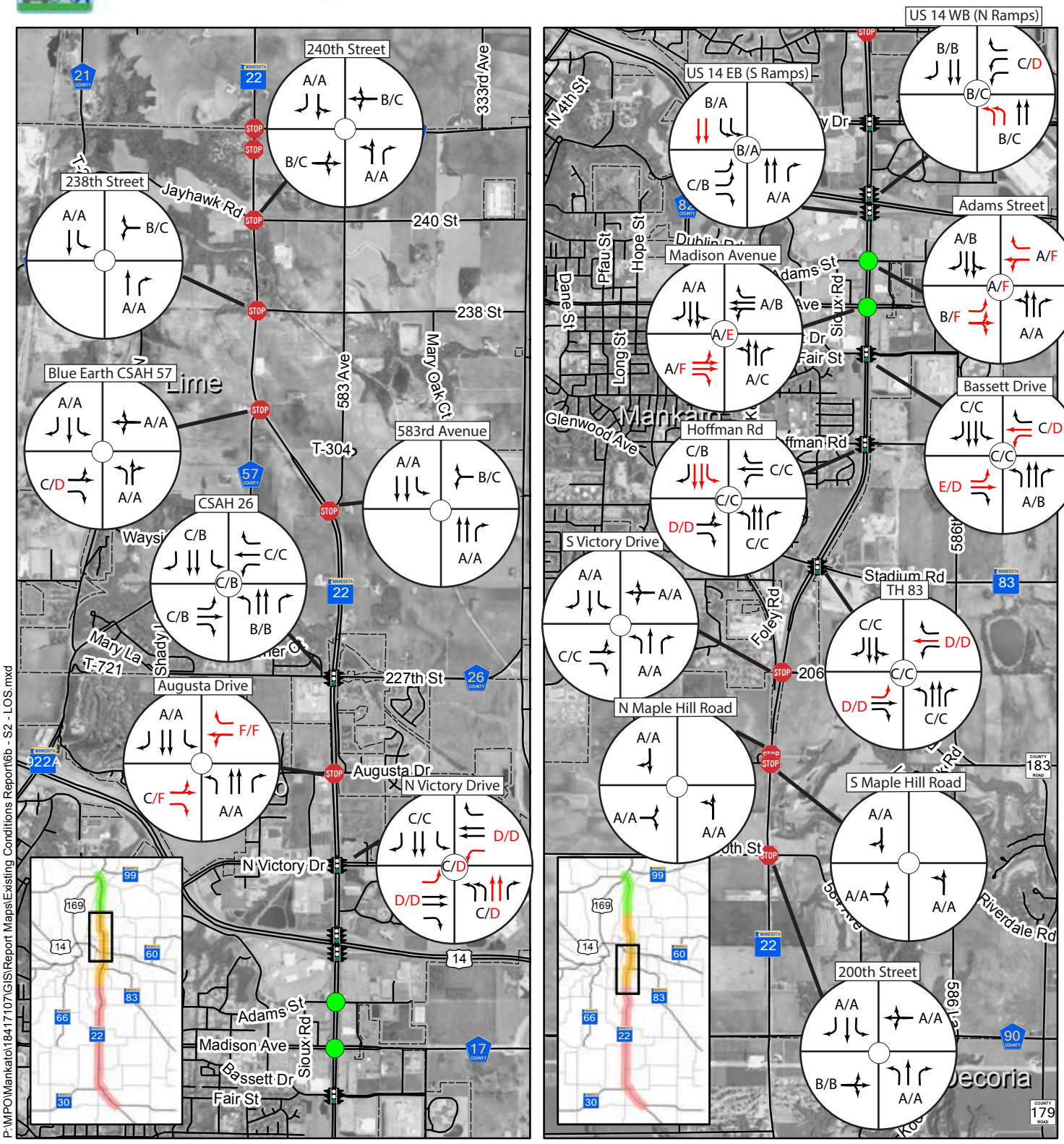
TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

Modelled Queue Spillback Events (In Either Peak)

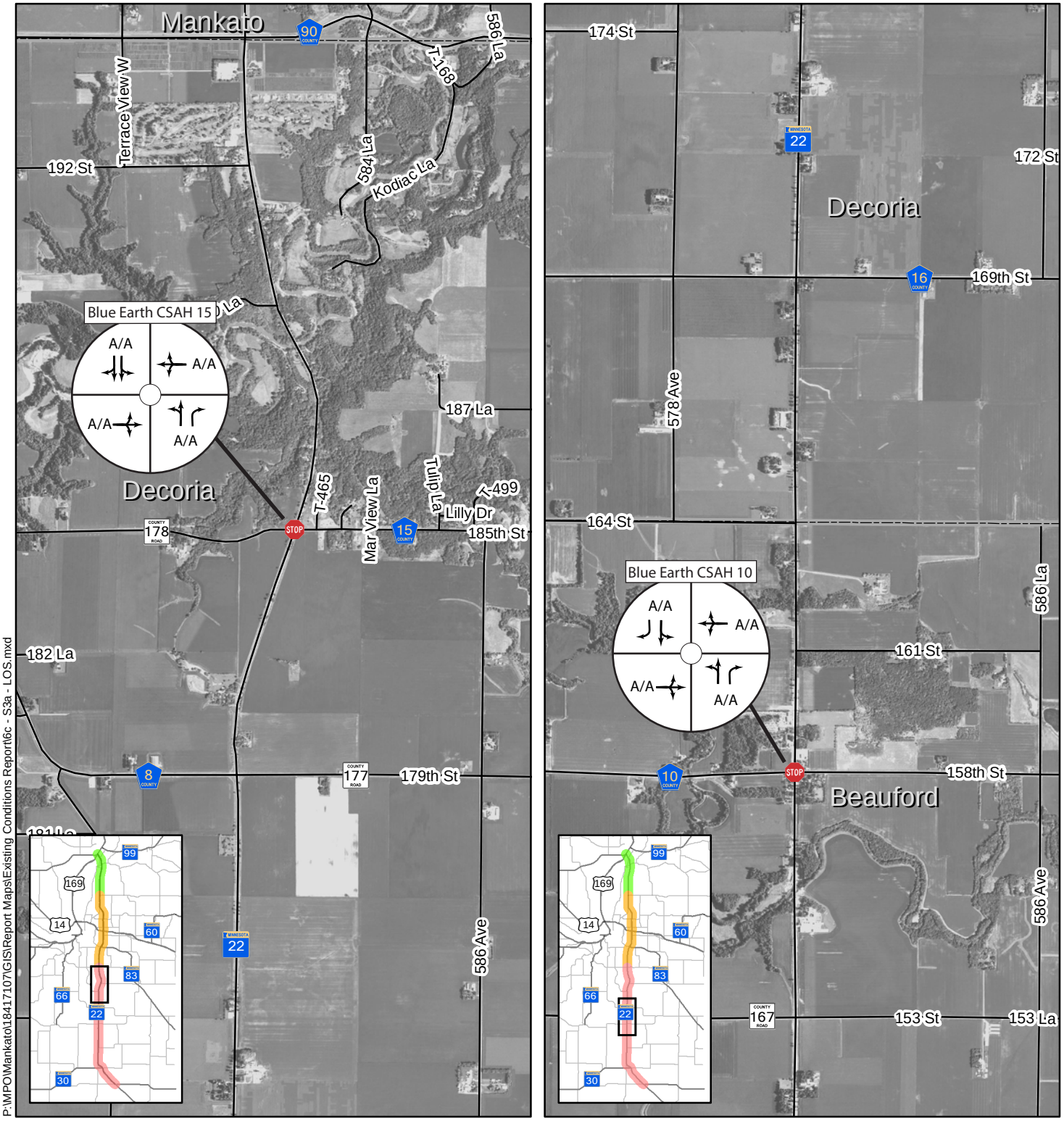
0 1,000 2,000 Feet

Figure 48. Future Year 2030 A.M. and P.M. Peak Hour Level of Service (Segment 1)



P:\MPO\Mankato\18417107\GIS\Report Maps\Existing Conditions Report\6b - S2 - LOS.mxd

Figure 49. Future Year 2030 A.M. and P.M. Peak Hour Level of Service (Segment 2)



Segment 1
Segment 2
Segment 3
Municipal Boundaries

Study Intersections

STOP TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

0 1,500 3,000 Feet

Figure 50. Future Year 2030 A.M. and P.M. Peak Hour Level of Service (Segment 3A)

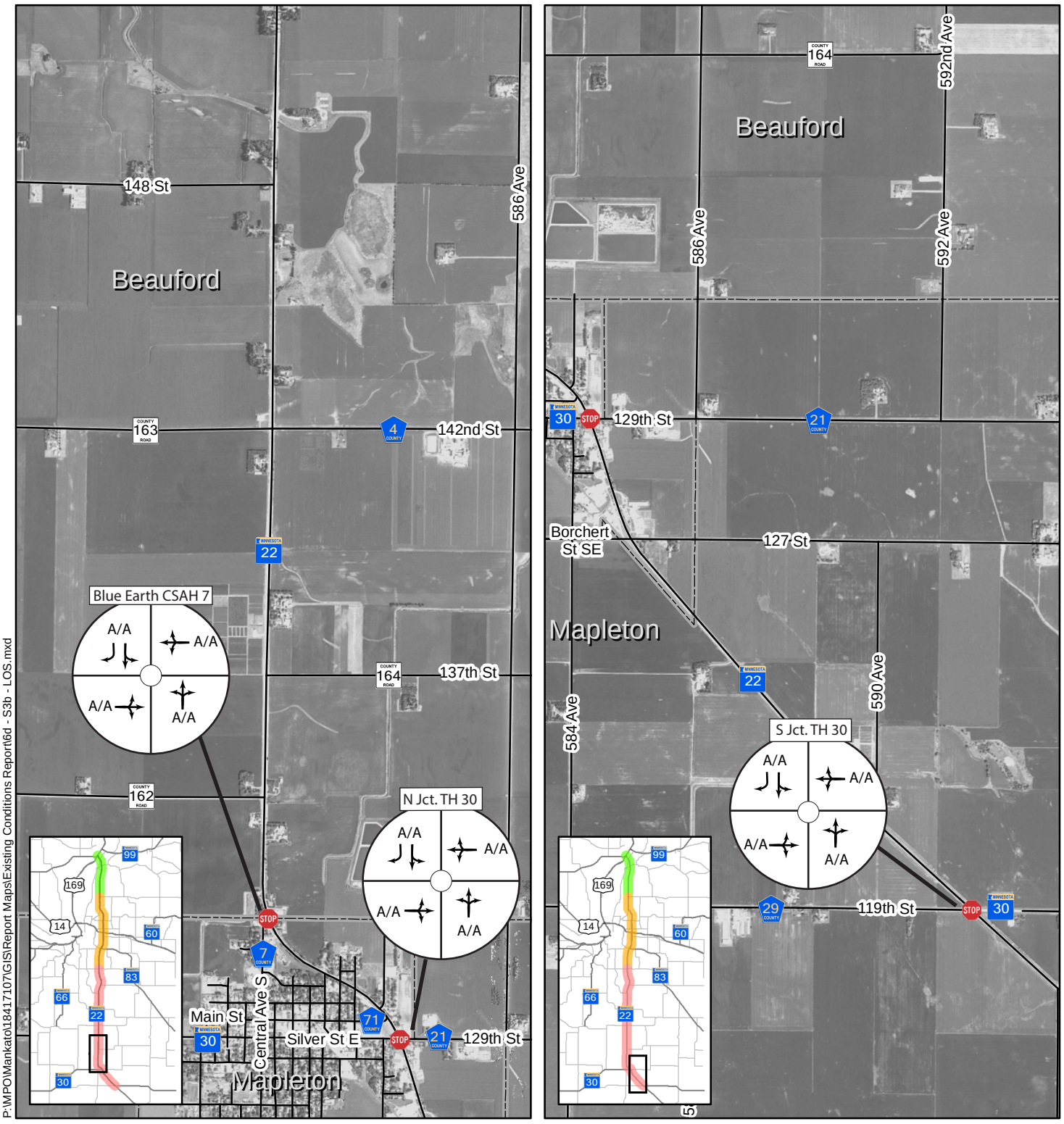
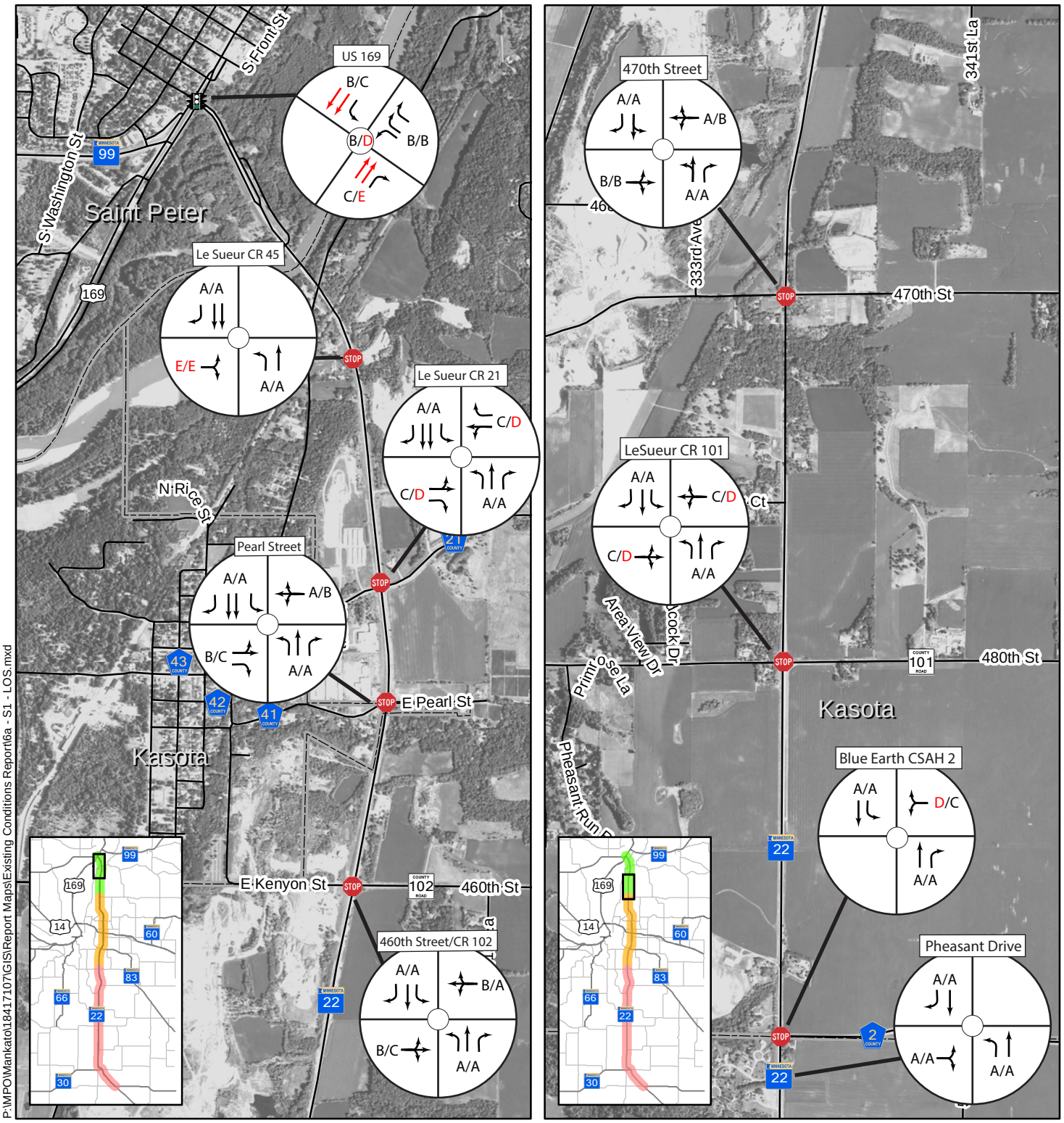


Figure 51. Future Year 2030 A.M. and P.M. Peak Hour Level of Service (Segment 3B)



P:\MPO\Mankato\18417107\GIS\Report Maps\Existing Conditions Report\6a - S1 - LOS.mxd

Segment 1
Segment 2
Segment 3
Municipal Boundaries

Study Intersections

TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

Modelled Queue Spillback Events (In Either Peak)

0 1,000 2,000 Feet

Figure 52. Future Year 2045 A.M. and P.M. Peak Hour Level of Service (Segment 1)

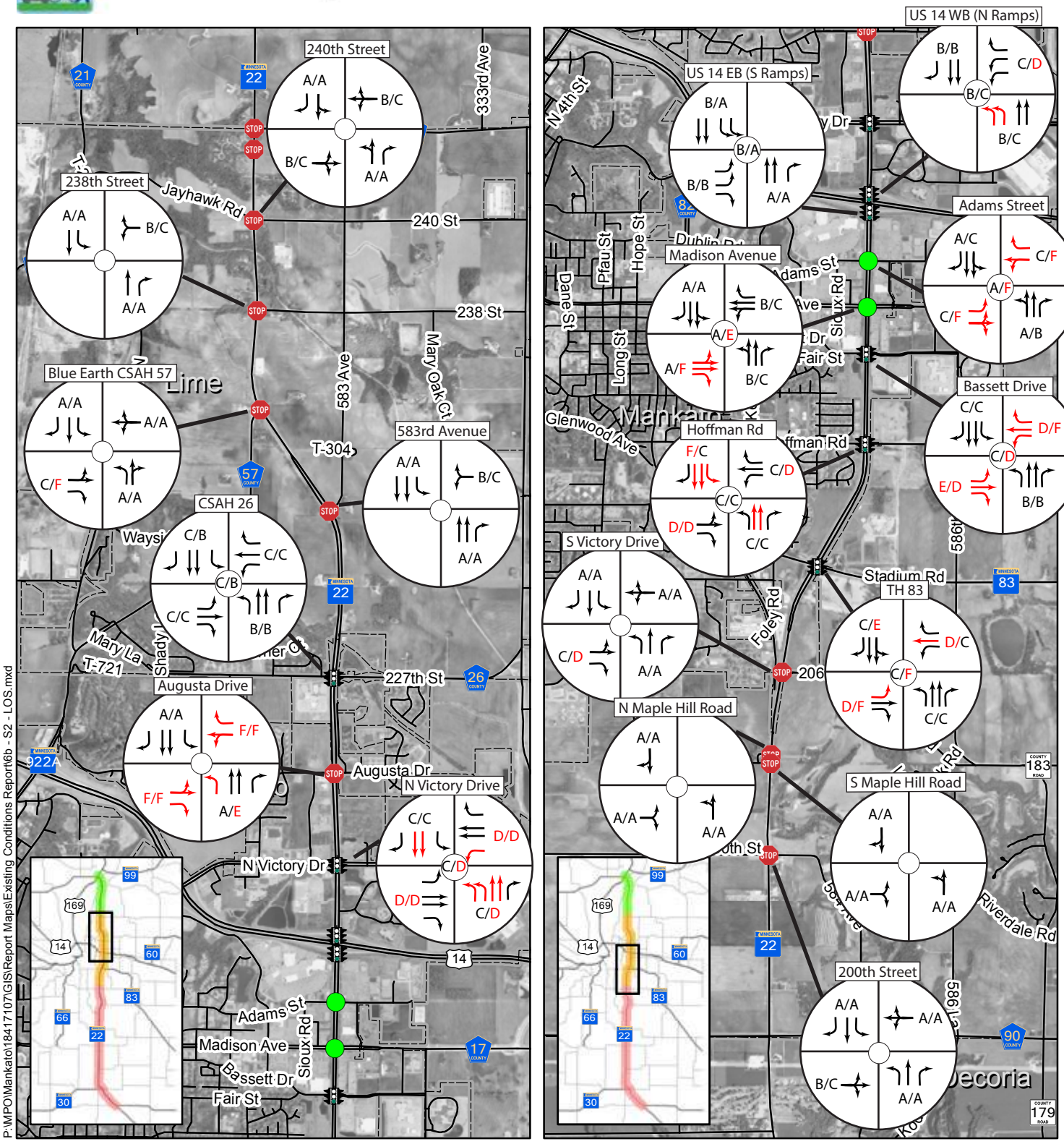
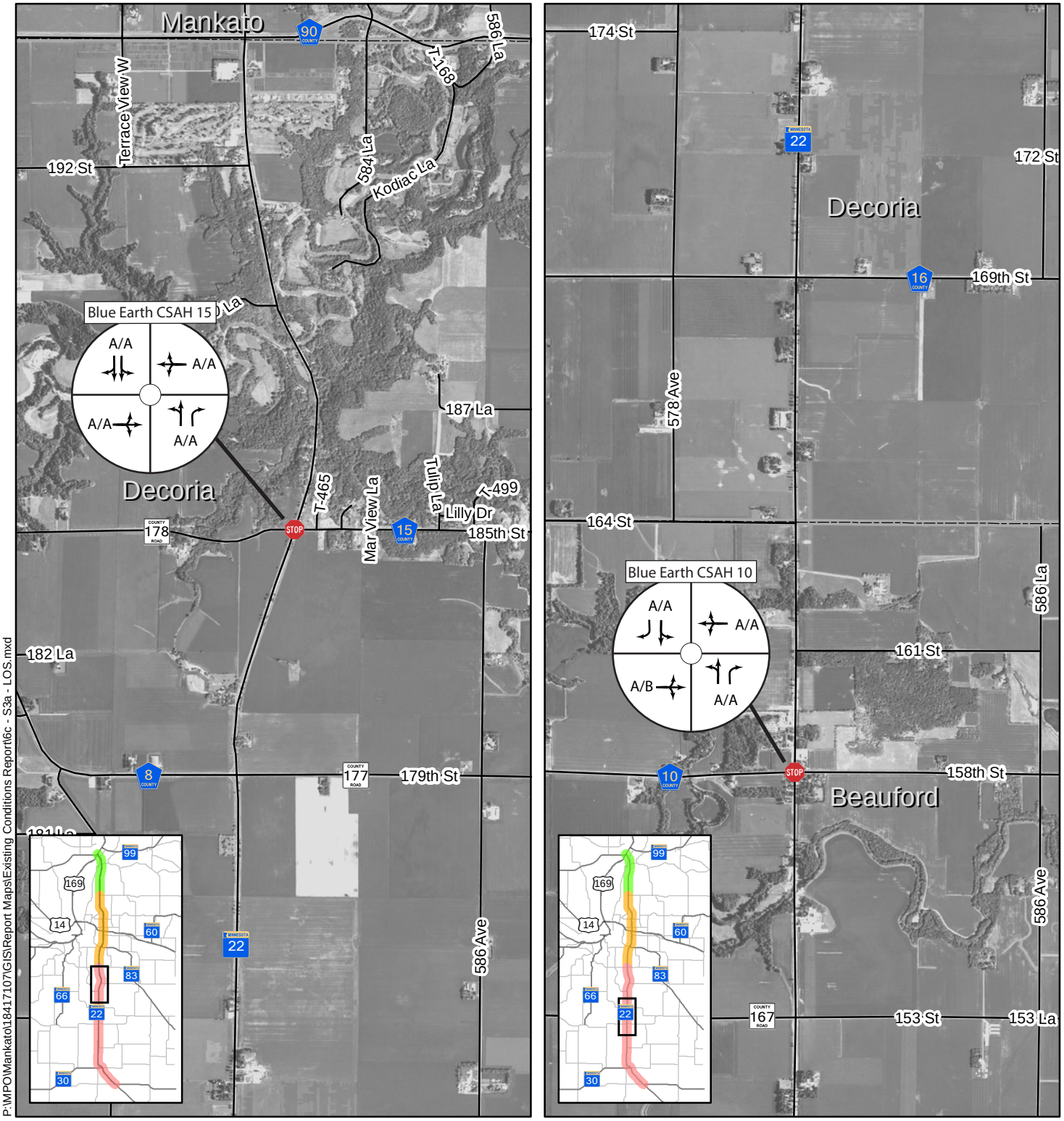


Figure 53. Future Year 2045 A.M. and P.M. Peak Hour Level of Service (Segment 2)



Segment 1
Segment 2
Segment 3
Municipal Boundaries

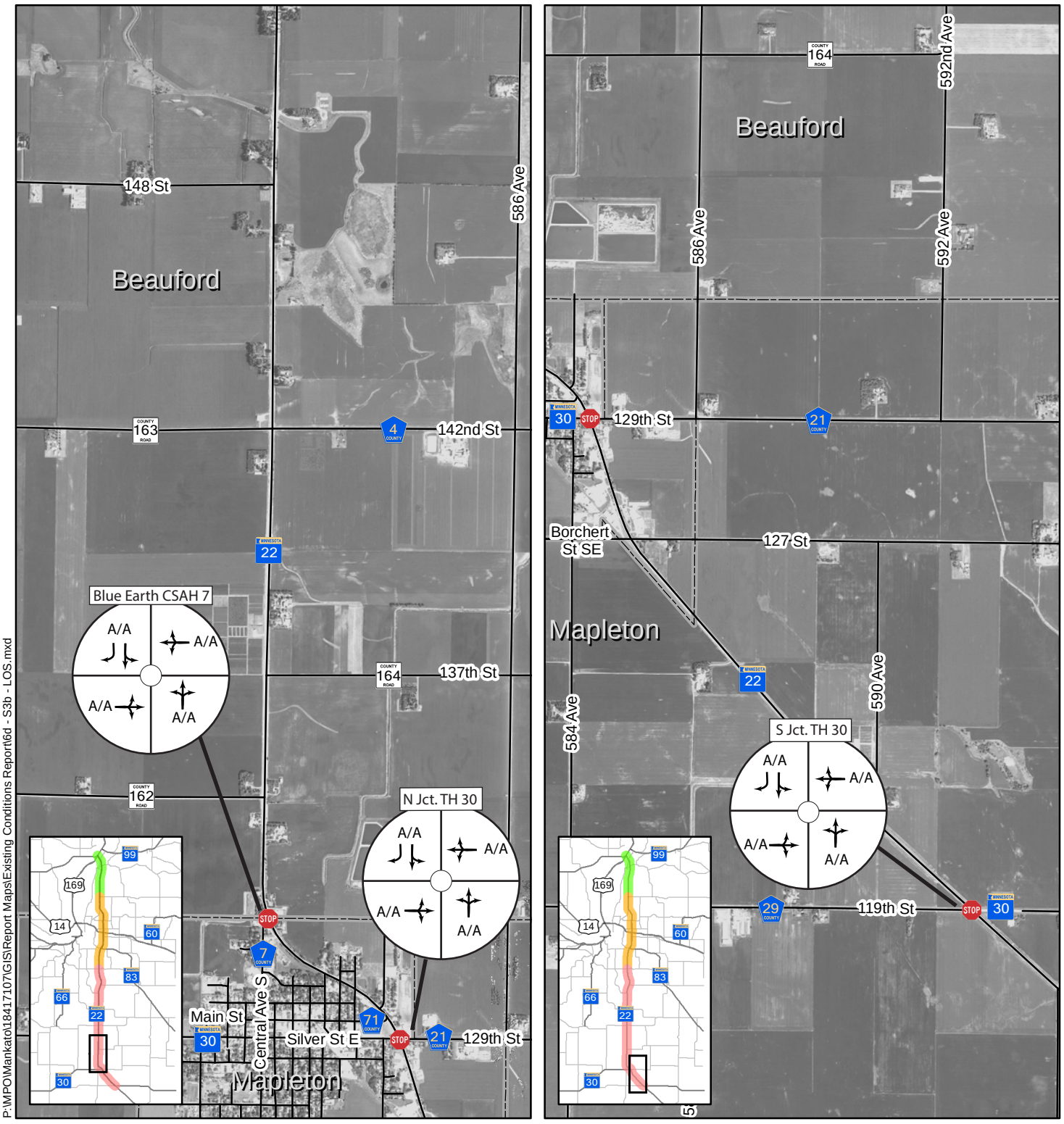
Study Intersections

STOP TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

0 1,500 3,000
Feet

Figure 54. Future Year 2045 A.M. and P.M. Peak Hour Level of Service (Segment 3A)



Segment 1
Segment 2
Segment 3
Municipal Boundaries

Study Intersections

TWSC
Roundabout
Signal

A/B AM Level of Service/PM Level of Service

0 1,500 3,000
Feet

Figure 55. Future Year 2045 A.M. and P.M. Peak Hour Level of Service (Segment 3B)

Preliminary Purpose and Need Statements

The preparation of a preliminary Purpose and Need Statement (PNS) is an essential step in defining a potential project and providing guidance for future analysis. Defining the scope and depth of the issues and the reasons for a project provides a focus to guide stakeholders, officials, and the public in sorting through various alternatives. The PNS can also help build consensus among various stakeholder groups, business people, landowners and modal interests, each of which are likely to view the corridor from a different perspective. Finally, the PNS can help screen alternative(s) for more detailed analysis in a future environmental document, if necessary.

One of the principle objectives of the Highway 22 Corridor Study is to assess, early in the concept development process, if sufficient transportation needs (or other considerations) along the corridor exist, or are anticipated in the future. If so, the PNS can also help define the magnitude of the needs (or other considerations), define the purpose for the project, and determine if further analysis (e.g., alternative development and evaluation) should continue.

Since any major future improvements along the corridor will likely seek federal funding, pertinent Federal Highway Administration (FHWA) transportation purpose and need guidance was used, in part, to help outline needs (and other considerations).

The purpose and need assessment utilized the existing conditions data, the future conditions technical analysis, and public stakeholder input received early in the study process, as documented in earlier sections of this document.

Purpose of the Potential Project

The purpose of the potential project(s) is to mitigate identified system deficiencies. This is evident and clear for all segments of Highway 22. Additional differentiating factors indicate the purpose for the individual segments of the corridor, including:

- Mitigation of vehicle mobility, safety concerns, system deficiency (i.e. lack of turn lanes, excess access, and deteriorating pavement), and multimodal interrelationship improvements in Segment 1. It should be noted that MnDOT did recently complete projects in this segment to address some safety issues by installing centerline and edgeline rumble strips and adding northbound and southbound turn lanes at County Road 101.
- Mitigation of vehicle mobility, safety concerns, system deficiency (i.e., corridor capacity and operational issues at intersections, traffic control changes, pavement and bridge deficiencies) in Segment 2.
- Mitigation of system deficiencies (i.e., lack of turn lanes, minor access modification, and deteriorating pavement) and multimodal interrelationship improvements in Segment 3

(CSAH 7 (Central Avenue) to Highway 30/CSAH 29). The portion of Segment 3 from CSAH 90 to CSAH 7 (Central Avenue) was determined not to need a project as MnDOT recently completed work to address pavement deficiencies, access management and safety in this segment in 2017 and 2018.

This is all necessary to provide a safe and efficient transportation system for users of the Highway 22 corridor.

Need for the Project

Based on this preliminary purpose and need assessment, the TAC determined sufficient need was identified to justify continuation of the study process and warranted review of potential future corridor improvements. The TAC determined that future corridor planning and improvements should address the following critical needs for each segment of the corridor:

Segment 1
(US 169 to CSAH 2)

- **Vehicle Mobility**
- **Modal Interrelationships**
- **Safety**
- **Transportation System Deficiencies**
- Other Environmental Factors

Segment 2
(CSAH 2 to CSAH 90)

- **Vehicle Mobility**
- Social or Economic Goals
- **Modal Interrelationships**
- **Safety**
- **Transportation System Deficiencies**
- Other Environmental Factors

Segment 3
(Mapleton)

- Social or Economic Goals
- **Modal Interrelationships**
- Safety
- **Transportation System Deficiencies**
- Other Environmental Factors

Those identified with bold text indicate primary needs; others identified are considered secondary supporting needs (i.e., opportunities for system improvements within the project study area that may be able to be addressed, if feasible, concurrent with addressing the primary needs). The Purpose and Need matrices (see **Appendix F**), document the relevance of each category to the respective segments along with identified needs or contributing information.

It is important to note, based on direction from FHWA-MN (including guidance within 23 Code of Federal Regulations (CFR) 450 Appendix A), that critical elements of this corridor-level planning study, if developed appropriately, can be "linked" directly into the National Environmental Policy Act (NEPA) process. It is the position of the Federal, State, and Metropolitan Planning Organizations (MPO) officials within the state of Minnesota that corridor-level planning studies may identify, and may delete from future considerations, alternatives that do not meet this purpose and

need statement; however, the corridor study will not select a "preferred alternative", as this determination can only be made during the NEPA phase of the project.

This preliminary Purpose and Need Statement and the subsequent corridor study recommendations are intended as a planning tool to initiate the identification of suitable and feasible alternatives for the Highway 22 corridor. The study results serve to inform staff and elected officials so that sound land use, economic development, and transportation planning decisions made during the planning phase can be fully linked with, and integrated into, the future NEPA phase of the project.

Corridor Vision

A vision based on long-term corridor function for each segment of the corridor was established to provide the basis for the development of preliminary alternative concepts. The following is a discussion of the key corridor characteristics that were considered during alternatives development. These characteristics considered input from the TAC, previous technical analysis, and were in consideration of the preliminary Purpose and Need Statements for each segment of Highway 22.

The TAC established and affirmed the following characteristics about the corridors' long-term function and vision.

Corridor Vision (Segment 1)

- Emphasis on multimodal connectivity, especially a recreational type trail
- Envision mostly a two-lane rural highway, a speed limit of 55-65 mph, and adjacent agricultural/residential/industrial land uses
- Highway 22 primarily used for local traffic with regional and pass through traffic primarily utilizing US 169
- Desire to balance vehicle mobility and accessibility along the corridor (emphasis on maintaining existing residential and industrial access to the corridor)
- Consider other future local roadway connectivity

Corridor Vision (Segment 2 – Mankato City Limits)

- Emphasis on multimodal connectivity
- Envision a mostly four-lane urbanizing/parkway with a speed limit of 45-55 mph
- Limited direct access to corridor
- Consider corridor aesthetics

Corridor Vision (Segment 2 – Outside Mankato City Limits)

- Emphasis on multimodal connectivity
- Envision a two/four-lane (maintaining existing transition from four to two-lane roadway) urbanizing roadway with a speed limit of 45-55 mph
- Managed direct access to the corridor
- Consider corridor aesthetics

Corridor Vision (Segment 3– Mapleton)

- Emphasis on multimodal accommodations adjacent to Highway 22 in urban core
- Envision a two or three-lane roadway with urbanizing characteristics
- Consider corridor aesthetics
- Desire to balance vehicle mobility and accessibility along the corridor

Development of Alternatives

The key outcome of this study was to identify, evaluate, and develop potential improvements, if deemed necessary, then recommend concept alternatives for Highway 22 by segment. These concept alternatives can then be carried forward for further analysis in future environmental process. To accomplish these tasks, a range of conceptual corridor alternatives were developed.

Preliminary Alternative Development Process

The development process was multifaceted using a range of inputs, including technical data, public comments, preliminary purpose and need statement, corridor vision, design parameters, and direction from the TAC. Some of the issue areas considered include:

- Pavement rehabilitation/replacement
- Traffic operations
- Congestion
- Access spacing
- Crashes
- Connectivity
- Pedestrian and bicycle facilities
- Local plan consistency
- Corridor aesthetics
- Agency/public input
- Historic/cultural resources
- Environmental justice
- Planning-level cost

The study team facilitated a TAC meeting at which the committee members identified initial corridor alternatives for the three segments. This meeting was a brainstorming session meant to consider various options and potential solutions. Below is a summary of the alternatives developed for each segment. After review and basic refinement with the TAC, these alternatives were presented as typical roadway sections to the public at the second open house in June 2018 (see **Appendix A** for open house #2 board materials).

Segment 1 (US 169 to CSAH 2)

- Two-lane (no build)
- Two-lane with multiuse trail on one side
- Three-lane (continuous left-turn lane or passing lanes)
- Three-lane with multiuse trail on one side
- Four-lane divided
- Four-lane divided with multiuse trail on one side

Segment 2A (CSAH 2 to CSAH 26 (227th Street) and Highway 83/CSAH 60 (Stadium Road) to CSAH 90)

- Two-lane/four-lane (no build)
- Two-lane/four-lane with multiuse trail on one side
- Three-lane
- Three-lane with multiuse trail on one side
- Four-lane divided
- Four-lane divided with multiuse trail on one side

Segment 2B (CSAH 26 (227th Street) to Highway 83/CSAH 60 (Stadium Road))

- Four-lane rural divided (no build)
- Four-lane urban divided

Segment 3 (Mapleton)

- Two-lane (no build)
- Two-lane rural with multiuse trail on one side
- Two-lane urban with multiuse trail on one side
- Three-lane rural
- Three-lane rural with multiuse trail on one side
- Three-lane urban with multiuse trail on one side

Intersection traffic control alternatives were also considered for several intersections along the corridor. They were presented to the public at the second open house in June 2018 as well. Intersection Control Evaluation (ICE) reports were completed for these intersections (see **Appendix E**).

The concepts developed by the TAC were compared against a No Build Alternative in each of the segments of the Highway 22 corridor. The No Build Alternative evaluated as part of this study assumed that pavement rehabilitation would take place in each segment, but the roadway cross section and intersection control would not change.

Refinement of Alternatives

Following the second open house, the concept alternatives were refined based on feedback received from the public and additional review by study team members. Up to three concepts per segment were moved forward for further development of complete corridor concept layouts (beyond the typical roadway sections). Detail of these concept alternative layouts are presented in **Appendix G**.

Segment 1 (US 169 to CSAH 2)

- Two-lane (no build)
- Two-lane (US 169 to 470th Street (TWP 140)), three-lane (continuous left-turn lane) (470th Street (TWP 140) to County Road 101 (480th Street)), two-lane (County Road 101 (480th Street) to CSAH 2) **with and without** multiuse trail on one side
- Two-lane (US 169 to 470th Street (TWP 140)), three-lane (continuous left-turn lane) (470th Street (TWP 140) to County Road 101 (480th Street)), three-lane (continuous left-turn lane) (County Road 101 (480th Street) to CSAH 2) **with and without** multiuse trail on one side
- Two-lane (US 169 to 470th Street (TWP 140)), three-lane (continuous left-turn lane) (470th Street (TWP 140) to County Road 101 (480th Street)), three-lane (northbound passing lane) (County Road 101 (480th Street) to CSAH 2) **with and without** multiuse trail on one side

Segment 2 (CSAH 2 to CSAH 90)

- Two-lane/four-lane (no build)
- Three-lane (continuous left-turn lane) from CSAH 2 to CSAH 57 (North Riverfront Drive), two-lane with multiuse trail on one side from Highway 83/CSAH 60 (Stadium Road) to CSAH 90, four-lane rural section **(or urban section)** from CSAH 57 (North Riverfront Drive) to Highway 83/CSAH 60 (Stadium Road), roundabout at CSAH 57 (North Riverfront Drive)
- Three-lane (continuous left-turn lane) from CSAH 2 to CSAH 57 (North Riverfront Drive), two-lane with multiuse trail on one side from Highway 83/CSAH 60 (Stadium Road) to CSAH 90, four-lane rural section **(or urban section)** from CSAH 57 (North Riverfront Drive) to Highway 83/CSAH 60 (Stadium Road), continuous-T intersection at CSAH 57 (North Riverfront Drive)

Segment 3 (Mapleton)

- Two-lane (no build)
- Three-lane rural with multiuse trail on one side
- Three-lane urban with multiuse trail on one side

The conceptual intersection control alternatives were carried forward into the overall layouts as well. Each is represented in the detailed concept alternative layouts presented in **Appendix G** (more specifically the roundabout concepts, where applicable).

Evaluation of Alternatives

The primary activities completed as part of the alternative evaluation process include preparing evaluation criteria, assessing the impacts of each alternative, preparing a preliminary ranking of the alternatives, and presenting the ranking's rationale in an evaluation matrix. As part of this process, potential solutions are recommended as concept alternatives for each of the three segments. These can be moved forward as part of the future environmental stage of a project(s).

Evaluation Criteria

Evaluation criteria were developed based on the preliminary purpose and need guiding principles and corridor vision. In addition to measurable technical criteria, public preference and improvement cost were used in the evaluation process. The screening criteria include:

- Reduce vehicle congestion
- Increase vehicle travel speed
- Reduce access along the corridor
- Minimize adjacent property impacts
- Improve intersection safety (i.e., turn lanes, RCI, roundabout, passing lanes)
- Improve bicycle connectivity
- Improve pedestrian/bicycle comfort/safety along the corridor
- Public preference
- Minimize cost

Evaluation Scoring

The alternatives were evaluated based on a qualitative estimate of each alternative's ability to address the evaluation factors. Each alternative was assigned a rating relative to its ability to meet the criteria. The rating system was as follows:

5	Good; meets criteria well
4	Acceptable; but relatively less desirable than Good
3	Moderate; no distinguishing characteristics
2	Less desirable; considering criteria
1	Poor; fails to meet criteria

A multifaceted review process by the TAC vetted the evaluation criteria and iterations of the evaluation matrices. SRF also made multiple revisions to ensure that criteria, documented impacts, and rankings were accurate before it was presented to the public for review. Through the vetting process, the TAC determined that a customized weight should be applied to some of the evaluation criteria. This was done to emphasize criteria most applicable to the corridor visions and public input received. The detailed evaluation matrices are available in **Appendix H.**

Concept Alternative Traffic Evaluation

Roadway Capacity

The future traffic operations were also considered for each of the alternatives evaluated as part of this study. As previously discussed, traffic volumes were developed for the years 2030 and 2045. **Table 11** summarizes the existing and future traffic volume ranges expected on Highway 22 in each segment. **Table 11** also provides planning-level capacity thresholds for varying roadway cross sections to theoretically maintain acceptable levels of operation. This information supports the notion that the concept alternative layouts can operate at an acceptable level of service under future conditions. This information also supports the notion that the existing no build alternative would likely experience operational issues in Segment 1 by 2045.

Table 11 – Corridor Traffic Volume Evaluation by Segment

Segment	Existing Traffic Volumes (vehicles/day)	2030 Future Traffic Volumes (vehicles/day)	2045 Future Traffic Volumes (vehicles/day)	Planning-Level Capacity (vehicles/day)		
				Two-lane Undivided Highway	Three-lane Undivided Highway	Four-lane Divided Highway
1	10,300 - 12,300	13,500 – 13,800	14,900 - 16,800	15,000	17,000	38,000
2	9,100 - 19,100	12,200 – 25,300	15,700 - 32,400	15,000	17,000	38,000
3	1,850 - 5,000	2,100 – 6,600	2,400 - 8,500	15,000	17,000	38,000

Segment 2 Considerations

Furthermore, a detailed traffic evaluation was completed for the higher volume section of Highway 22 in Mankato from CSAH 26 (227th Street) to Hoffman Road. This traffic evaluation was completed to review and evaluate the concept alternatives being considered to determine how each would function under existing and future traffic volumes at an intersection level of detail. Detailed analysis and results are provided in **Appendix I**.

Corridor travel times were also evaluated for the various concept alternatives being considered in Segment 2. **Table 12** provides details of the travel time for each alternative. It should be noted that

for a rural versus urban cross section that travel time will be the same as long as the same width is used for travel lanes and shoulders.

Table 12 – Travel Time for 2045 PM Peak Hour (Minutes)

Segment 2 CSAH 26 (227th Street) to Highway 83/CSAH 60 (Stadium Road)							
No Build		Traffic Signals		Roundabouts		RAB w/ Meters	
NB	SB	NB	SB	NB	SB	NB	SB
9.3	7.8	8.3	10.5	9	8.9	10	10.8

Both a rural and urban cross section was evaluated for this segment. **Appendix H** provides details of the evaluation matrix for both alternatives. Some of the highlights include:

Rural Cross Section:

- Lower cost
- Requires ditches and/or drainage ponds to manage stormwater runoff
- Larger roadway footprint typically
- Lighting is typically only at intersections
- Landscaping is typically more natural and requires less maintenance

Urban Cross Section:

- Improves corridor aesthetics with additional landscaping, etc.
- Increases greenspace between roadway and trail/sidewalk
- Improves pedestrian crossing safety by reducing crossing distance
- Improves bicycle/pedestrian comfort and safety
- Higher cost
- Requires drainage utilities (i.e. storm sewer and curb and gutter)
- Potential for speed reduction
- Lighting is typically along corridor and at intersections

Alternatives to Carry Forward

As part of the evaluation process, alternatives were identified in each of the three segments of Highway 22 that can be compared against the No Build Alternative in a future environmental documentation stage of the project development process. The discussion of whether the No Build Alternative met the project's purpose and need was merely meant to serve as the beginning of the framework used to support the need for improvements in the corridor. Furthermore, where multiple alternatives were considered for a segment, the TAC selected alternatives that it felt best fit the needs of that segment. While others may be carried forward for consideration during the future environmental stage of the project, this singular alternative is the initial recommendation of the guiding committee of this study. During a future environmental stage of the project, the alternatives that were not eliminated in this evaluation process will also be meshed into the selected Build Alternative for each segment and evaluated as a composite Build Alternative in the next stage of the project development process.

The alternatives were evaluated by members of the TAC and the public at open house meetings. Recommendations for Highway 22 include:

Segment 1 (US 169 to CSAH 2)

- Two-lane (US 169 to 470th Street (TWP 140)), three-lane (continuous left-turn lane) (470th Street (TWP 140) to County Road 101 (480th Street)), three-lane (continuous left-turn lane) (County Road 101 (480th Street) to CSAH 2) **with and without** multiuse trail on one side

Segment 2 (CSAH 2 to CSAH 90)

- Three-lane (continuous left-turn lane) from CSAH 2 to CSAH 57 (North Riverfront Drive), two-lane with multiuse trail on one side from Highway 83/CSAH 60 (Stadium Road) to CSAH 90, four-lane **rural section or urban section** from CSAH 57 (North Riverfront Drive) to Highway 83/CSAH 60 (Stadium Road), **roundabout or continuous-T intersection** at CSAH 57 (North Riverfront Drive)

Segment 3 (Mapleton)

- Three-lane urban with multiuse trail on one side

The detailed concept layouts and planning-level unit cost estimates are available in **Appendix G**. Total project cost estimates are available in **Appendix K**. The Implementation Plan Chapter of this report provides further detail on each alternative above.

Multiuse Trail Considerations

With the Highway 22 Corridor Study, the City of Mankato, in partnership with MAPO, MnDOT, and the MnDNR are interested in pursuing a regional multiuse trail that will establish a connection between Mankato and Saint Peter, including the City of Kasota. Concurrently, the MnDNR is working on the Minnesota River State Trail in this area, which would create connections to significant regional destinations such as the Minnesota River, Kasota Prairie, Kasota Prairie Scientific and Natural Area (SNA), and Riverside Park. This trail has the potential to become a regional trail as noted in the section **Multiuse Trail and Alignment Alternatives**, and/or a portion of the Minnesota River State Trail.

Depending on the chosen route, much of the proposed trail could either extend along the Highway 22 right-of-way, or through the rural landscape using a combination of county road right-of-way and private property. The trail will provide an alternative for people traveling between Mankato and Saint Peter and will add a high quality outdoor recreation facility of regional, and potentially statewide significance.

Site Information

Statewide and Regional Trends

The 2014-2018 State Comprehensive Outdoor Recreation Plan (SCORP), published by the MnDNR, gives outdoor recreation decision-makers and managers a focused set of priorities and suggested actions to guide them as they make decisions about outdoor recreation. The SCORP outlines outdoor recreation trends, challenges, and issues, including protecting existing natural resources, sustaining existing facilities, promoting healthy lifestyles, connecting people with nature, and an increasing demand for a diverse range of recreation opportunities based upon population changes.

Several studies show that involvement in nature-based outdoor recreation among young adults and their children had decreased since the 1990s. SCORP also notes that location plays a significant role because many users of the regional trail system live within three miles of the park or trail that they utilize. Regional trails play an important role because they provide healthful forms of exercise for people of all age groups that can be carried out by families, groups, or individuals.

According to SCORP, Minnesota's growth rate has increased since 2000, but at a slower rate than in the 1990s. Although population growth in the state has slowed, the geographic pattern of growth remained largely the same with the high growth areas centered on the Twin Cities metropolitan area. Outside factors such as gas prices, trail infrastructure improvements, and increased local sidewalk and trail network connectivity, may also promote increased use as trail users look for more

recreation opportunities closer to home and use of the regional trail system as part of their transportation network.

Highway 22 Segments

Each of the three Highway 22 corridor study segments have distinctive characteristics with regards to multiuse trail considerations.

Segment 1

Segment 1 is the primary area of focus for a trail connection from Mankato to Saint Peter. It is also part of the identified area for the proposed Minnesota River State Trail. The City of Mankato has interest in using county and township roads to connect the communities and destinations. The MnDNR has been studying potential opportunities for an off-road trail along the Minnesota River corridor. There are challenges within each of these corridors, including narrow right-of-way, high average daily traffic volumes, public and private ownership of the land, above-ground utilities, railroad crossings, and so forth.

Segment 1 – Highway 22 Corridor

Segment 2

The north end of Segment 2 includes the multiuse trail search area starting at the Sakatah Singing Hills State Trail. South of the state trail, this segment is characterized by local trails connecting to commercial nodes along Highway 22, and further west into downtown Mankato. Local trails also extend to new development on the east side of Highway 22 and regional destinations beyond. The study also incorporates options for safe pedestrian crossings across Highway 22 in the commercial areas, as well as at Hoffman Road, near the new Prairie Winds Middle School. South of Hoffman Road, there is desire to connect existing trails to the South Route County Trail that runs along CSAH 90, the southern boundary of the segment.

Lime Valley Road & CSAH 5 Intersection

Highway 22 & Augusta Drive Intersection

Sakatah Singing Hills State Trail

South Approach to South Route Trail at CSAH 90

Segment 3

In Segment 3, a multiuse trail adjacent to Highway 22 is being considered. This is not a trail component that is linked to a broader trail network but rather a local amenity to provide multimodal accommodations to the local population. There is a desire to make pedestrian crossing improvements across Highway 22 in the City of Mapleton as well. Identifying potential solutions, with considerations for pedestrian and bicycle movements, will help the City of Mapleton better define its streetscape along the Highway 22 corridor.

City of Mapleton

Multiuse Trail Existing Conditions

The study team developed maps to identify existing conditions, and issues and opportunities within the corridor. The primary objective was to develop one or more regional trail corridors, locate gaps in the local trail system, and develop improved pedestrian crossings. See Trail Analysis, Segment 2 Existing Conditions and Segment 3 Existing Conditions in **Appendix J**.

The study team looked at a variety of trails at the state, regional and local level for possible connections within the study area. From a state level, both water and land trails were identified, as well as MnDNR recreation and conservation sites. At a regional level, systems such as the Minnesota River Valley Scenic Byway, snowmobile trails, county bicycle trails, and birding trails were mapped for overlaps in connectivity. Property-ownership was also identified to determine possible issues with property acquisition. On a local level, the team mapped local bicycle routes, bike lanes, bus routes, and school locations to find gaps in local connections.

Multiuse Trail Site Analysis

Other analysis considerations were assessed to determine which trail alternative would minimize environmental impacts and construction costs, while maximizing the trail functionality for users. **Appendix J** includes a matrix of the multiuse trail site analysis, typical sections for the three alternate trail corridors, and an accompanying map of trail alternatives that was developed later in the process. The site information gathered included:

- Public destinations
- Landownership and utilities
- Driveway and railroad crossings
- Wetlands impacted
- Right-of-Way

Public Destinations

A well-designed regional linking trail commonly offers trail users opportunities to travel between key regional destinations at the start and end of the trail. Depending on the route, there are several destinations present between Mankato and Saint Peter. Most of the land through which the trail corridor extends is agricultural or open space. Destinations along the trail corridor include the Sakatah Singing Hills State Trail, natural areas, and the Chankaska Creek Ranch & Winery. Existing trails in the regional trail corridor study area include snowmobile trails, birding trails, and the Minnesota River Scenic Byway. The Scenic Byway was viewed as an amenity for the proposed regional trail because of the high quality scenic value the route offers.

Land Ownership and Utilities

The number of adjacent landowners was evaluated to determine how many landowners may border the trail. The number of landowners was determined by counting the number of parcels along each trail corridor.

Some parcels are likely owned by the same landowner. A key design element was to keep the trail within the existing roadway right-of-way. In addition to the land ownership, the number of driveway crossings were counted to determine how many trail crossings may be required.

Above ground utilities, such as power lines, may pose trail design challenges in certain circumstances. In some cases, above ground utilities may need to be relocated to accommodate the trail. Above ground utilities were mapped to determine how many above ground utilities each alternative may encounter.

Driveway and Railroad Crossings

Trail corridors with driveway and railroad crossings may require reconstruction of driveway aprons, and enhanced crossing facilities at railroads for safety. These can have major impacts on construction costs.

Wetland Impacts

One of the main attractions of the landscape between Mankato and Kasota are the small wetlands and stream corridors. The locations of wetlands, as identified by the National Wetland Inventory, that may be potentially impacted due to trail construction were identified for each corridor in the early phases of the trail alternate identification.

Right-of-Way

Public road right-of-way was identified as part of the analysis. Roadways with a wider right-of-way may provide flexibility in trail design to avoid challenging site elements or environmentally sensitive lands, reducing the need to acquire additional land.

Statewide Trails

At a statewide scale, the proposed regional trail will provide a trail connection to the Sakatah Singing Hills State Trail. The Sakatah Singing Hills State Trail extends 39 miles from Mankato to Faribault, where it connects to the Mill Towns State Trail.

County Trails

At a County scale, filling local connections along Highway 22 will provide a trail connection to the South Route Trail, which runs east-west along CSAH 90 on the south side of Mankato, and connects to the Red Jacket Trail.

Local Trails, Parks, and Destinations

At the local level, stronger and continuous trail connections will complement facilities located within Mankato, Kasota, and Saint Peter. Improved connectivity will benefit the community with safe and alternative means for accessing resources (e.g. commercial districts, downtowns, schools, and parks).

Multiuse Trail Stakeholder Meetings

Over the course of the study, the trail elements were presented and discussed at two agency coordination meetings.

Agency Coordination Meeting (Trails) #1

At the first meeting, the Trail Analysis Map was presented with the intent to review and identify missing information, and issues and opportunities regarding the future regional trail corridor alternatives in Segments 1 and 2. Additionally, Existing Condition maps for Segments 2 and 3 were presented, and missing information was identified. See **Appendix J** for documentation of these maps.

Agency Coordination Meeting (Trails) #2

The second meeting covered issues across each of the segments. In Segment 1, the alternative trail alignments were further discussed. In Segment 2, the primary focus was on gaps and grade-separated crossings. And in Segment 3, trial and sidewalk considerations were discussed. The following is a discussion of each of these elements.

Trail Corridor Alternatives Discussion

A Trail Corridor Alternatives Map was presented to the group to illustrate three options for future trail corridor analysis, with the objective of confirming three routes for detailed corridor analysis. See the Early Draft of Trail Corridor Alternatives Map in **Appendix J**.

Alternative 1 is located along the Highway 22 corridor. This trail alternative is defined as an independent 10-foot, paved trail, built to MnDOT, MnDNR, and ADA standards and guidelines. The trail would originate at the Sakatah Singing Hills State Trail trailhead, on the east side of Highway 22. Given the distance of the corridor, it was suggested that there may be a couple of Highway 22 crossings. In this scenario, consideration for determining the location of the crossings would be limited to areas of controlled access. For example, CSAH 21 and CSAH 57 (North Riverfront Drive) have been identified as areas for potential future roundabouts, which would be able to provide a controlled pedestrian crossing. The other option would require a grade-separated crossing. Alternate 2 is made up of segments along Lime Valley Road, CSAH 5 and CSAH 21. This trail alternative is defined as an independent 10-foot, paved trail, built to MnDOT, MnDNR, and ADA standards and guidelines. This alternate originates at the western Sakatah Singing Hills State

trailhead and extends to downtown Kasota. The group discussed the possibility of Lime Valley Road being a local connection to the primary alignment of the regional trail along CSAH 5. It was noted that this option is constrained by right-of-way widths. It was also noted that a shared facility may not meet the requirements of the Greater Minnesota Regional Parks and Trails Commission, and that a shared facility would not meet requirements for a state trail. The group also discussed adding an east-west connection along Jayhawk Road, connecting CSAH 5 to Highway 22, as well as an east-west connection to Kasota Prairie SNA.

Alterative 3 is made up of a portion of CSAH 5, from US 14 to Deerhaven Drive. This trail alternative is defined as an independent 10-foot, paved trail, built to MnDOT, MnDNR, and ADA standards and guidelines. This trail originates near the Minnesota River with destinations like the Kasota Prairie SNA the Kasota Prairie Conservation Area, and downtown Kasota. This alignment would extend across several private parcels.

Gaps

Creating a continuous local trail system was important to the stakeholder group. The following are gaps along Highway 22 identified by the group:

- Along the west side of Highway 22, between Augusta Drive and CSAH 26 (227th Street) (constructed in fall of 2018)
- Both sides of Highway 22 from Hoffman Road to Highway 83/CSAH 60 (Stadium Road), and then a trail on the west side down to CSAH 90, to provide a connection to the South Loop Regional Trail
- East-west gaps along US 14, CSAH 17 (Madison Avenue) and CSAH 3 (N Victory Drive) were also mentioned

Grade-Separated Crossings

Due to traffic speed and the number of lanes, pedestrian travel across Highway 22 can be perceived as being difficult. The group discussed specific areas along the route that may be viewed as priorities, and solutions for types of grade-separated pedestrian crossings. The following are two locations that were discussed as potential crossing locations:

- Between Highway 83/CSAH 60 (Stadium Road) and Hoffman Road – this is near the Prairie Winds Middle School, along with future commercial and industrial uses
- At the Augusta Drive and Highway 22 intersection

Considerations for grade-separated crossings include both overpasses and underpasses. Safety, lighting, and standing water were noted as potential issues for an underpass crossing. Overpass considerations included choosing from a helical ramp versus a long ramp. In either condition, land

acquisition may be needed. Refer to Pedestrian Crossings Options in **Appendix J** for examples of these types of crossings.

Mapleton Trail and Sidewalk Considerations

Options for a local trail along the Highway 22 corridor were discussed, and the study team presented some examples of previous corridor alternative sections for review and discussion. The examples included sidewalks and trails, along with streetscape elements like lighting and banners – refer to **Appendix J** for sample streetscape cross sections.

Multiuse Trail Alignment Alternatives

Regional Trail Design Guidelines

The trail design for the Mankato to Saint Peter Regional Trail includes a 10-foot-wide paved surface separated from vehicular traffic.

A bituminous trail surface is preferred because it is cost-effective, less prone to erosion than aggregate surfaces, provides for a more desirable trail user experience. A bituminous trail requires a larger up-front cost, but the annual maintenance is less than a gravel trail, which requires grading and maintenance after storm events when rutting and channelizing can occur.

The following factors will be taken into consideration during preliminary and final design of the trail:

- Right-of-way width
- Topography and drainage impacts
- Existing vegetation
- Curb cuts and driveway crossings
- Overhead and subsurface utilities
- Intersection crossings
- Proximity to adjacent buildings, homes, farms, businesses and churches

In circumstances with limited right-of-way, trails will still be located off-road, but with less boulevard between the trail edge and back of curb. In these locations, the trail can be separated from the road by a minimum paved two-foot-wide clear zone if the facility design criteria allow for this. In the case of Highway 22, a minimum paved two-foot-wide clear zone would not be allowed. This paved clear zone between the back of curb and trail edge provides a buffer between the trail users and motorists and will be striped to delineate the edge of the trail. This trail design may also be used in locations where wetlands are located adjacent to roadways. Boardwalks, though more expensive, may be used to extend across wetlands. Pedestrian ramps will be included at all roadway crossings. To meet ADA design guidelines and standards, regional trails should have a maximum of 8.3 percent grade, but should try to achieve less than a five percent slope in all but extreme

circumstances, and a cross slope of two percent for drainage. The regional trail may exceed 8.3 percent in circumstances where the roadway grade exceeds 8.3 percent. The trail may match but not exceed the existing roadway grade when greater than 8.3 percent. Regional trails may be wider than 10 feet if forecasted user volumes warrant an increased width and space is available for the trail. In addition, where right-of-way allows, final trail design will attempt to maximize the boulevard width to account for sign placement and snow storage.

Regional trail segments will be designed in accordance with all applicable federal, state, and local guidelines and standards. In addition, trail development will adhere to the following guiding documents:

- Guide for the Development of Bicycle Facilities, prepared by the American Association of State Highway and Transportation Officials (AASHTO), 2012
- MnDOT Bikeway Facility Design Manual, Minnesota Department of Transportation (MnDOT), March 2007
- State Aid Rule 8820.9995 Minimum Bicycle Path Standards, State Aid for Local Transportation
- Trail Planning, Design, and Development Guidelines, Minnesota Department of Natural Resources (MnDNR)
- Manual on Uniform Traffic Control Devices (MUTCD), MnDOT, 2014
- Public Right-of-way Access Guidelines (PROWAG)
- Best Practices for Traffic Control at Regional Trail Crossings, A collaborative effort of Twin Cities road and trail managing agencies, July 2011
- Selecting Roadway Design Treatments to Accommodate Bicycles, Federal Highway Administration, January 1994
- Bicycle and Pedestrian Wayfinding, Metropolitan Council, October 2011

Alternate Trail Alignments

Through critical analysis and input from stakeholders, three alternate trail alignments were developed during the process (see **Figure 56** at the end of this multiuse trail section). Alternative A is an off-road trail, Alternative B follows township and county roads, and Alternative C runs adjacent to Highway 22. It is important to remember that the final trail alternative could be a combination of any of the alternatives.

Alternate A

The southern end of alignment Alternate A is divided into two alternate alignments, with both beginning at different points along the Sakatah Singing Hills State Trail. Alternate A West (A1W) is an 11.5-mile off-road, paved trail that would take users along the Minnesota River, and to destinations such as the Kasota Prairie SNA, Kasota Prairie Conservation Area, and downtown

Kasota, before connecting at the Highway 22 bridge crossing to Saint Peter. Alternate A East (A1E), a 10.3-mile trail, has similar destinations, but would begin along CSAH 5 for the first few miles, at which point it would transition to an off-road paved trail. These alternatives provide the highest scenic value to users, as well as comfort value, in terms of the relative low traffic volume, the traffic speed, and the distance of the trail from the travel lanes.

There are inherent challenges to these alternatives, including right-of-way acquisition from private residents, wetland conflicts and railroad and road crossings. The Unimin Corporation, a mining operation, owns a significant amount of land in the area, and they are open to discussing the development of trails, though limited only to bicycle and pedestrian users, across their property.

Alternate B

Alternate B, is a separate paved trail, approximately 6.8 miles long, that begins at the Sakatah Signing Hills State Trail trailhead at CSAH 57 (North Riverfront Drive). The route continues north on Lime Valley Road, then connects to CSAH 21 to the south end of Kasota, where it transitions east along County Road 102 (460th Street) to intersect with the Highway 22 corridor. Several east-west spurs included on this alignment to connect to regional destinations. This alignment has high scenic value and relatively low traffic volumes, and would be potentially open to snowmobile use, in addition to bicycles and pedestrians.

Like Alternative A, this alignment has challenges with right-of-way acquisition, and railroad and road crossings. Even more challenging, however, is the narrowness and gravel condition of Lime Valley Road, which is a township-owned road.

Alternate C

Alternate C, is a separate paved trail, approximately 7.8 miles long, that begins at the Sakatah Signing Hills State Trail trailhead on the east side of Highway 22. The route continues north on Highway 22 until It crosses the river and ends at the Riverside Nature Resource Area in south Saint Peter. This alignment is viewed primarily as a commuter trail, as there are no significant regional destinations beyond these two origin and endpoints. Benefits of a trail along this corridor include its use as a commuter trail and it provides access to the Sakatah Singing Hills State Trail. Like Alternate B, this route would be potentially open to snowmobile use, in addition to bicycles and pedestrians.

Less desirable traits of a trail along the Highway 22 corridor include its lack of scenic value, and the high exposure of heavy vehicle traffic and high speed vehicular traffic.

Synthesis Matrix

The Alternatives described above were synthesized into a matrix to provide an overall assessment of the three primary alternate trail corridors. Based upon the standards and definition of a regional trail, the Highway22 option would not be able to be considered part of that system. Refer to Cross Sections for Alternative A, Cross Sections for Alternative B, and Cross Sections for Alternative C in

Appendix J for enlargements of the cross-sections referenced in the Trail Corridor Alternatives-Evaluation Summary in **Appendix J**.

Permitted Regional Trail Uses

Regional trails would be open to the public. The intended uses include walking, jogging, in-line skating, bicycling, and other uses mandated by state law including, but not limited to, non-motorized electric personal assisted devices. For the off-road trail option, motorized vehicle and equestrian uses will be prohibited, except for motorized vehicles used for maintenance or law enforcement activities or otherwise permitted for ADA access. During winter months, snowmobiling may be permitted along certain segments of the trail corridor.

Accessibility Statement

All study partners are committed to providing access and recreational opportunities to all people, including persons with disabilities, minorities, and other special-population groups. Efforts should be made to meet this commitment through appropriate facility design and programming considerations and by actively addressing potential barriers to participation.

All regional trail facilities described in the study will be developed in accordance with ADA standards and guidelines. More specifically, the Mankato to Saint Peter Regional Trail will adhere to the Minnesota Bikeway Facility Design Manual (MnDOT 2007); Trail Planning, Design and Development Guidelines (MnDNR 2007); Designing Sidewalks and Trails for Access, Part I and II: Best Practices Design Guide (FHWA); ADA Accessibility Guidelines for Outdoor Developed Areas (United States Access Board); and ADA Accessibility Guidelines for Buildings and Facilities (U.S. Access Board) unless more current guidelines and standards exist at the time of development.

All unconstructed segments and those associated with regional trail reconstruction, associated trailheads and trail amenities, such as rest stops, parking lots and rest rooms will be designed to accommodate individuals with disabilities. In addition, the paved trail will safely accommodate two-way directional non-motorized vehicle traffic and incorporate periodic rest stops to provide users an opportunity to rest and comfortably interact with other trail users.

Compliance with ADA standards is an important goal of trail design. Routing the trail within existing street right-of-way makes it a challenge to fully comply with ADA standards in certain areas. Parking is available at trailheads along the trail.

Multiuse Trail Public Input and Participation

The multiuse trail public input process followed along with the overall Highway 22 Corridor Study public input process. It included several meetings with the defined stakeholder group and public. Public open house meetings were held to obtain the community input on the proposed trail alignment alternatives themselves. Comments received have been addressed in revisions to the study. See **Appendix A** for public engagement materials presented at these events.

Summary of Open House #2 (Kasota) Approach & Key Findings

Attendance at the open house included members of the public and representatives from a variety of local agencies and stakeholders. Preference between the three alternative trail alignments centered primarily on Alternate A – the off-road trail option. Some were strongly opposed to Alternate C – along Highway 22, for concerns such as poor sight lines, safety, and impacts to property owners, while others were in favor of its direct access to the Sakatah Singing Hills State Trail. Across the board, there was positive support for the east-west trail connections of Alternate B, which increase access to the river corridor. Alternate B was generally considered a better option than Alternate C, though several had concerns about the narrowness of the trail and road section. Many Kasota residents expressed negative feedback regarding trail access along Cherry Street, due primarily to security reasons. A high number of snowmobile enthusiasts came out to voice their concerns that snowmobiles would be prohibited from using the trails.

Summary of Open House #2 (Mankato) Approach & Key Findings

Attendance at the open house included members of the public and representatives from a variety of local agencies and stakeholders. Several attendees provided input on the trail alternatives. A dot exercise was used to rank interest in the three trail alternatives: Corridor Alternative A that extended along an independent alignment between the Minnesota River and CSAH 5 received the most support with over 14 dots. Corridor Alternative B received 10 dots, and Corridor Alternative C along Highway 22 received three dots. Other input included a desire to allow snowmobiles on the trail corridor, with an emphasis on crossing the Minnesota River because there are currently few locations for snowmobiles to cross the river.

Multiuse Trail Conclusion and Next Steps

Multiuse trail considerations and recommendations will be included as part of the recommended roadway alternatives in Segments 2 and 3. With regards to the Minnesota State River Trail connection between Saint Peter and Mankato, it was determined by the study group that a more thorough analysis of the trail alternatives would need to be completed outside of the Highway 22 Corridor Study. MnDOT and MAPO in coordination with Le Sueur and Blue Earth Counties and the MnDNR are in the process of evaluating the trail alternatives more thoroughly and will determine outcomes and next steps as part of a separate study.

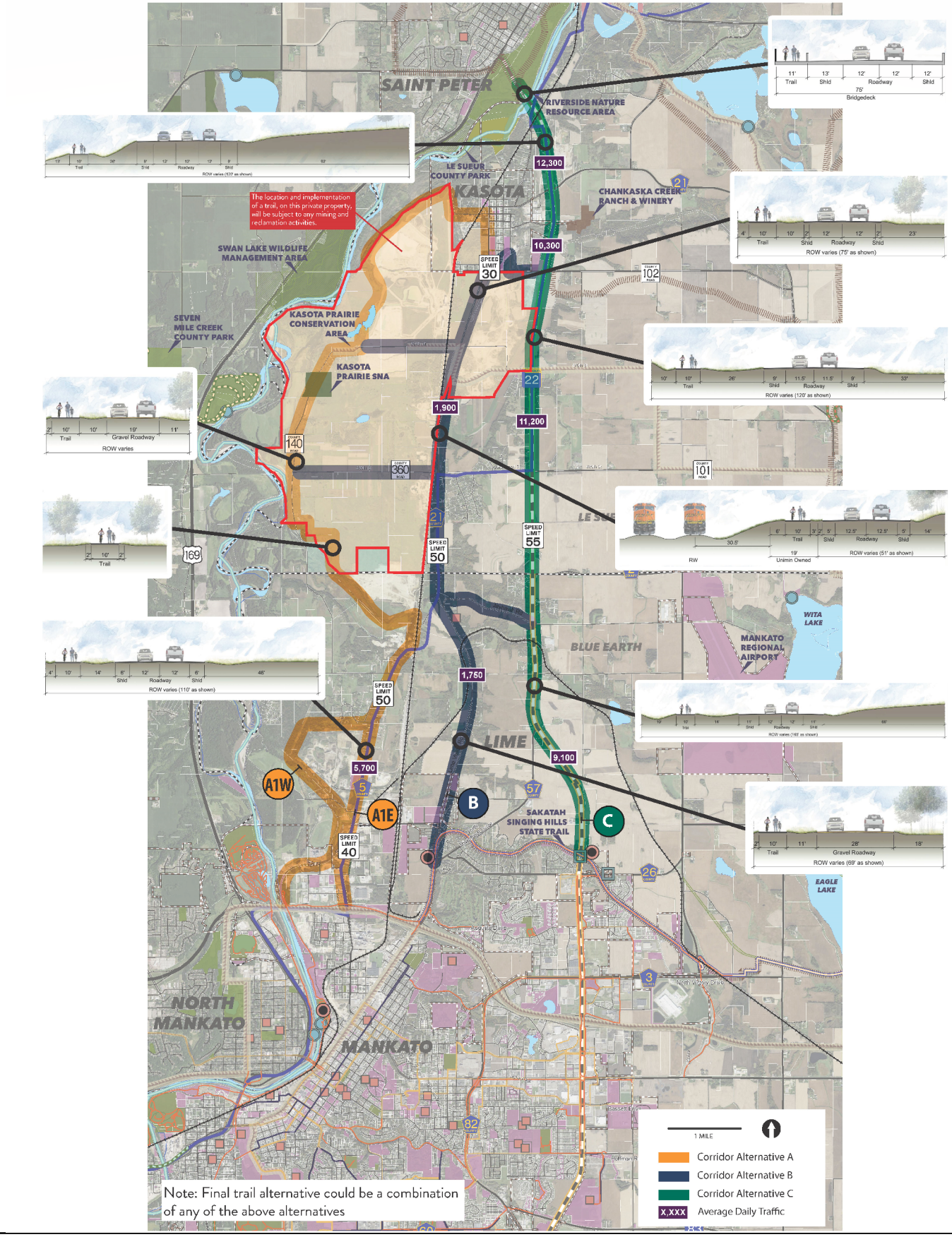


Figure 56. Recommended Trail Alternatives Map

Implementation Plan

As part of the Highway 22 Corridor Study, an Implementation Plan was developed. The purpose of the implementation plan is to provide a clear systematic blueprint that outlines the vision of the Highway 22 Corridor Study over time with a series of projects. This plan coordinates improvements that were identified based upon safety or operational need as part of this study. The implementation plan is an important component of the Highway 22 Corridor Study, as it looks to satisfy the following study goals and objectives:

- Identify potential projects within a half-mile area of the Highway 22 study area that can have a positive impact on corridor operations
- Continually provide a safe and efficient transportation system that serves the users of Highway 22 through the year 2045 planning horizon
- Limit impact to the traveling public
- Address traffic operations, safety, pavement and bridge preservation needs
- Develop an implementation prioritization schedule for the recommended projects utilizing the phasing sequencing categories of short-term, long-term and opportunity driven

Implementation Plan Reference Documents

The first step in developing the implementation plan was to understand and document current planned or programed improvements along and near the Highway 22 corridor. The following documents were utilized:

- MnDOT, Capital Highway Investment Plan (CHIP) 2019-2028
- MnDOT, State Transportation Improvement Program (STIP) 2019-2022
- The City of Mankato, Surface Transportation Capital Improvement Plan (CIP) 2018-2022
- Blue Earth County, Capital Improvement Plan (CIP) 2018-2022

It should be noted that the purpose of MnDOT's CHIP is to communicate programmed and planned capital highway projects over the next 10 years. The first four years of the CHIP represents the STIP, which is MnDOT's committed construction program. The CHIP also identifies projects in the six years after the current STIP, which are MnDOT's planned investments - understanding these projects are subject to change. The projects identified in the City of Mankato's CIP and Blue Earth County's CIP are committed construction projects. The following is a list of projects identified from above referenced documents:

MnDOT

- Funding committed for landscaping projects on Highway 22 from 206th Street in Mankato to 5th Avenue in Mapleton (STIP 2019)
- Funding committed for US 169 from 0.2 miles south to 0.25 miles north of US 14 (STIP 2019)
- Funding committed for Highway 99 from Birch Street in Nicollet to the south junction of US 169 in Saint Peter, mill and overlay, replace bridge 4596 and 52013, lighting and ADA (STIP 2021)
- Funding committed for US 169 from south junction of Highway 99 to Union Street, mill and overlay northbound lanes and construct dual left-turn lanes at south junction of Highway 22 (STIP 2022)
- Funding identified for potential pavement project on Highway 22 from north of intersection of Highway 83/CSAH 60 (Stadium Road) to Bassett Drive (CHIP 2023)
- Funding identified for potential pavement project on Highway 22 from CSAH 3 (North Victory Drive) to CSAH 26 (227th Street) (CHIP 2023)
- Funding identified for potential pavement project on Highway 22 from CSAH 57 to US 169 including several bridge replacements (CHIP 2023)
- Funding identified to replace bridge 8436, rehab bridge 07036, rehab bridge 40003, rehab bridge 40002 on Highway 22 in Le Sueur County (CHIP 2024)
- Funding identified for potential pavement project on US 169 in from Lake Street to the river in North Mankato, including several bridge replacements/rehabs (CHIP 2024)
- Funding identified for potential pavement project on Highway 22 from Mapleton to Wells (CHIP 2025)
- Funding identified for US 14 from Highway 22 to Highway 60 (CHIP 2026)

City of Mankato

- Construction of roundabout at the intersection of Madison Avenue (CSAH 17) and Haefner Drive (2019)

Blue Earth County

- Construction of roundabout at the intersection of CSAH 17 (Madison Avenue) and Haefner Drive (2019)
- Regrading and urbanizing CSAH 82 from CSAH 60 (Stadium Road) to Fair Street. Provide safe pedestrian and bicycle access by construction a 10-foot bituminous trail between the existing trail segments on CSAH 82 (2021)
- Improve safety by reconstruction of shoulders, ditch slopes, and horizontal and vertical curves on CSAH 12 from CSAH 26 to CSAH 2. Also, improve drainage and provide 10 ton per axle pavement (2022)

Highway 22 Corridor Study Recommended Projects

Based on the study process and evaluation, projects were developed to satisfy the study's goal of providing a safe and efficient transportation system that serves Highway 22 users through the year 2045 planning horizon. These projects were reviewed and developed in coordination with stakeholders and shared with the public as part of the study's public involvement process. A table of the recommended projects for each segment, need justification for each project, implementation priority, recommended phasing sequence, and planning-level cost estimate for each is provided in **Appendix K**. Concept layouts and detailed planning-level cost estimates for these recommended projects are available in **Appendix G**.

Additional Intersection Recommendations

Recall that a detailed traffic analysis was completed for Segment 2 and available in **Appendix I**. The following is a summary of the more detailed intersection recommendations not included in the implementation plan in **Appendix K**:

- CSAH 26 (227th Street)
    - Construct a roundabout by year 2030. Add right-turn bypass lanes for all approaches by year 2045.
- Augusta Drive
    - Construct a roundabout by year 2030. Expand to a 2x2 roundabout with mainline metering and right-turn bypass lanes for all approaches by year 2045.
- CSAH 3 (North Victory Drive)
    - Construct a roundabout by year 2030. Add signal metering to the mainline approaches by year 2045.
- Adams Street
    - Add signal metering to the mainline approaches by year 2045.
- Madison Avenue
    - Add signal metering to the mainline approaches by year 2045.
- Bassett Drive
    - Construct a roundabout by year 2030. Expand to a 2x2 roundabout with mainline metering and right-turn bypass lanes for all approaches by year 2045.
- Hoffman Road
    - Construct a roundabout by year 2030. Expand to a 2x2 roundabout with mainline metering and right-turn bypass lanes for all approaches by year 2045.
- TH 83/CSAH 60 (Stadium Road)
    - Construct a roundabout by year 2030.

It should also be noted that bicycle and pedestrian crossing accommodations are recommended at all signals and roundabouts (existing and proposed) within the City of Mankato. Both intersection types can be designed to safely accommodate bicycles and pedestrians.

Project Costs

Planning-level project costs were developed for the roadway improvements to outline the investments needed along the Highway 22 corridor through the 2045 planning horizon. **Figure 57** illustrates the anticipated investments needed for each phasing sequence of the implementation plan. **Figure 58** illustrates the anticipated investments needed for the entire implementation plan by segment. For each segment, a final alternative was not selected; therefore, the figures below provide a cost range (low to high) that is based on the alternatives that remain for each segment. Costs for projects developed specifically from this plan were developed using planning-level construction cost estimates and do not include the cost for right-of-way acquisition. **Appendix G** contains the planning-level cost estimates for each segment.

With regards to recommended improvements, MnDOT will coordinate a cost share agreement according to their Cost Participation Policy. A maintenance agreement will be necessary for any work (e.g. intersection improvements, bicycle/pedestrian accommodations) that will be done with local partners (e.g. County and City). A comprehensive maintenance agreement that acknowledges ditches, landscaping, bicycle facilities, other drainage, etc. will also be needed. With regards to recommended pedestrian projects, a significant amount of the cost share will likely be the responsibility of the local agency.

Figure 57. Implementation Plan Project Costs by Phasing Sequence (Current Dollars)

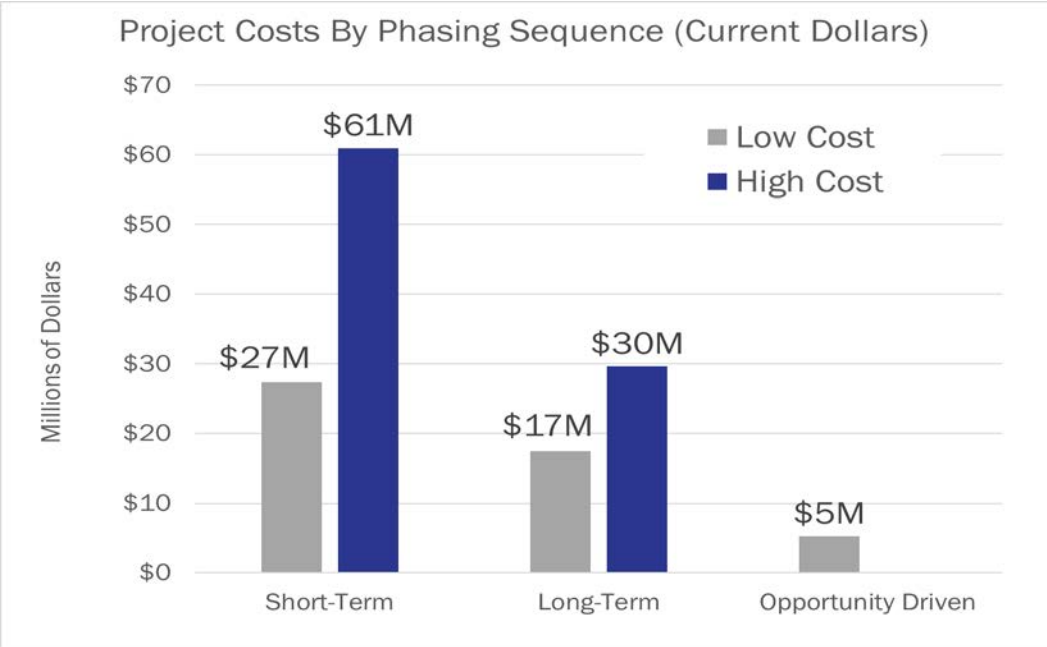
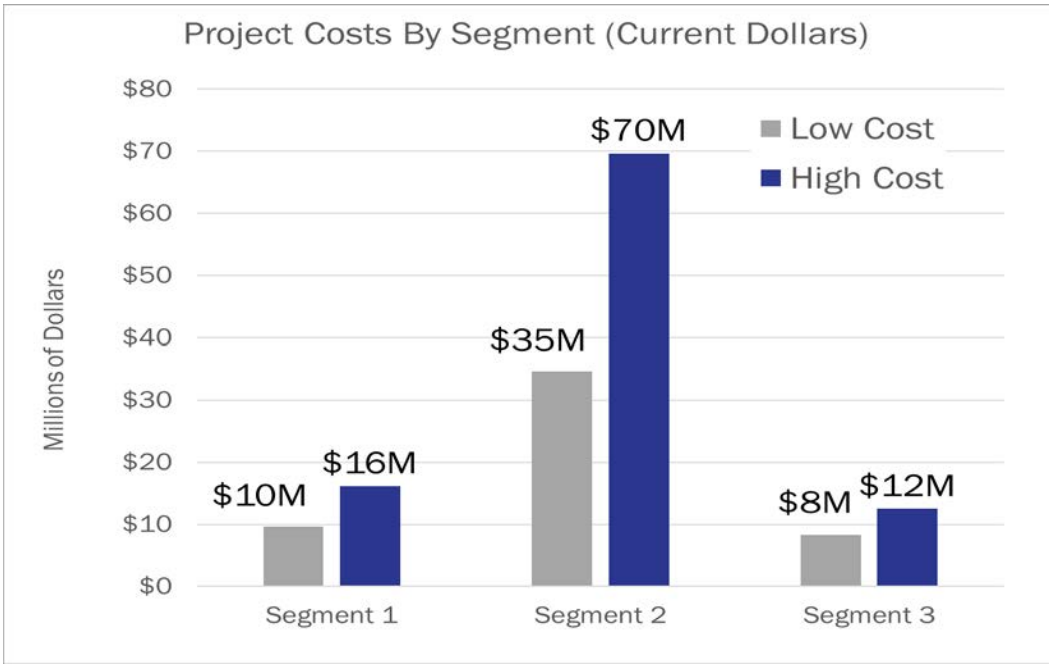


Figure 58. Implementation Plan Project Costs by Segment (Current Dollars)



Appendices

Appendix A: Public Engagement Materials

Appendix B: O-D Analysis Supporting Materials

Appendix C: Access Analysis Supporting Materials

Appendix D: Traffic Analysis Supporting Data

Appendix E: Intersection Control Evaluation (ICE) Reports

Appendix F: Purpose and Need Matrices

Appendix G: Concept Layouts and Planning-Level Cost Estimates

Appendix H: Evaluation Matrices

Appendix I: VISSIM Urban Analysis Report

Appendix J: Multiuse Trail Analysis Documentation

Appendix K: Implementation Plan