

Future Bridge Traffic Impact Study

GRAND FORKS-EAST GRAND FORKS
METROPOLITAN PLANNING ORGANIZATION



FINAL DOCUMENT

January 31, 2022

ALLIANT ENGINEERING, INC. | 733 S Marquette Ave, Suite 700, Minneapolis, MN 55402

Acknowledgements

The project team acknowledges and thanks the members of the Ad Hoc Committee for their participation in the study process. Their involvement provided valuable insight and was important to the successful completion of the study. The Future Bridge Traffic Study was prepared under the direction of the MPO and engaged the MPO Board, Technical Advisory Committee (TAC), and MPO staff.

Ad Hoc Committee

Dave Zavoral, Chamber of Commerce (Grand Forks Representative)
Josh Brown, Chamber of Commerce (East Grand Forks Representative)
Kyle Kvamme, Grand Forks City Council (Ward 5)
Brian Larson, East Grand Forks City council (At Large)
John Zavoral, Rhinehart Township, East Grand Forks
Eric Hansen, 32nd Avenue Neighborhood, Grand Forks
Craig Wald, Bygland Neighborhood, East Grand Forks
Tanya Kuntz, Elks Drive/24th Avenue Neighborhood, Grand Forks
Andrew Budke, Near Southside Neighborhood, Grand Forks
Zach Bopp, Rhinehart Neighborhood, East Grand Forks
Chris Arnold, Grand Forks School District Buildings & Grounds

Consultant Team

Alliant Engineering, Inc.
Minneapolis, MN

Widseth
Grand Forks, ND & East Grand Forks, MN

Notice

The preparation of this document was funded in part by the United States Department of Transportation with funding administered through the North Dakota Department of Transportation, Minnesota Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration. Additional funding was provided through local contributions from the governments of Grand Forks, East Grand Forks, Grand Forks County, and Polk County. The United States Government and the States of Minnesota and North Dakota assume no liability for the contents or use thereof.

The document does not constitute a standard specification, or regulation. The United States Government, the States of Minnesota and North Dakota, and the Metropolitan Planning Organization do not endorse products or manufacturers. Trade or manufacturers' names appear herein only because they are considered essential to the objective of the document.

The contents of the document reflect the authors, who are responsible for facts and accuracy of data presented herein. Contents do not necessarily reflect policies of the States and Federal Department of Transportation.

Table of Contents

Acknowledgements.....	i
Table of Contents.....	iii
List of Tables	v
List of Figures	vi
List of Appendices.....	vii
Executive Summary.....	ES-1
1. Introduction	1
1.1 Study Area	1
1.2 Study Purpose	3
1.3 Stakeholder and Public Involvement	3
1.3.1 Stakeholders and Audiences.....	3
1.3.2 Engagement Level and Decision Process.....	4
1.3.3 Ad Hoc Committee.....	4
1.3.4 Public Open Houses and Project Website	6
1.4 Previous Studies	10
1.5 Study Approach.....	10
2. Existing and Future Conditions.....	11
2.1 Existing Transportation System and Infrastructure	11
2.1.1 Roadway Characteristics.....	11
2.1.2 Multimodal Characteristics.....	19
2.2 Built and Natural Environment	22
2.2.1 Community Resources	22
2.2.2 Natural Resources.....	25
2.2.3 Farmland	28
2.2.4 Visual.....	28
2.2.5 Air Quality	30
2.2.6 Noise	30

2.2.7	Hazardous Materials	30
2.3	Land Use	31
3.	Traffic Analysis	36
3.1	Existing and Forecast Traffic Volumes and Patterns.....	36
3.1.1	Existing Traffic Volumes.....	36
3.1.2	Future Traffic Volumes	43
3.2	Traffic Safety.....	52
3.2.1	Crash Summaries	53
3.2.2	Contributing Factors	56
3.3	Existing and No Build Traffic Operations and Mobility	61
3.3.1	Level of Service Methodology.....	62
3.3.2	Roadway Segment Analysis	63
3.3.3	Intersection Traffic Operations Analysis.....	67
4.	Purpose and Need.....	72
4.1	Introduction.....	72
4.2	Purpose.....	72
4.3	Need	72
4.3.1	Primary Needs.....	72
4.3.2	Secondary Needs	73
4.4	Early Agency Coordination	74
5.	Alternatives Development and Evaluation.....	77
5.1	Mobility and Congestion	78
5.1.1	Forecast Traffic Volumes and Patterns.....	78
5.1.2	Future Build Traffic Operations and Mobility.....	83
5.1.3	Traffic Control Warrants Analysis	95
5.1.4	Intersection Mitigation	98
5.2	Multimodal System Linkage	103
5.3	Community and Economic Factors	104
5.3.1	Total Travel on Study Corridors	104

5.3.2	Traffic Change on the Study Corridors Adjacent to Schools.....	105
5.3.3	Consistency with Approved Transportation Plans.....	105
5.3.4	Support for Economic Development	105
5.3.5	Impact to the Greenway	106
5.4	Environmental Impacts	106
5.5	Benefit-Cost.....	107
5.6	Key Differentiators	108
6.	Next Steps	109

LIST OF TABLES

Table ES-1.	Evaluation Summary Key Differentiators.....	ES-4
Table 1-1.	Study Roadways and Intersections	1
Table 1-2.	Seats for Ad Hoc Committee.....	5
Table 1-3.	Website Traffic Statistics (Open House #1)	6
Table 1-4.	Website Traffic Statistics (Open House #2)	8
Table 1-5.	Study Phases and Goals	10
Table 2-1.	Study Corridor Functional Classification.....	12
Table 3-1.	Existing Turning Movement Volume Data Sources	37
Table 3-2.	Historical Volume Trend Analysis	38
Table 3-3.	2016-2020 Intersection Crash Analysis Summary	54
Table 3-4.	Contributing Factors at Issue Intersections.....	56
Table 3-5.	2016-2020 Segment Crash Analysis Summary	59
Table 3-6.	Level of Service Grade Definitions	63
Table 3-7.	Existing (2021) Conditions Intersection Delay and LOS.....	68
Table 3-8.	2030 No Build Conditions Intersection Delay and LOS.....	69
Table 3-9.	2045 No Build Conditions Intersection Delay and LOS.....	70
Table 5-1.	2030 Elks Drive Bridge Conditions Intersection Delay and LOS.....	90
Table 5-2.	2045 Elks Drive Bridge Conditions Intersection Delay and LOS.....	92
Table 5-3.	2030 32 nd Avenue Bridge Conditions Intersection Delay and LOS	93
Table 5-4.	2045 32 nd Avenue Bridge Conditions Intersection Delay and LOS	94
Table 5-5.	Existing Signal and All-Way Stop Warrant Analysis Summary.....	96
Table 5-6.	2030 Signal and All-Way Stop Warrant Analysis Summary	96
Table 5-7.	2045 Signal and All-Way Stop Warrant Analysis Summary	97
Table 5-8.	2045 Intersection LOS Summary.....	98
Table 5-9.	Intersection Mitigation Summary.....	99
Table 5-10.	Summary of Intersection Mitigation Assumed for Cost Estimate	101
Table 5-11.	Daily VMT and VHT on the Regional Urban System	103



Table 5-12. Daily VMT and VHT on Study Corridors	103
Table 5-13. Total Travel on Study Corridors	104
Table 5-14. Traffic Change Near Schools	105
Table 5-15. Benefit-Cost Analysis	107
Table 5-16. Evaluation Summary Key Differentiators.....	108

LIST OF FIGURES

Figure ES-1. Proposed Decision-Making Structure	ES-2
Figure ES-2. Potential Future Bridge Visualization	ES-3
Figure 1-1. Study Area.....	2
Figure 1-2. Proposed Decision-Making Structure.....	4
Figure 1-3. Survey Respondent Priorities	7
Figure 1-4. Survey Respondent Opinion of Purpose and Need	7
Figure 1-5. Alternatives Meeting Purpose and Need Ratings.....	9
Figure 1-6. Survey Respondent Opinion of Purpose and Need	9
Figure 2-1. Access and Mobility Relationship to Functional Classification.....	11
Figure 2-2. Transportation System Functional Classification	13
Figure 2-3. Existing Access Inventory and Classification	14
Figure 2-4. Roadway Geometric, Traffic Control and Lighting Characteristics.....	17
Figure 2-5. Right of Way and Above Ground Utilities.....	18
Figure 2-6. Existing and Planned Non-Motorized Facilities	20
Figure 2-7. Transit Network	21
Figure 2-8. Community Resources	24
Figure 2-9. Natural Resources.....	29
Figure 2-10. Existing Land Use – Grand Forks.....	32
Figure 2-11. Existing Land Use – East Grand Forks	33
Figure 2-12. Future (2045) Land Use Plan – Grand Forks	34
Figure 2-13. Future (2045) Land Use Plan – Grand Forks	35
Figure 3-1. COVID-19 Peak Period Volume Adjustment Factors	38
Figure 3-2. Existing Traffic Volumes.....	39
Figure 3-3. Point Bridge West to East Traffic Patterns	41
Figure 3-4. Point Bridge East to West Traffic Patterns	42
Figure 3-5. Forecast 2030 No Build Traffic Volumes	44
Figure 3-6. Forecast 2045 No Build Traffic Volumes	45
Figure 3-7. Forecast 2030 Elks Drive Bridge Traffic Volumes	46
Figure 3-8. Forecast 2045 Elks Drive Bridge Traffic Volumes	47
Figure 3-9. Forecast 2030 32 nd Avenue Bridge Traffic Volumes.....	48
Figure 3-10. Forecast 2045 32 nd Avenue Bridge Traffic Volumes.....	49
Figure 3-11. 2015 to 2030 No Build Traffic Volume Change	50
Figure 3-12. 2015 to 2045 No Build Traffic Volume Change	51

Figure 3-13. 32 nd Avenue S & S Washington Street Crash Type/Severity Breakdown	57
Figure 3-14. 24 th Avenue S & S Washington Street Crash Type/Severity Breakdown.....	57
Figure 3-15. DeMers Avenue & S Washington Street Crash Type/Severity Breakdown.....	58
Figure 3-16. Bygland Road SE & Greenway Boulevard SE Crash Type/Severity Breakdown	58
Figure 3-17. 2015 Existing Segment Volume/Capacity and Level of Service.....	64
Figure 3-18. 2030 No Build Segment Volume/Capacity and Level of Service	65
Figure 3-19. 2045 No Build Segment Volume/Capacity and Level of Service	66
Figure 5-1. Potential Future Bridge Visualization	77
Figure 5-2. 2030 No Build vs. Elks Drive Bridge Volume Change.....	79
Figure 5-3. 2045 No Build vs. Elks Drive Bridge Volume Change.....	80
Figure 5-4. 2030 No Build vs. 32 nd Ave Bridge Volume Change.....	81
Figure 5-5. 2045 No Build vs. 32 nd Ave Bridge Volume Change.....	82
Figure 5-6. 2030 Elks Drive Bridge Conditions Segment Volume/Capacity and Level of Service.....	85
Figure 5-7. 2045 Elks Drive Bridge Conditions Segment Volume/Capacity and Level of Service.....	86
Figure 5-8. 2030 32 nd Ave Bridge Conditions Segment Volume/Capacity and Level of Service.....	87
Figure 5-9. 2045 32 nd Ave Bridge Conditions Segment Volume/Capacity and Level of Service.....	88

LIST OF APPENDICES

Appendix A: Public Participation

Appendix B: Evaluation Matrix

Appendix C: Intersection Mitigation Concept Sketches and School/Pedestrian Safety Strategies

Executive Summary

The Grand Forks-East Grand Forks Metropolitan Planning Organization (MPO) cooperated with local, state, and federal partners, to conduct this traffic impact study of a future bridge between Grand Forks, ND and East Grand Forks, MN across the Red River.

Safe and convenient access across the Red River is a priority for the Grand Forks-East Grand Forks region. In 2020, the two cities prepared the Grand Forks – East Grand Forks Hydraulic Analysis of South End Red River Bridge study to review river crossing alignments. This and the 2018 Metropolitan Transportation Plan (MTP) provide a starting point for the Traffic Impact Study. The purpose of this study is to develop and evaluate alternatives for a new bridge that will provide improved mobility and safety and support economic development in the region, within the feasible corridor locations documented in the prior hydraulics study.

PROJECT PURPOSE

Prior studies and plans dating back to the 1960's have identified the need for a new local river crossing between the two cities to reduce congestion at the existing crossings and the surrounding roadway network. These include the 2018 Metropolitan Transportation Plan and the 2020 Hydraulic Analysis of South End Red River Bridge study. The conclusions of these studies support further analysis of a new river crossing in the corridors: Elks Drive and 32nd Avenue S. The current study will develop and evaluate river crossing alternatives in these corridors and related improvements on the local street system as needed. The following purpose statement has been prepared for the project.

The purpose of the Grand Forks-East Grand Forks Future Bridge Project is to improve mobility and connectivity between Grand Forks and East Grand Forks by reducing congestion on the Point Bridge and connecting roadways while providing a more direct connection for trips between the two cities.

PROJECT NEEDS

The project needs discussion identified transportation deficiencies that currently exist or are reasonably expected to occur within the project area. The needs section discusses the transportation problems which led to the initiation of the project (primary needs). In addressing these needs, the agencies involved also look for other transportation problems or opportunities for system improvements within the area that may be addressed concurrently (secondary needs). The study needs are as follows:

- Primary Needs
 - Mobility/Congestion
 - Multimodal System Linkage
- Secondary Needs
 - Crashes
 - Social and Economic Factors

STAKEHOLDER AND PUBLIC INVOLVEMENT

A key part to the completion of the study was the stakeholder and public involvement process, which included partner agencies through the MPO TAC; an Ad Hoc Committee of community representatives and elected officials; public meetings; and an interactive project website. Alliant facilitated input opportunities and other applicable forms of engagement with many different stakeholders to understand stakeholder needs, concerns, and input on the alternatives. Stakeholders were involved throughout the process, at different involvement frequencies depending on the stakeholder role in decision-making, as shown in **Figure ES-1**.

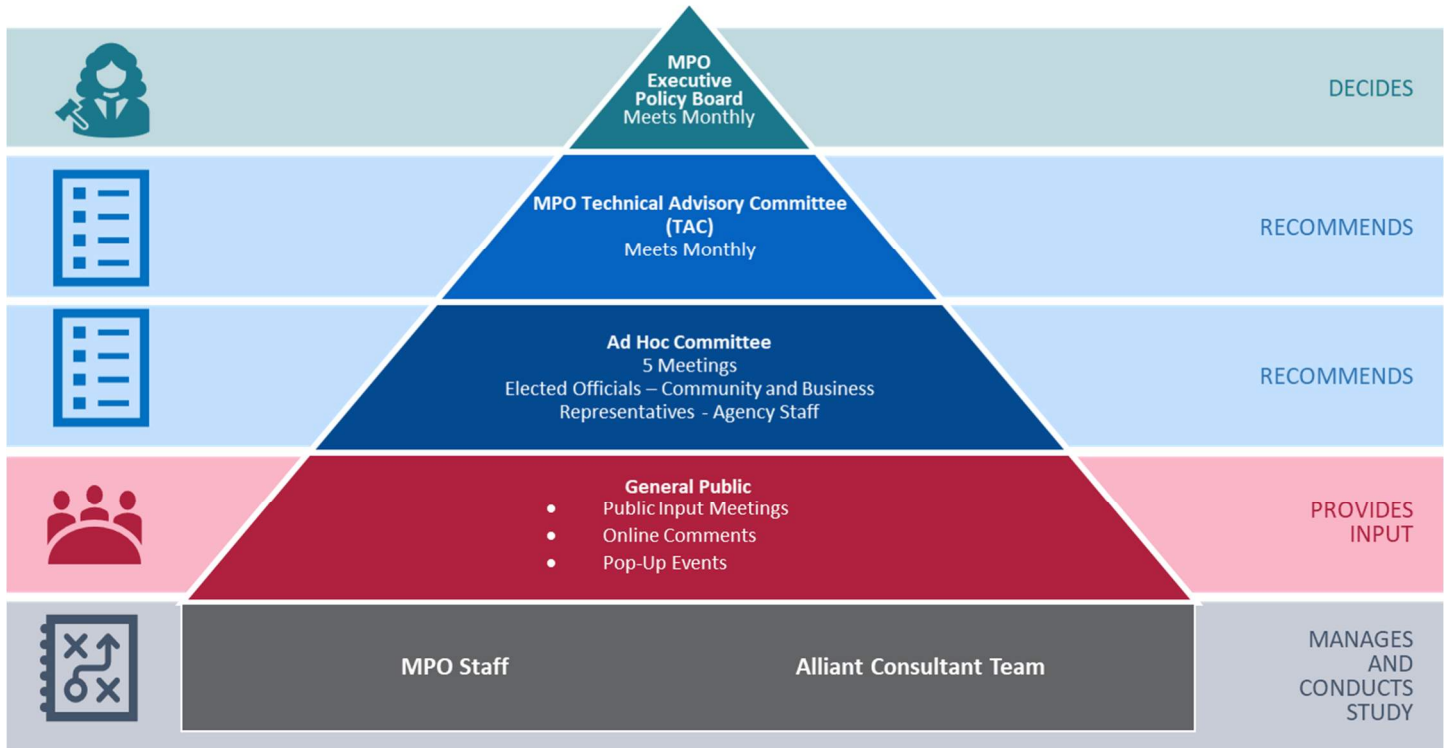


Figure ES-1. Proposed Decision-Making Structure

The Ad Hoc Committee was created specifically for the Future Bridge Traffic Impact Study to provide a balanced representation of stakeholder interests, affected communities, and geographic areas and serve as communication link between those interests and communities and the project team. Committee members were appointed by the MPO Executive Policy Board. The Ad Hoc meetings were livestreamed for the public to view and recordings were archived for viewing at any time.

Two public open houses were held during the study. Each open house had an ongoing online component where participants could view information and submit comments at any time over a multi-week period, as well as a live event. The live event for the first meeting was online and the second live event was held both online and in person.

ALTERNATIVES ANALYSIS

Based on prior studies (the 2018 Metropolitan Transportation Plan and the 2020 Hydraulic Analysis of South End Red River Bridge study), the alternatives to be analyzed in this study were as follows:

- No Build (no new bridge)
- Elks Drive Bridge Corridor
- 32nd Avenue Bridge Corridor

Each of the alternatives would include mitigation needed based on the intersection traffic operations and traffic control warrants analysis. In both the Elks Drive and 32nd Avenue bridge options, precise corridor alignments or landing locations were not identified in this study. However, for either location, a new bridge would be expected to have the following characteristics:

- 2 travel lanes for vehicles
- Signed for no trucks
- Bicycle/pedestrian trail on bridge
- Greenway trail routed under bridge (similar to other bridges)
- High point about 3 feet above street level in Grand Forks
- Flood wall closure system would be maintained (assumed to be a street opening similar to Elks Drive today)

Figure ES-2 shows a visualization of what the bridge could look like. The photo was taken at Elks Drive, but the look would be similar at Elks Drive or at 32nd Avenue.



Figure ES-2. Potential Future Bridge Visualization

The alternatives were evaluated based on whether they were compatible with the project purpose and how well they meet the project needs. The need categories evaluated were Mobility and Congestion, Multimodal System Linkage, and Community and Economic Factors. Although Safety is an identified need, it was not evaluated specifically due to the amount of analysis needed to forecast results; however, it is assumed that all three options (including No Build) would include safety improvements, especially around schools. Environmental impacts and benefit/cost were also evaluated.

Table ES-1 shows the higher order criteria where the two alternatives had different scores. The criteria that are not shown had the same score for both Elks Drive and 32nd Avenue options.

Table ES-1. Evaluation Summary Key Differentiators

Evaluation Criteria		Alternatives Rating				
		No New Bridge	Elks Drive	32 nd Avenue		
Purpose and Need	Multimodal System Linkage					
	Total miles of travel on the system (distance)	N	+	++		
	Total hours of travel on the system (time)	N	+	++		
	Total miles of travel on study corridors (distance)	N	+	++		
	Total hours of travel on study corridors (time)	N	+	++		
	Ped/bike connectivity	-	+	++		
	Community and Economic Factors					
	Total miles of travel on study corridors (distance)	N	+	++		
	Traffic change on study corridors adjacent to schools	N	+	N		
	Consistency with approved transportation plans	-	N	+		
Env. Impacts	Environmental Impacts					
	Potential impact on flood protection system	N	N	-		
	Soil stability	N	-	N		
Cost	Benefit/Cost					
	Bridge Cost (\$millions)	N/A	\$30.0	\$36.4		
	Intersection Mitigation Cost (\$ millions)	\$17.2 - \$25.8	\$2.4 - \$3.6	\$3.1 - \$4.7		
	Total Planning Level Cost Estimate (\$ millions)	\$17.2 - \$25.8	\$32.4 - \$33.6	\$39.5 - \$41.4		
	Transportation Benefits (\$ millions)	N/A	\$30.3	\$48.5		
	Benefit-Cost Ratio	N/A	<1	>1		
Rating		++	+	N	-	--

The following lists key takeaways from the study:

- Both new bridge options address the identified needs
- Both new bridge options provide a more equitable distribution of traffic
- The 32nd Avenue bridge option has a greater cumulative benefit for hours and miles traveled and a positive benefit-cost ratio
- School safety is a concern today that can be addressed independent of decisions or next steps on a river crossing alternative. Improvements made in the near term would be expected to remain useful with any alternative.
- This study is not recommending one option over the other

1. Introduction

The Grand Forks-East Grand Forks Metropolitan Planning Organization (MPO) cooperated with local, state, and federal partners, to conduct this traffic impact study of a future bridge between Grand Forks, ND and East Grand Forks, MN across the Red River.

Safe and convenient access across the Red River is a priority for the Grand Forks-East Grand Forks region. In 2020, the two cities prepared the Grand Forks – East Grand Forks Hydraulic Analysis of South End Red River Bridge study to review river crossing alignments. This and the 2018 Metropolitan Transportation Plan (MTP) provide a starting point for the Traffic Impact Study. The purpose of this study is to develop and evaluate alternatives for a new bridge that will provide improved mobility and safety and support economic development in the region.

1.1 STUDY AREA

The traffic study area is defined by study corridors and intersections, based on the anticipated traffic influence area in Grand Forks and East Grand Forks. The study areas for other resources may be smaller, depending on the extent of potential impacts. The City of Grand Forks is in Grand Forks County, North Dakota. The City of East Grand Forks is in Polk County, Minnesota. The Red River runs between the two cities. The study corridors and intersections are listed in **Table 1-1**. The study area is illustrated in **Figure 1-1**.

Table 1-1. Study Roadways and Intersections

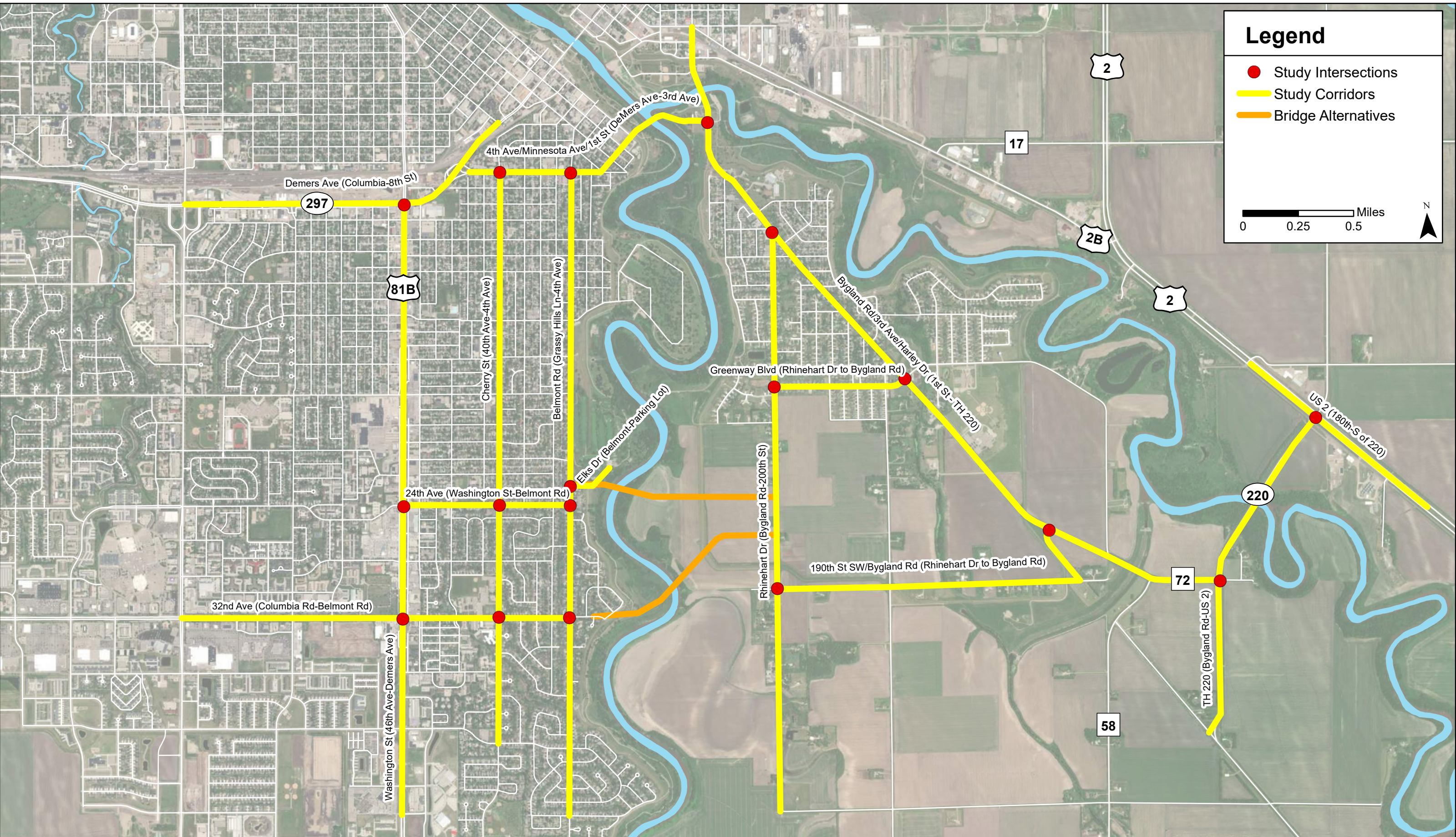
Location	Grand Forks	East Grand Forks
Study Roadways	○ 32 nd Avenue S	○ Bygland Road SE/3 rd Avenue SE/2 nd Avenue NE/Harley Drive
	○ 24 th Avenue S	○ US 2
	○ Elks Drive	○ Rhinehart Drive SE
	○ Demers Avenue	○ TH 220
	○ 4 th Avenue S/Minnesota Avenue	○ 1 st Street SE
	○ S Washington Street	○ Greenway Boulevard SE
	○ Cherry Street	○ 190 th Street SW
	○ Belmont Road	
Study Intersections	○ 32 nd Avenue S & S Washington Street	○ Bygland Road SE (CR 72) & 1 st Street SE
	○ 32 nd Avenue S & Cherry Street	○ Bygland Road SE (CR 72) & Rhinehart Drive SE
	○ 32 nd Avenue S & Belmont Road	○ Rhinehart Drive SE & Greenway Boulevard SE
	○ 24 th Avenue S & S Washington Street	○ Rhinehart Drive SE & Future 24 th Street SE
	○ 24 th Avenue S & Cherry Street	○ Rhinehart Drive SE & Future 32 nd Street SE
	○ 24 th Avenue S & Belmont Road	○ Rhinehart Drive SE & 190 th Street SW
	○ Belmont Road & Elks Drive	○ Bygland Road SE (CR 72) & Greenway Boulevard SE
	○ Demers Avenue & S Washington Street	○ Bygland Road SE (CR 72) & Bygland Road SE/190 th Street SW
	○ 4 th Avenue S & Cherry Street	○ TH 220 & Harley Drive
	○ 4 th Avenue S & Belmont Road	○ TH 220 & US 2

Legend

- Study Intersections
- ▬ Study Corridors
- ▬ Bridge Alternatives

0 0.25 0.5 Miles

N



Future Bridge Traffic Impact Study



Figure 1-1
Study Area

Source: ESRI World Imagery Basemap

1.2 STUDY PURPOSE

The Alliant Engineering, Inc. (Alliant) team was hired as a consultant to the Grand Forks-East Grand Forks Metropolitan Planning Organization (MPO) and local, state, and federal partners to conduct a traffic impact study of a future bridge between Grand Forks, ND, and East Grand Forks, MN, across the Red River.

Prior studies and plans have identified the need for a new local river crossing between the two cities to reduce congestion at the existing crossings and the surrounding roadway network. These include the 2018 Metropolitan Transportation Plan and the 2020 Hydraulic Analysis of South End Red River Bridge study. The conclusions of these studies support further analysis of a new river crossing in the corridors: Elks Drive and 32nd Avenue S. The current study will develop and evaluate river crossing alternatives in these corridors and related improvements on the local street system as needed.

1.3 STAKEHOLDER AND PUBLIC INVOLVEMENT

A key part to the completion of the study was the stakeholder and public involvement process, which included partner agencies, an Ad Hoc Committee, public meetings, and a website.

1.3.1 Stakeholders and Audiences

The following stakeholders were identified for involvement in this study:

- MPO Executive Policy Board (Board)
- MPO Technical Advisory Committee (TAC)
- Partner Agencies (may also be represented on Board and/or TAC)
 - City of Grand Forks, ND
 - City of East Grand Forks, MN
 - Grand Forks County, ND
 - Polk County, MN
 - NDDOT
 - MnDOT
 - Federal Highway Administration
 - Other Local, State and Federal Agencies
- Ad Hoc Committee
 - Elected Officials
 - Neighborhood/School District/Business Representatives
- Other Organizations and Members of the Public
 - Residents adjacent to key corridors
 - Neighborhood residents
 - Greater MPO area residents
 - Schools, including
 - Kelly
 - Viking
 - Phoenix

- Local businesses
- Greenway advocates
- Emergency services
- Bicyclists, pedestrians, and other non-motorized users if not included in above groups
- Environmental agencies (via the PEL process)

1.3.2 Engagement Level and Decision Process

This project required a two-way conversation between the stakeholders, including the public, and the project team. Alliant facilitated input opportunities and other applicable forms of engagement with many different stakeholders to understand stakeholder needs and concerns. Stakeholders were involved throughout the process, at different involvement frequencies depending on the stakeholder role in decision-making, as shown in **Figure 1-2**.

Due to the COVID-19 pandemic, the engagement plan emphasized online meetings and engagement. The plan originally deemphasized indoor group settings such as in-person public open houses but was adjusted to include an in-person public open house in December 2021.

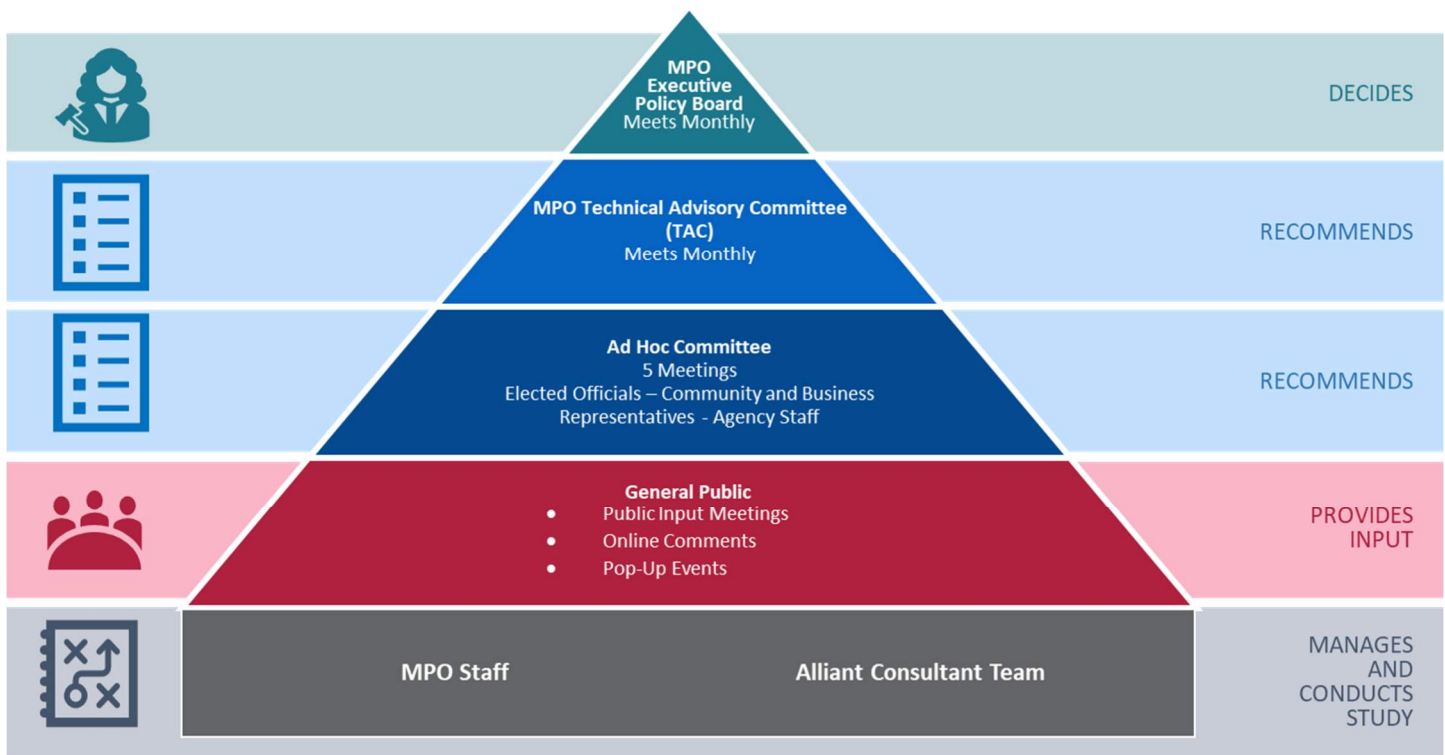


Figure 1-2. Proposed Decision-Making Structure

1.3.3 Ad Hoc Committee

The Ad Hoc Committee for the Future Bridge Traffic Impact Study provided a balanced representation of stakeholder interests, affected communities, and geographic areas and serve as communication link between those interests and communities and the project team. Committee members were appointed by the MPO

Executive Policy Board. Seats and rationale are described in **Table 1-2**. The Ad Hoc meetings were livestreamed for the public to view and recordings were archived for viewing at any time.

Responsibilities of the Ad Hoc Committee members were as follows:

- Represent their constituents’ perspectives during group deliberations
- Communicate project progress with their constituents with agency staff as requested.
- Prepare for and participate in up to five meetings (1-2 hours each) during the project
- Attend study public outreach events and review online and other public comments
- Work to develop consensus recommendations to the MPO Executive Policy Board at each step in the decision process

Table 1-2. Seats for Ad Hoc Committee

Committee Seat	Representing
Elected Officials	
Grand Forks City Council – Ward 5	Single seat to capture both bridge alignments
East Grand Forks City Council – At Large	Single seat to capture both bridge alignments
Community and Business	
32nd Avenue Neighborhood (GF)	Directly adjacent neighborhood
Elks Drive/24th Ave Neighborhood (GF)	Directly adjacent neighborhood
Near Southside Neighborhood (GF)	Indirectly affected neighborhood (traffic)
Rhinehart Neighborhood (EGF)	Directly adjacent neighborhood
Bygland Neighborhood (EGF)	Directly adjacent neighborhood
Rhinehart Township	Directly adjacent neighborhood
Grand Forks School District	Schools with potential traffic impacts
Chamber of Commerce (GF Rep)	Business/economic interest
Chamber of Commerce (EGF Rep)	Business/economic interest
Agency Staff (Advisory Role/Non-Recommendng)	
City of Grand Forks, ND	North Dakota City
City of East Grand Forks, MN	Minnesota City
Grand Forks County, ND	North Dakota County
Polk County, MN	Minnesota County (unincorporated area)
North Dakota Dept. of Transportation	State of North Dakota Transportation
Minnesota Dept. of Transportation	State of Minnesota Transportation
Federal Highway Administration	Federal Transportation
BNSF Railway	Freight Rail
Grand Forks Airport Authority	Airport
Grand Forks-East Grand Forks MPO	Regional Transportation/Planning

1.3.4 Public Open Houses and Project Website

In addition, the project team developed a website for the project. This website was linked from the MPO website for ease of access. The website includes the following pages:

- Home page with announcements, a project overview, and a form to sign up for email updates
- Public Involvement page where the open houses are hosted and summarized
- Ad Hoc Group page with the roster, meeting materials, and meeting recordings
- Study Documents page where technical memorandums and other documents are posted as they are published
- Resources page where relevant previous studies are linked

Two public open houses were held during the study. Each open house had an ongoing online component where participants could view information and submit comments at any time over a multi-week period, as well as a live event. The live event for the first meeting was online and the second live event was held both online and in person. Meeting materials and survey responses are provided in **Appendix A**.

1.3.4.1 Open House 1

The purpose of the first open house was to share information on the background of the project, identify issues and opportunities, and obtain input on the draft purpose and need.

This open house was hosted online for 3 weeks during July and August 2021, and had a live online presentation on Tuesday, July 27 from 6:30-7:30pm where participants could provide input and discussion via the meeting chat. A recording was available online for the remainder of the online engagement period. Attendance was low for the live event (13 participants) but there was good traffic to the website. An additional 40 people viewed the live event recording, and over a thousand people visited the website. **Table 1-3** details participation levels obtained through website traffic statistics. 281 survey responses were submitted and 48 comments were placed on an interactive map.

Table 1-3. Website Traffic Statistics (Open House #1)

	Before Open House	After Open House
Total Site Visits	2,186	6,605 (increase of 3,093 during open house period)
Total Unique Users	445	1,796 (increase of 1,049 during open house period)

The survey asked participants to rank their priorities. The results are shown in **Figure 1-3**. 253 people responded to this question and 40 of them wrote in a comment for “other” priority, which included impact on neighborhood character and quality of life, impact on property values, added option for bridges during a flooding event, and convenience and access across the river.

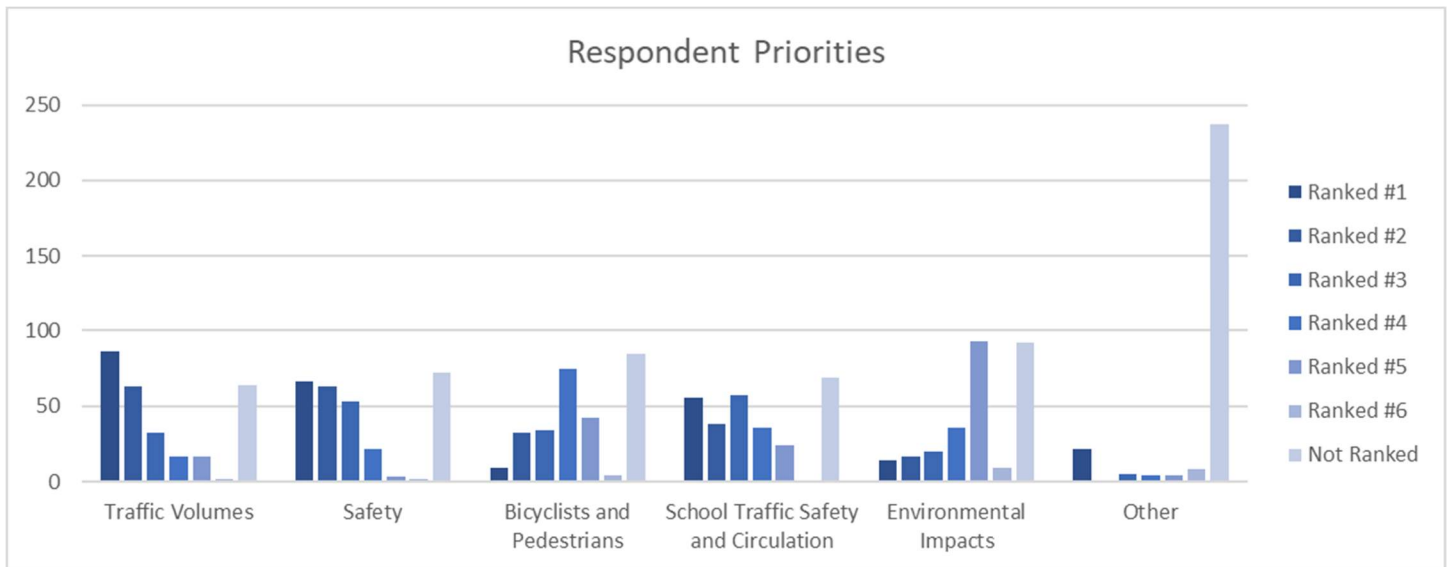


Figure 1-3. Survey Respondent Priorities

Respondents were also asked whether they agreed or disagreed with the purpose and need statement. The results are shown in **Figure 1-4**. 59% of respondents “Strongly Agree” with the project purpose and need, while only 17% “Strongly Disagree” – over three times as many people strongly agreed than strongly disagreed. 264 people responded to this question and 181 of them added a comment. Of those who strongly agreed, comment themes included added convenience, reduction in traffic and congestion especially on other bridges, both cities are growing south. Of those who strongly disagreed, common themes included a benefit for East Grand Forks only, negative impacts to neighborhoods around 32nd Avenue, preference for a bridge farther south, and increased traffic around schools.

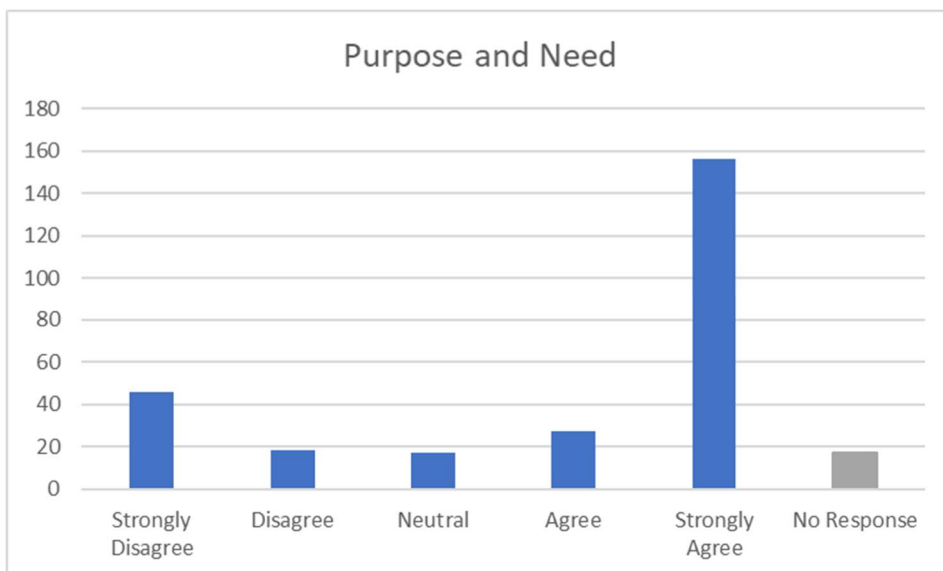


Figure 1-4. Survey Respondent Opinion of Purpose and Need

1.3.4.2 Open House 2

The purpose of the second open house was to share the evaluation results, envision what a new bridge could look like, highlight pedestrian safety and traffic calming strategies around schools, and get input on all three alternatives:

- No New Bridge
- New Bridge at Elks Drive
- New Bridge at 32nd Avenue

This open house was hosted online for 3 weeks during December 2021 and January 2022 and had a live in-person event on Thursday, December 16 from 4:30-6:30 pm where participants could view display boards, watch a presentation, and ask questions to project staff. The boards and live presentation were also available online. Participants both online and in person were encouraged to provide comments via a survey, which was the same for both formats.

Around 20 people attended the live event and over 1,700 new visitors for this event period. **Table 1-4** details participation levels obtained through the in-person sign-in sheet, website traffic statistics, and the survey.

Table 1-4. Website Traffic Statistics (Open House #2)

	In Person	Online
Total Visits	20+	6,052
Unique Users	--	1,768 new (3,857 on website to date)
Survey Responses	13	354

The survey asked participants to rank how well they feel each alternative meets the project purpose and need. The results are shown in **Figure 1-5**. They were also asked what they would change, if anything, to improve the performance of each bridge option. Key takeaways from these write-in responses include:

- Elks Drive Option
 - Improve traffic control at affected intersections (signal/roundabout)
 - Increase elevation
 - Modify Grand Forks bridge approach
- 32nd Avenue Option
 - Improve pedestrian safety and loading zones around schools
 - Improve traffic control at affected intersections – signal/roundabout
 - Increase elevation
 - Widen/add lanes

How well do you feel each alternative meets the project purpose and need?

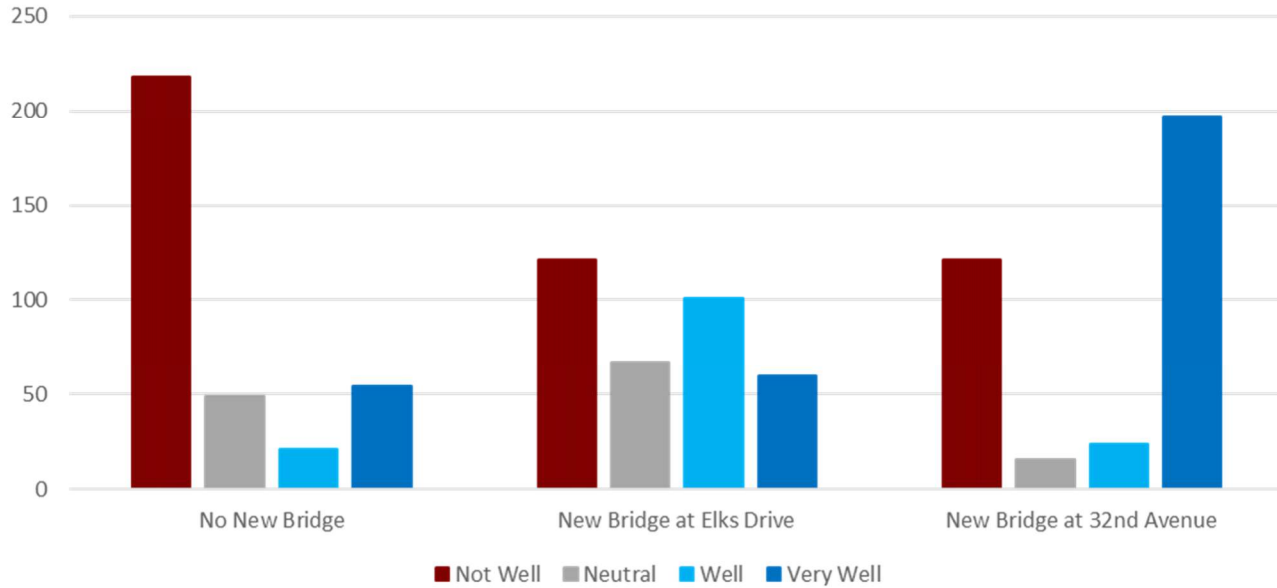


Figure 1-5. Alternatives Meeting Purpose and Need Ratings

Respondents were also asked which alternative they preferred. The results are shown in Figure 1-6.

Which alternative do you prefer?

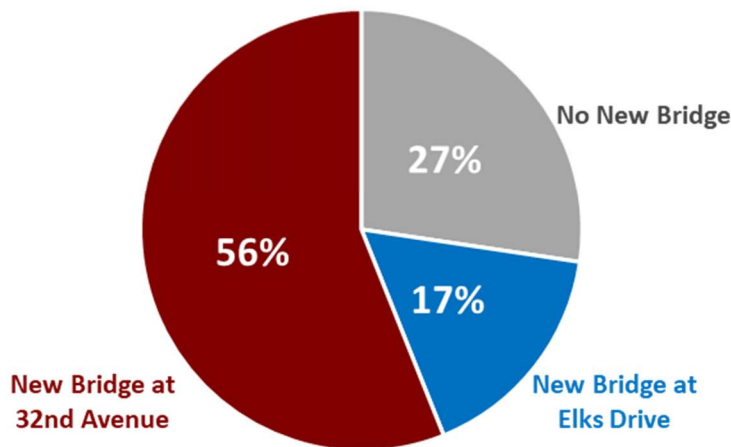


Figure 1-6. Survey Respondent Opinion of Purpose and Need

Participants were also asked if they had any comments or questions on the bridge alternatives or the study. 157 people responded to this question and the following themes came up often:

- Concerns about increased traffic in neighborhoods (especially around schools) and overall benefit to Grand Forks
- Desire for a bridge farther south
- Enthusiasm about a new connection across the river
- Questions about funding – where will the money come from, what portion will each city pay?
- Flooding – impacts to flood system/options after flood/suggest making bridge higher
- Concerns about impacts to the Greenway

1.4 PREVIOUS STUDIES

Prior studies and plans have identified the need for a new local river crossing between Grand Forks and East Grand Forks to reduce congestion on the Point Bridge and the surrounding roadway network. The two most recent documents are the 2018 Metropolitan Transportation Plan and the 2020 Hydraulic Analysis of South End Red River Bridge.

- The 2045 Metropolitan Transportation Plan (2018) identified needs for two new bridges: an intracity bridge for travel between Grand Forks and East Grand Forks and an intraregional bridge for regional trips. The preferred alignment for the intracity bridge was identified as 32nd Avenue.

The Hydraulic Analysis of South End Red River Bridge (2020) study identified two crossing locations for further analysis: Elks Drive and 32nd Avenue. This study also demonstrated that a crossing at 47th Avenue is infeasible because of the need for complicated flood mitigation.

1.5 STUDY APPROACH

The project was conducted in three phases: Discovery, Development, and Design. Study content as it relates to the phase and goals is summarized in **Table 1-5**.

Table 1-5. Study Phases and Goals

Phase and Goals	Study Tasks
<p>Discovery <i>Discover and understand existing and future conditions, constraints, and stakeholder needs and concerns.</i></p>	<ul style="list-style-type: none"> • Study purpose and goals • Existing and future conditions • Project needs and benefits
<p>Development <i>Develop and evaluate potential crossing and traffic options that respond to identified issues and needs.</i></p>	<ul style="list-style-type: none"> • Alternatives • Evaluation results
<p>Documentation <i>Summarize the study results and set up the project for the next step</i></p>	<ul style="list-style-type: none"> • Study report

2. Existing and Future Conditions

2.1 EXISTING TRANSPORTATION SYSTEM AND INFRASTRUCTURE

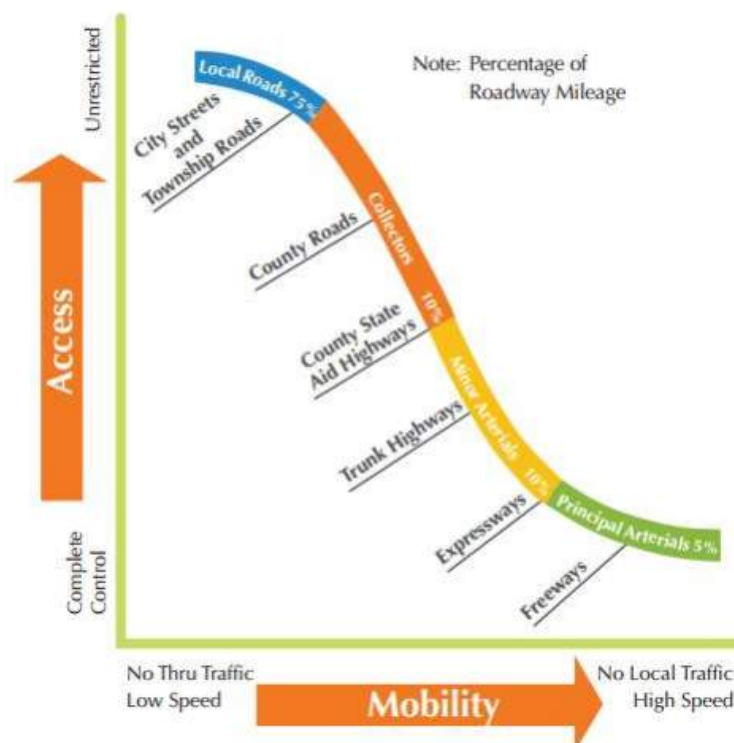
Key components of the existing transportation system and infrastructure relevant to the Future Bridge Traffic Impact Study include roadway characteristics, infrastructure, public/private access, and multimodal characteristics. These features and conditions are documented in the following sections.

2.1.1 Roadway Characteristics

The following sections define the key roadway characteristics including the functional classification, roadway geometrics, traffic control devices, parking, and right of way.

2.1.1.1 Functional and Funding Classification

Roadways serve two major functions: access and mobility. The function of a roadway is dependent on its classification. Interstates and principal arterials provide the highest degree of mobility but are limited in providing land access. Local streets provide a high degree of land access with less mobility. **Figure 2-1** shows a comparison of the different functional classifications relating access to mobility.



Source: FHWA Publications No. FHWA-RD-91-044 (Nov 1992)

Figure 2-1. Access and Mobility Relationship to Functional Classification

The study roadways are classified as detailed in **Table 2-1**. **Figure 2-2** shows the transportation system functional classification of the roadway network.







Table 2-1. Study Corridor Functional Classification

Corridor	Functional Classification
32nd Avenue S	Principal Arterial west of S Washington Street Minor Arterial east of S Washington Street
24th Avenue S	Collector
Elks Drive	Local Road
Demers Avenue	Principal Arterial
4th Avenue S/Minnesota Avenue/ 1st Street SE	Minor Arterial
S Washington Street	Principal Arterial
Cherry Street	Collector
Belmont Road	Minor Arterial
Bygland Road SE/3rd Avenue SE/ 2nd Avenue NE/Harley Drive	Minor Arterial
US 2	Principal Arterial
Rhinehart Drive SE	Major Collector north of Greenway Blvd SE Minor Collector Between Greenway Blvd SE and 182 nd Street SW Local Road south of 182 nd Street NW
TH 220	Minor Arterial
Greenway Boulevard SE	Major Collector
190th Street SW	Local Road

2.1.1.2 Roadway Access Inventory

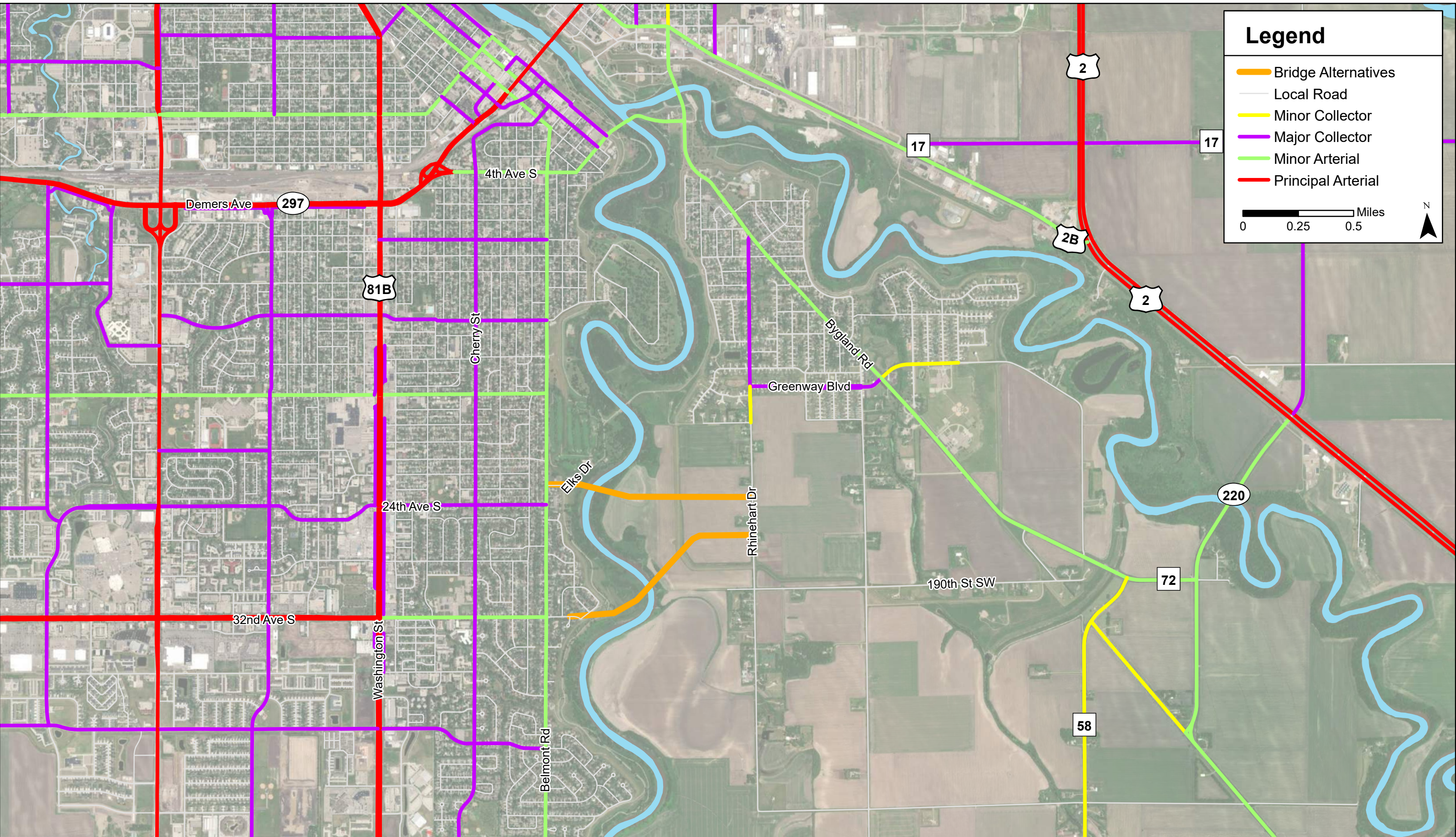
Access is a key factor affecting the quality of roadway mobility and safety. An illustration of each public access point and non-residential driveway along the study corridors is provided in **Figure 2-3**.

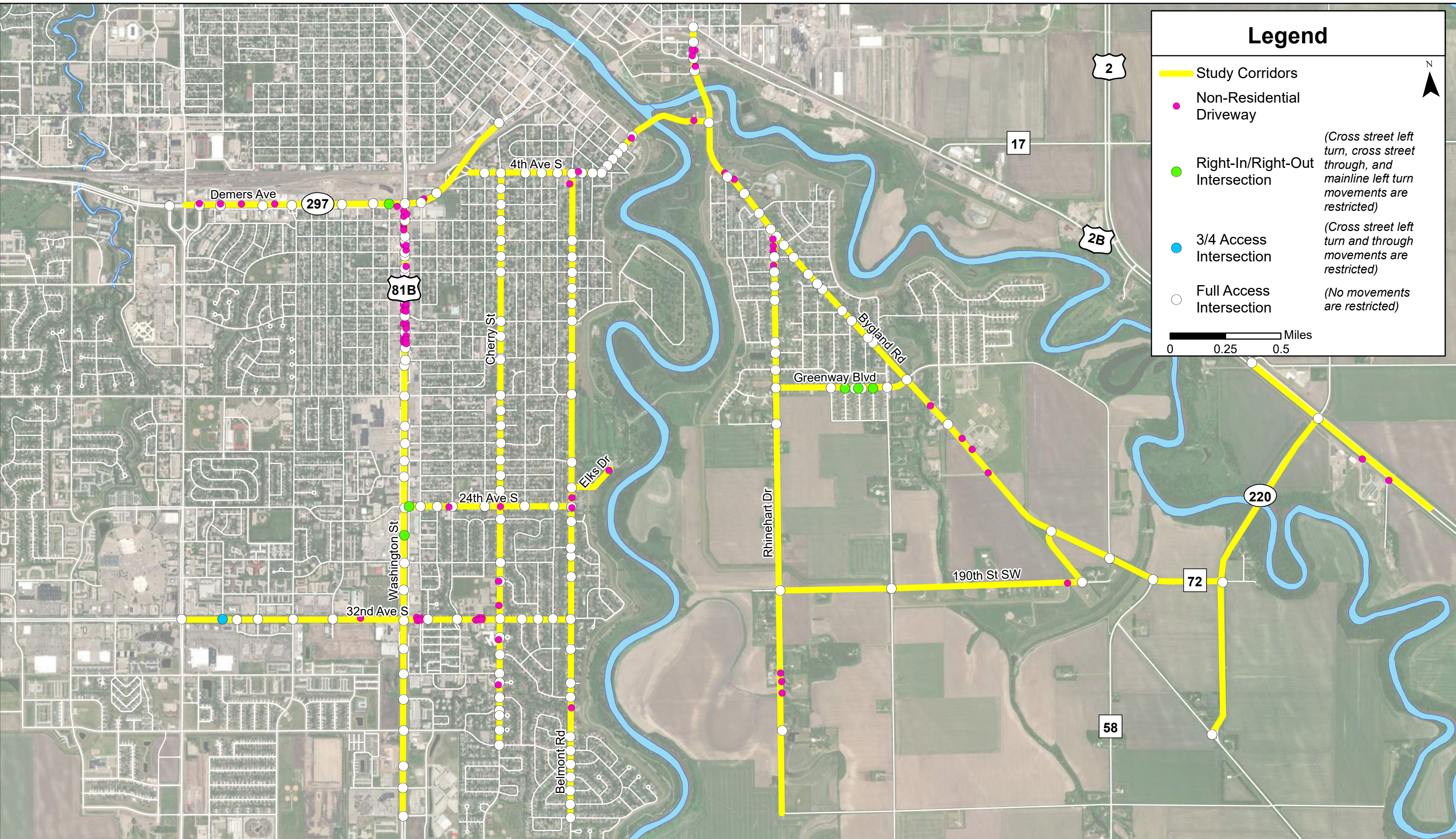
Legend

-  Bridge Alternatives
-  Local Road
-  Minor Collector
-  Major Collector
-  Minor Arterial
-  Principal Arterial

0 0.25 0.5 Miles

N





Legend

- Study Corridors
- Non-Residential Driveway
- Right-In/Right-Out Intersection
(Cross street left turn, cross street through, and mainline left turn movements are restricted)
- 3/4 Access Intersection
(Cross street left turn and through movements are restricted)
- Full Access Intersection
(No movements are restricted)

0 0.25 0.5 Miles

Figure 2-3
Existing Access Inventory and Classification

2.1.1.3 Lane Geometrics, Traffic Control, and Typical Sections

Roadway typical sections vary within the study area. The following general characteristics are present:

- **32nd Avenue S:**
 - Four lane divided urban design roadway with left and right turn lanes west of S Washington Street. No on-street parking.
 - Two lane urban residential east of S Washington Street. Parking is generally allowed on both sides.
- **24th Avenue S:**
 - Two lane urban residential design. Parking is generally allowed on both sides.
- **Elks Drive:**
 - Two lane urban residential with no lane markings. Parking is allowed on the south side.
- **Demers Avenue:**
 - Four lane divided urban design roadway with left and right turn lanes southwest of 4th Avenue S. No on-street parking.
 - Four lane undivided urban design roadway with minimal access northwest of 4th Avenue S. No on-street parking.
- **4th Avenue S/Minnesota Avenue/1st Street SE:**
 - Three lane (two lanes westbound, one lane eastbound) urban residential eastward from the alley east of Cherry Street. Parking is allowed on the south side.
 - Two lane urban residential with turn lanes at key intersections east of the alley. Parking is allowed on the south side west of the Point Bridge. Along the bridge and to the east there is no parking.
- **S Washington Street:**
 - Five lane (two lanes each direction with a two-way center left turn lane) urban design north of Hammerling Avenue. No on-street parking.
 - Four lane divided urban design roadway with left and right turn lanes South of Hammerling Avenue. No on-street parking.
- **Cherry Street:**
 - Two lane urban residential design. Parking is generally allowed on both sides south of 17th Avenue. Between 17th Avenue and 10th Avenue parking is generally allowed on the west side. No on-street parking north of 10th Avenue.
- **Belmont Road:**
 - Two lane urban residential design. Parking is generally allowed on both sides south of 32nd Avenue S. Parking is allowed on the west side north of 32nd Avenue S.
- **Bygland Road SE/3rd Avenue SE/2nd Avenue NE/Harley Drive:**
 - Two lane roadway with turn lanes at key locations, transitions between rural on the eastern end and urban on the western end. No on-street parking southeast of Greenway Boulevard SE. Parking is generally allowed on both sides northwest of Greenway Boulevard SE.
- **US 2:**
 - Four-lane divided rural roadway design with turn lanes at key intersections and driveways. No on-street parking.

- **Rhinehart Drive SE:**
 - Two lane residential design, transitions between rural on the southern end and urban on the northern end. Parking is generally allowed on both sides north of 13th Street SE. No on-street parking south of 13th Street SE.
- **TH 220:**
 - Two lane rural design. No on-street parking.
- **Greenway Boulevard SE:**
 - Two lane suburban residential design. Parking is generally allowed on both sides.
- **190th Street SW:**
 - Two lane rural design. No on-street parking.

Figure 2-4 illustrates the key roadway lane geometrics and traffic control devices.

2.1.1.4 Right of Way, Above Ground Utilities, and Street Lighting

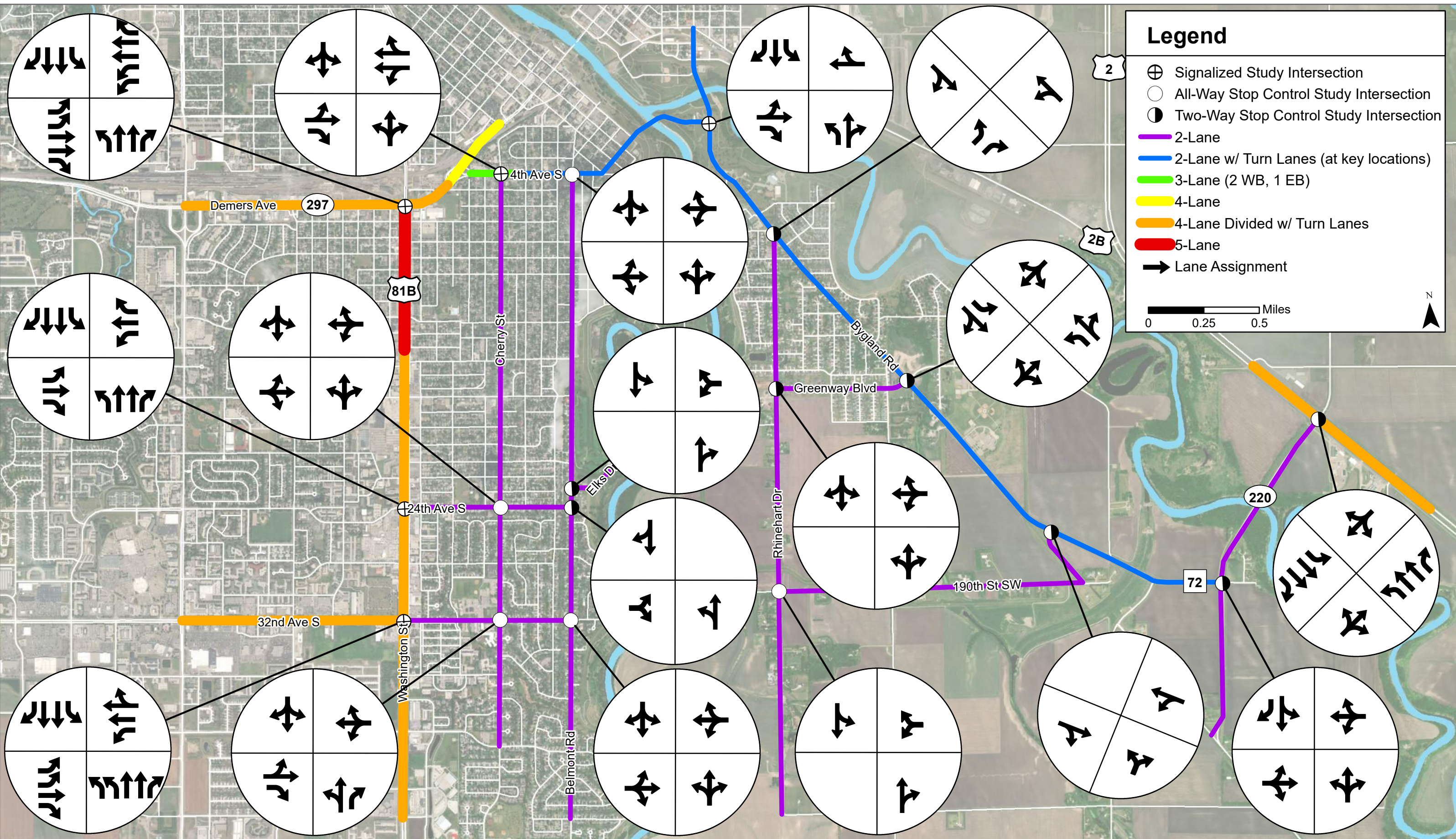
Right of way was estimated using parcel mapping provided by the City of Grand Forks and Polk County (for East Grand Forks). Right of way varies by corridor. Above ground utilities in the corridor consist primarily of electric transformer pads and drainage structures and features. Transmission power lines exist along the following corridors:

- 32nd Avenue S, east of S Washington Street (along the south side)
- 24th Avenue S, ½ block west of Belmont Road (along the south side)
- Demers Avenue, between S 24th Street and S 20th Street (along the north side)
- S Washington Street, south of 32nd Avenue S (along the west side)
- Belmont Road, south of 32nd Avenue S and between 27th and 13th Avenues S (along the east side)
- Rhinehart Drive SE, south of 182nd Street SW (along the west side)
- 190th Street SW (along the south side)

Street lighting is provided along most corridors and at major intersections. **Figure 2-5** illustrates the estimated right of way (based on property parcels) and lighting.

2.1.1.5 Pavement Conditions

Based on visual inspection, pavement conditions on the study corridors appear to be acceptable. There is no pavement on the southern end of Rhinehart Drive SE for roughly 0.10 miles. There are some pavement patches on Rhinehart Drive SE, Belmont Road, 24th Avenue S, and the eastbound lanes of US 2. There is heavy patching on 32nd Avenue S east of S 10th Street. A detailed review of pavement conditions is beyond the scope of this memo. However, further review may be undertaken if needed during the alternatives development process.



Future Bridge Traffic Impact Study



Figure 2-4
Roadway Geometric and Traffic Control Characteristics

Source: ESRI World Imagery Basemap

Legend

- Approx. Right-of-Way
- New Streetlights
- Streetlights
- Study Corridors

0 0.25 0.5 Miles

N

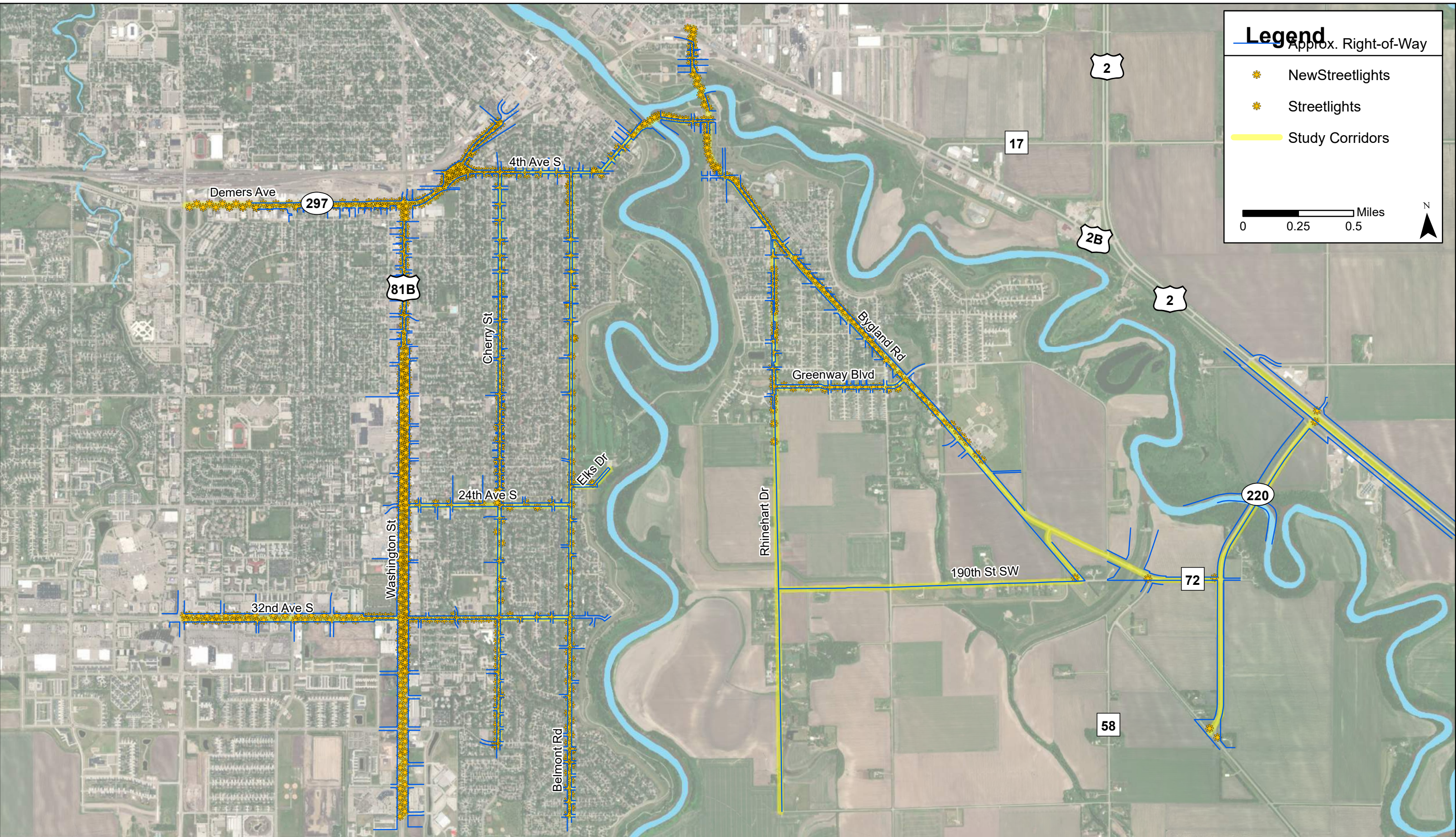


Figure 2-5
Right of Way and Lighting

2.1.1.6 Structures

There are six bridges connecting Grand Forks and East Grand Forks over the Red River: one railroad bridge, two pedestrian-only bridges, and three bridges accessible by vehicles. The railroad bridge, one pedestrian bridge, and the US Hwy 2 bridge are in the study area. Each of the bridges connecting the cities are detailed below:

- **Point Bridge**

The Point Bridge is the southernmost connection between Grand Forks and East Grand Forks. It connects Minnesota Avenue in ND and 1st Street SE in MN. The bridge is signed for no trucks on the Grand Forks side and has a weight restriction of 40,000 pounds. There is a very narrow (3.5 foot) sidewalk on the south side of the bridge; however, signs are posted prohibiting pedestrians and sidewalk leading the bridge has been removed. Bicycles are allowed on the bridge, although there are no bicycle facilities. .

- **Sorlie Bridge (not in study area)**

The Sorlie Bridge connects each of the two cities' downtown areas via Demers Avenue. There is a sidewalk on either side of the corridor.

- **Kennedy Bridge (not in study area)**

The Kennedy Bridge is the northernmost connection between the cities via US Highway 2. There is a sidewalk on the north side of the corridor.

- **BNSF Railroad Bridge**

The railroad bridge between Grand Forks and East Grand Forks is located between the Point Bridge and Sorlie Bridge.

- **Pedestrian Bridges**

There are two pedestrian bridges connecting Grand Forks and East Grand Forks. They are both part of the Greenway trail system. Only one is within the project study area.

- The southern bridge is near 17th Avenue S in Grand Forks and Laurel Drive SE in East Grand Forks.
- The northern bridge (not in study area) is near Red Dot Place in Grand Forks and 20th Street NW in East Grand Forks.

2.1.2 Multimodal Characteristics

The following sections document the key features of the pedestrian, bicycle and transit systems in the study area.





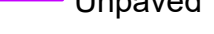
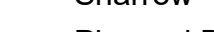




2.1.2.1 Sidewalk, Trails, Bike Lanes, Shared-Use Paths

Sidewalk or multiuse trails exist along most the study roadways. The Grand Forks-East Grand Forks 2045 Metropolitan Transportation Plan (MTP) identifies plans for additional bicycle and pedestrian improvements along many corridors in each city. **Figure 2-6** illustrates the existing and planned future sidewalk, trails and bicycle facilities as documented in the 2045 MTP.

2.1.2.2 Transit Facilities

Cities Area Transit (CAT) is the public transportation system serving Grand Forks and East Grand Forks metropolitan area. **Figure 2-7** illustrates the CAT network in and around the study area.

Legend

-  Sidewalk
-  Bike Lane
-  Bike Route
-  Multi-Use Path
-  Unpaved Trail
-  Sharrow
-  Planned Bike Lane
-  Planned Bike Route
-  Planned Path
-  Study Corridors

0 0.25 0.5 Miles

N

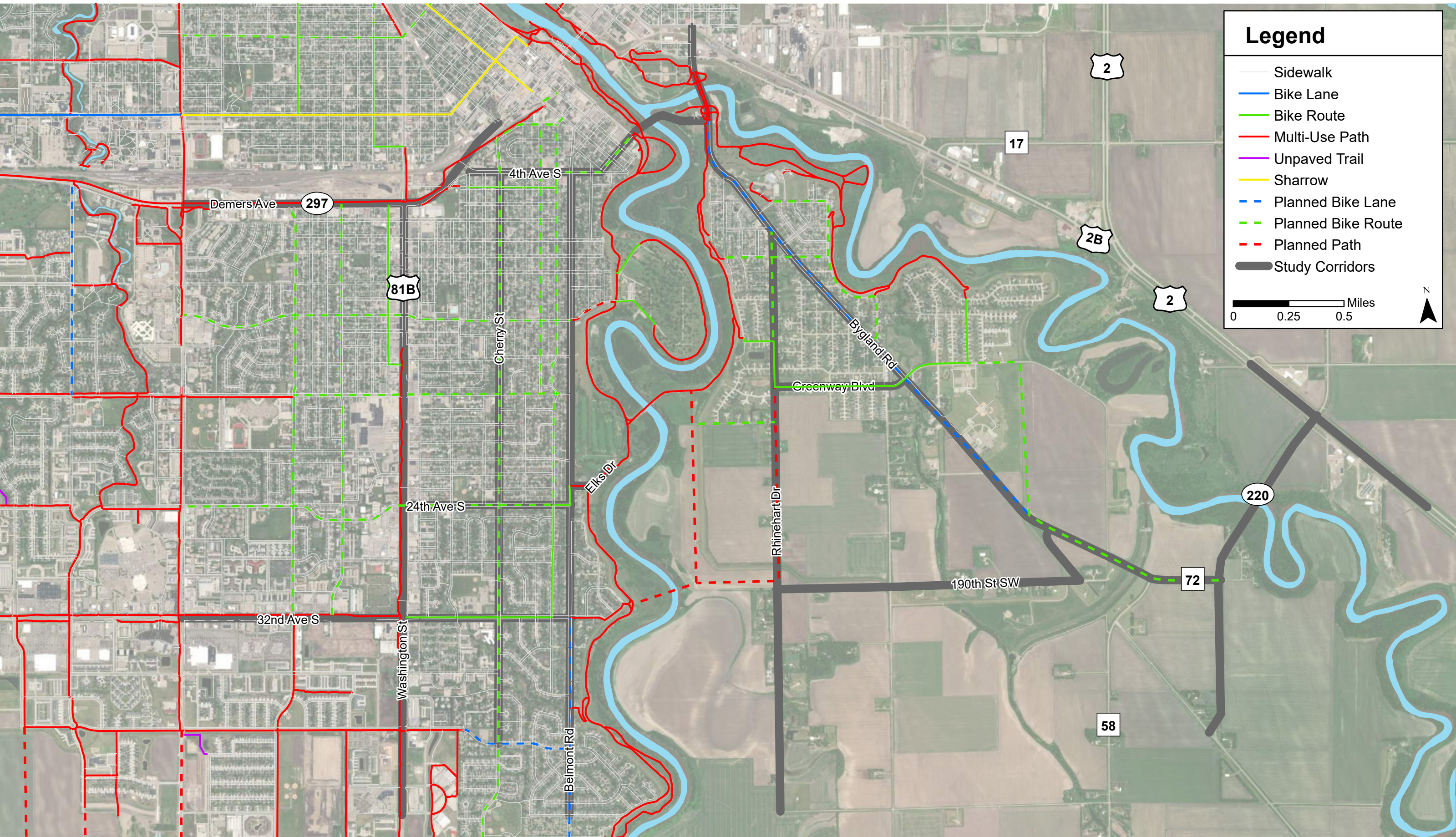
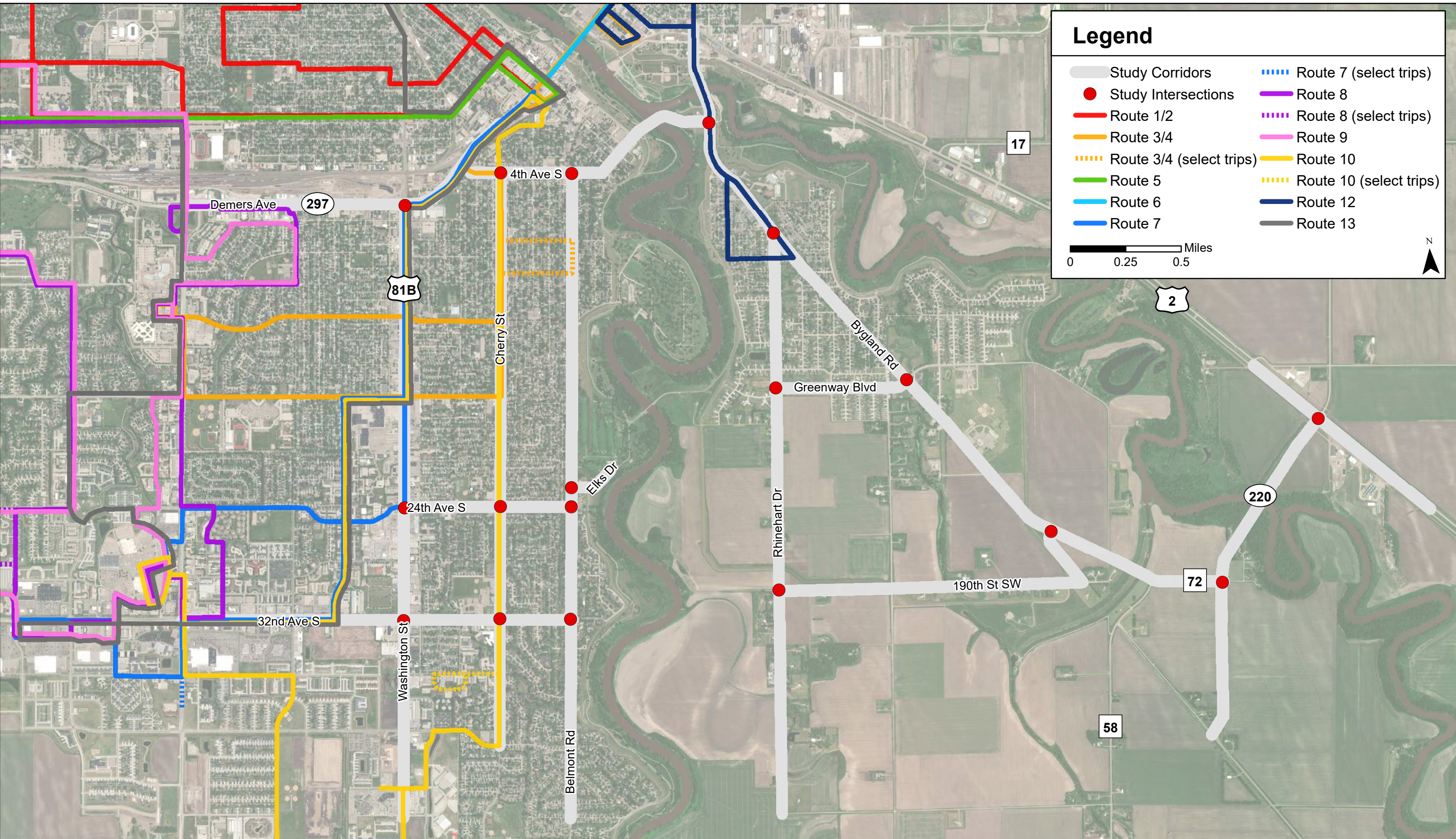


Figure 2-6
Existing and Planned Sidewalk, Trails, and Bicycle Facilities



2.2 BUILT AND NATURAL ENVIRONMENT

A review of the existing and planned future conditions was completed within the future bridge study corridors. The purpose of this review is to identify issues and resources that should be considered at a screening level because they might differentiate one bridge location from another or because they might present a fatal flaw. This review is being conducted consistent with a Planning and Environmental Linkages (PEL) study and not at the level of detail for formal environmental documentation (National Environmental Policy Act or NEPA), which will be a subsequent step in this process.

The key elements included in the study scope of work were reviewed as documented below. Items were excluded from the analysis if they were not considered relevant to this initial review. These include relocations, energy usage resulting from the project, and temporary construction. If relevant, these items could be reconsidered during the evaluation process.

2.2.1 Community Resources

2.2.1.1 Environmental Justice

The Grand Forks-East Grand Forks Metropolitan Planning Organization (MPO) Environmental Justice Program Manual outlines the procedures for delineating the presence of environmental justice populations within a study area. Based on this guidance, areas of minority and poverty groups have been identified as occurring within the Grand Forks portion of the study corridor near Cherry Street, S Washington Street, and 4th Avenue South (**Figure 2-8**). Neighborhoods most likely to experience impacts from a new bridge were engaged during the study through representation on the Ad Hoc group in addition to more general project communications (see Section 1.3 and Appendix A).

2.2.1.2 Schools

There are eight schools highlighted within the study area that include elementary, middle, and high schools (**Figure 2-8**). On the Grand Forks side, there are six schools within the study area and on the East Grand Forks side, there are two schools. Due to the close proximity to the bridge alternatives, particularly on 4th Avenue S, 24th Avenue S, and 32nd Avenue S, the Grand Forks schools could see an increase in traffic near the schools. With the increase in traffic, it is important to ensure there are safe routes and access to school. Both Grand Forks and East Grand Forks, the School Districts, the MPO and Safe Kids Grand Forks have developed Safe Routes to Schools maps for schools in the study area and are actively monitoring and updating school walking routes and issues in relation to this study. In addition, ongoing discussions regarding possible consolidation and redistricting for Grand Forks schools will be incorporated into the study as relevant.

2.2.1.3 Historic and Cultural Resources

Both the Minnesota and the North Dakota State Historic Preservation Offices (SHPO) were provided an early opportunity to provide input during the planning stages of this project. Continued coordination should occur to determine if any known historic and cultural resources exist within the study corridor. The SHPO consultation will help determine where the archaeological and historic sites in relation to the study corridor and what measures need to be taken to preserve these areas.

Grand Forks has two historic neighborhoods within the Study limits, the Near Southside Historic District and the Downtown Grand Forks Historic District, that could be affected by the projected (**Figure 2-8**). These areas carry historic protections and the community members are passionate about their preservation, including from traffic impacts. The Near Southside neighborhood in particular today bears a disproportionate traffic burden related to river crossing traffic, setting up an equity conversation that will be important to address. Additionally, the Grand Forks Historical Society is located on Belmont Road just south of Elks Drive and is identified as a Section 106 property.

2.2.1.4 Parks, Open Space, and Recreational Areas

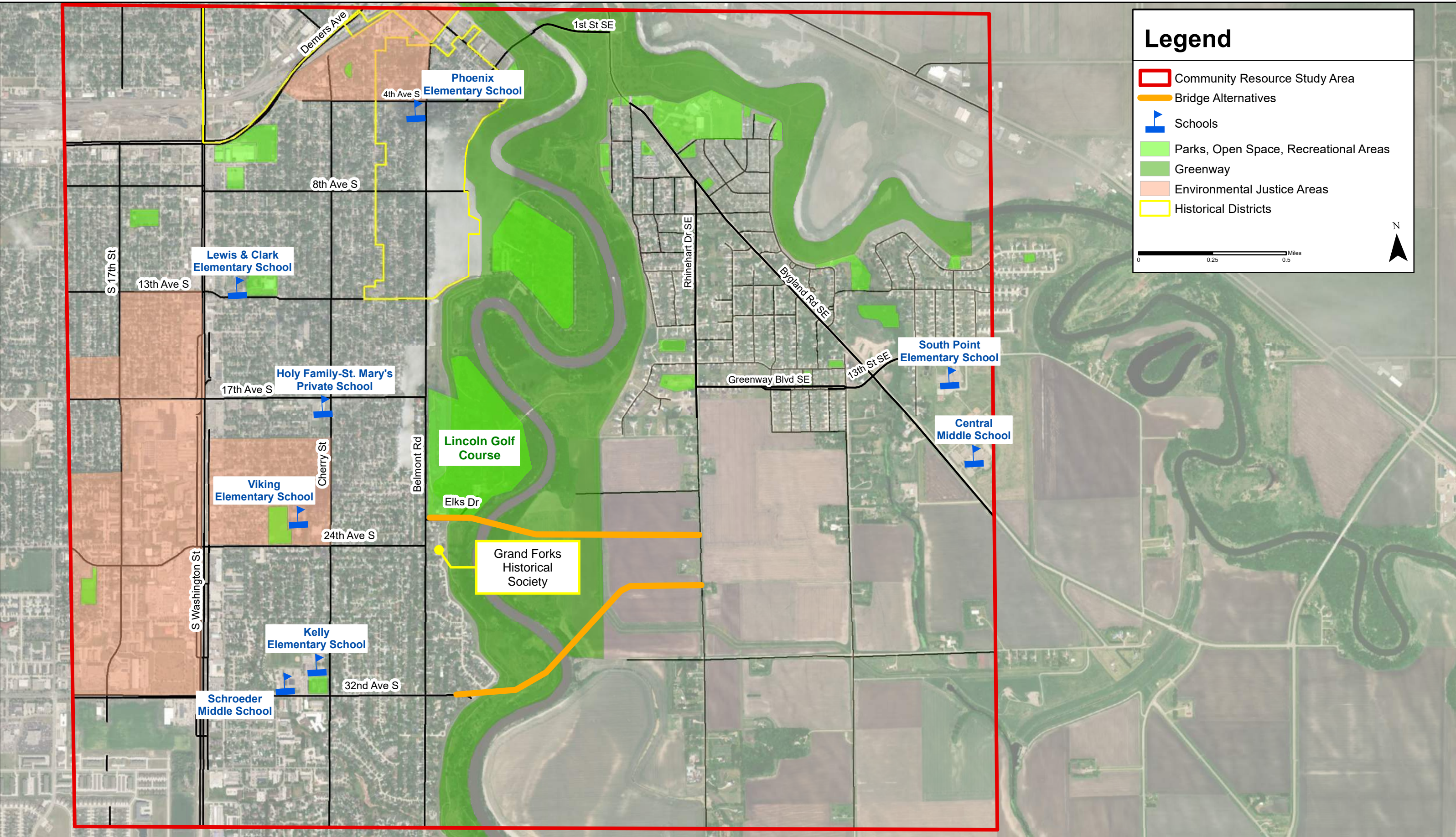
The majority of the parks, open space, and recreational areas within Grand Forks and East Grand Forks occur along the Red River and Red Lake River as part of the Greenway system (**Figure 2-8**). The Greenway system extends north to south along the Red River and east to west along the Red Lake River. There are other designated park areas within both cities that are outside the Greenway system.

The Greenway system, parks, and paths for walking and bicycling is a vital part of the Grand Forks and East Grand Forks community. It is important that bridge alternatives preserve the natural features within the Greenway system and maintain a sufficient park and trail system as outlined in both cities' land use plans. The Grand Forks Greenway Technical Committee provided review and comment during project public open house comment periods (see **Appendix A**).

This portion of the study included preliminary identification of Section 4(f) resources, which are publicly owned parklands, recreation areas, wildlife areas and significant historic sites with special protections in relation to transportation projects. Likely Section 4(f) resources in the study area include the Greenway, the Lincoln Golf Course, and the Grand Forks Historical Society, all of which are identified in Figure 2-8. However, as part of the original Greenway planning, potential future bridge corridors at 17th Avenue, Elks Drive, and 32nd Avenue were identified with the understanding that recreational development and use of these corridors would be avoided so as to allow a future bridge to be constructed without interfering with the Greenway (see The Greenway Master Development and Restoration Plan, July 2000, Greenways Incorporated). Because the future corridors were identified in the master planning for reuse as part of the flood protection system's environmental documents, the Section 4(f) restriction is relaxed.

2.2.1.5 Pedestrian/Bicyclist

Pedestrian and bicycle facilities are discussed and documented in a prior section of this memo.



Legend

- Community Resource Study Area
- Bridge Alternatives
- ▲ Schools
- Parks, Open Space, Recreational Areas
- Greenway
- Environmental Justice Areas
- Historical Districts

N

0 0.25 0.5 Miles

2.2.2 Natural Resources

2.2.2.1 Water Quality

Currently, there are vehicular bridges that connect the downtown areas of Grand Forks and East Grand Forks and there is a pedestrian bridge in the study area near 17th Avenue South in Grand Forks as discussed in section 2.1.6. The proposed bridge alternatives would introduce a new river crossing that does not exist today. Short term impacts to water quality can be anticipated during the construction of the bridge; however, long term impacts to water quality are not anticipated.

In order to mitigate the short term impacts to water quality, the project proponent will be required to obtain a NPDES/SDS General Permit prior to the construction of the project since the project will likely disturb more than one acre of land. The addition of new roadway surfaces also could trigger requirements for a municipal stormwater (MS4) permit in Grand Forks. BMPs will be required to be installed during construction to reduce erosion and sediment loading into the surrounding water resources. To confirm that the BMPs are effectively working, the BMPs will be inspected per the requirements of the Storm Water Pollution Prevention Plan (SWPPP). A complete list of BMPs will be described in the SWPPP that would be prepared for the project prior to construction.

2.2.2.2 Wetlands

The United States Fish and Wildlife (USFWS) Service National Wetlands Inventory (NWI), the Minnesota Department of Natural Resources (DNR) Wetland Inventory, and the MN DNR Public Waters Inventory was utilized to explore the presence of wetlands within the study area. The USFWS NWI and MN DNR NWI identified approximately 75 wetlands within the study area (**Figure 2-9**). The MN DNR Public Waters Inventory did not identify any public water wetlands within the study area. The majority of these wetlands are adjacent to the Red River and the Red Lake River. These wetlands include freshwater emergent, shrub, forested, pond, and riverine wetlands.

During subsequent project development efforts, a field wetland delineation should be conducted before the construction of the proposed project to determine wetland size and type present within the construction limits. The state regulatory authority for Minnesota and North Dakota who administers the state wetland regulations and the Army Corps of Engineers shall provide approval for any wetland delineation and permitting plans that are associated with this project.

2.2.2.3 Water Body Modification, Wildlife, Invasive Plant Species

Water Body Modification

This study assumes a new bridge will span across the Red River south of downtown Grand Forks/East Grand Forks. See **Figure 2-9**. When an alternative is selected and the design of the bridge is finalized, appropriate Army Corps and DNR permits should be obtained to conduct work in the Red River.

Wildlife

Wildlife present in the study corridor consist of common wildlife adapted to urban and agriculture environments, such as white-tailed deer, songbirds, and small mammals (squirrels, rabbits, raccoons). During

construction of the bridge, mobile wildlife present within the project site will likely disperse to adjacent and/or similar habitats and less mobile species may likely experience more adverse effects from construction. However, once construction is completed, the area below the bridge will be restored to previous conditions where appropriate, allowing the wildlife species back into this habitat.

Invasive Plant Species

Invasive plant species have an impact on agriculture, native plant communities, and the natural environment. It is not known if any invasive plants are present within the study area. During construction, efforts should be made to prevent the propagation and spread of invasive plant species. Prior to any construction activity, a noxious weed survey should be conducted to determine the presence and extent of any plants listed on the Minnesota and North Dakota Noxious Weed List. If present, a noxious weed plan should be developed that outlines specific eradication plans for each species present and guidelines for the prevention of spreading of seed and plant materials during construction.

When there is work within the Red River, all equipment should be decontaminated before it is put into the river and when the equipment is taken out of the river. This will prevent aquatic nuisance species from being transported to other waterways and negatively impacting them.

2.2.2.4 Floodplain

The Red River flows south to north within the study area. The Federal Emergency Management Agency (FEMA) has mapped the existing floodplain associated with the river (**Figure 2-9**).

Proposed changes within the floodway area will require close coordination and appropriate approvals obtained with FEMA, the Army Corps, and Grand Forks and East Grand Forks floodplain manager during project development.

Flood Protection Infrastructure

The existing flood protection system on both the Grand Forks and East Grand Forks side is highlighted in **Figure 2-9**. Within the study corridor, Grand Forks flood protection infrastructure includes a flood protection wall and earth levee and East Grand Forks includes a earth levee. In Grand Forks, there is a stop log opening that exists for Elks Drive and on 32nd Avenue S there is an opening primarily for pedestrians/bicyclists and the pump station. On the East Grand Forks side, there are some existing openings that could be located near the proposed bridge alignments. For the proposed 32nd Avenue and Elks Drive new river crossing areas, it will be necessary to identify where the flood control infrastructure is located in relation to the bridge alignment and avoid or mitigate unnecessary adverse impacts to existing flood control infrastructure.

2.2.2.5 State Scenic River

The Red River and Red Lake River are located within the project study area and they are not designated Wild and Scenic Rivers by Minnesota and North Dakota.

2.2.2.6 Threatened and Endangered Species

State Level

The National Heritage Information System (NHIS) identifies each state's rare plant, animal, and native plant communities, and other rare features. The NHIS is managed by the state Parks and Recreation Department in North Dakota and the state Department of Natural Resources (DNR) in Minnesota. Rare species tracked within the NHIS include sightings of State endangered, threatened, or special concern species as well as Federally listed threatened and endangered species. The NHIS data should be requested for the East Grand Forks area to understand what state listed species are within the study corridor.

In North Dakota, there is no state threatened and endangered species list and North Dakota relies on the species list identified in the U.S. Fish and Wildlife (USFWS) Endangered Species Act. The USFWS office in North Dakota has primary oversight over the threatened and endangered species here. The federally listed species below can be relied upon to identify the listed species in Grand Forks.

Federal Level

The Information for Planning and Consultation (IPaC) is a U.S. Fish and Wildlife Service (USFWS) online project planning tool which streamlines the USFWS environmental review process. The online tool was utilized to determine if any Federally listed species, critical habitat, migratory birds, or other natural resources may be impacted by the project.

The following Federally listed species were identified as potentially occurring within the project area. While these species may potentially be affected by the future project, no critical habitat for these species exists within the study area.

- Federally endangered
 - Whooping crane (*Grus americana*)
 - Poweshiek Skipperling (*Oarisma poweshiek*)
- Federally threatened
 - Northern long-eared bat (*Myotis septentrionalis*)
 - Dakota skipper (*Hesperia dacotae*)

Additionally, there are several migratory birds listed below that are of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in the project area. These include:

- Species of Conservation Concern
 - American bittern (*Botaurus lentiginosus*)
 - Black tern (*Chidonias niger*)
 - Black-billed cuckoo (*Coccyzus erythrophthalmus*)
 - Bobolink (*Dolichonyx oryzivorus*)
 - Buff-breasted sandpiper (*Calidris subruficollis*)
 - Franklin's gull (*Leucophaeus pipixcan*)
 - Lesser yellowlegs (*Tringa flavipes*)
 - Long-eared owl (*asio otus*)
 - Marbled godwit (*Limosa fedoa*)
 - Red-headed woodpecker (*Melanerpes erythrocephalus*)

- Semipalmated sandpiper (*Calidris pusilla*)
- Willet (*Tringa semipalmata*)
- Bald and Golden Eagle Protection Act
 - Bald eagle (*Haliaeetus leucocephalus*)

2.2.2.7 Soils

The USDA NRCS Web Soil Survey was used to gather baseline soils data at Elks River and 32nd Avenue S. The soils mapped within the study area consist of upland and hydric soils. The upland soils are concentrated in Grand Forks where the soils have been manipulated to form an urban area. The soils on the East Grand Forks side are primarily hydric soils that are less suitable for road construction and maintenance. Comparing the soils at Elks River and 32nd Avenue S, there are no major differences between the soils that would hinder construction.

An extensive geotechnical field study will need to be conducted to understand the soil conditions present at the chosen bridge alternative before construction begins.

2.2.2.8 Trees

Boulevard trees border the residential streets of Grand Forks and patches of trees border the Red River. The largest area of native trees borders the Red River near Elks Drive. The future bridge roadway design will establish a new right-of-way that will impact any tree species within the proposed right-of-way.

Any proposed tree removal should be conscious of bat roosting season. The U.S. Fish and Wildlife provides guidance for tree removal in order to avoid any impacts to bat species.

2.2.3 Farmland

Agricultural production is a significant industry for East Grand Forks and Polk County. The majority of the East Grand Forks area included in the study area is in agricultural production whereas the Grand Forks portion is primarily developed.

According to the USDA Natural Resources Conservation Service (NRCS), land in agricultural production within the East Grand Forks area is defined as prime farmland, prime farmland if drained, and prime farmland if protected from flooding or not frequently flooded during the growing season. The Grand Forks area was defined as not prime farmland. Potential impacts to prime farmland should be considered during the review of the bridge alternatives.

2.2.4 Visual

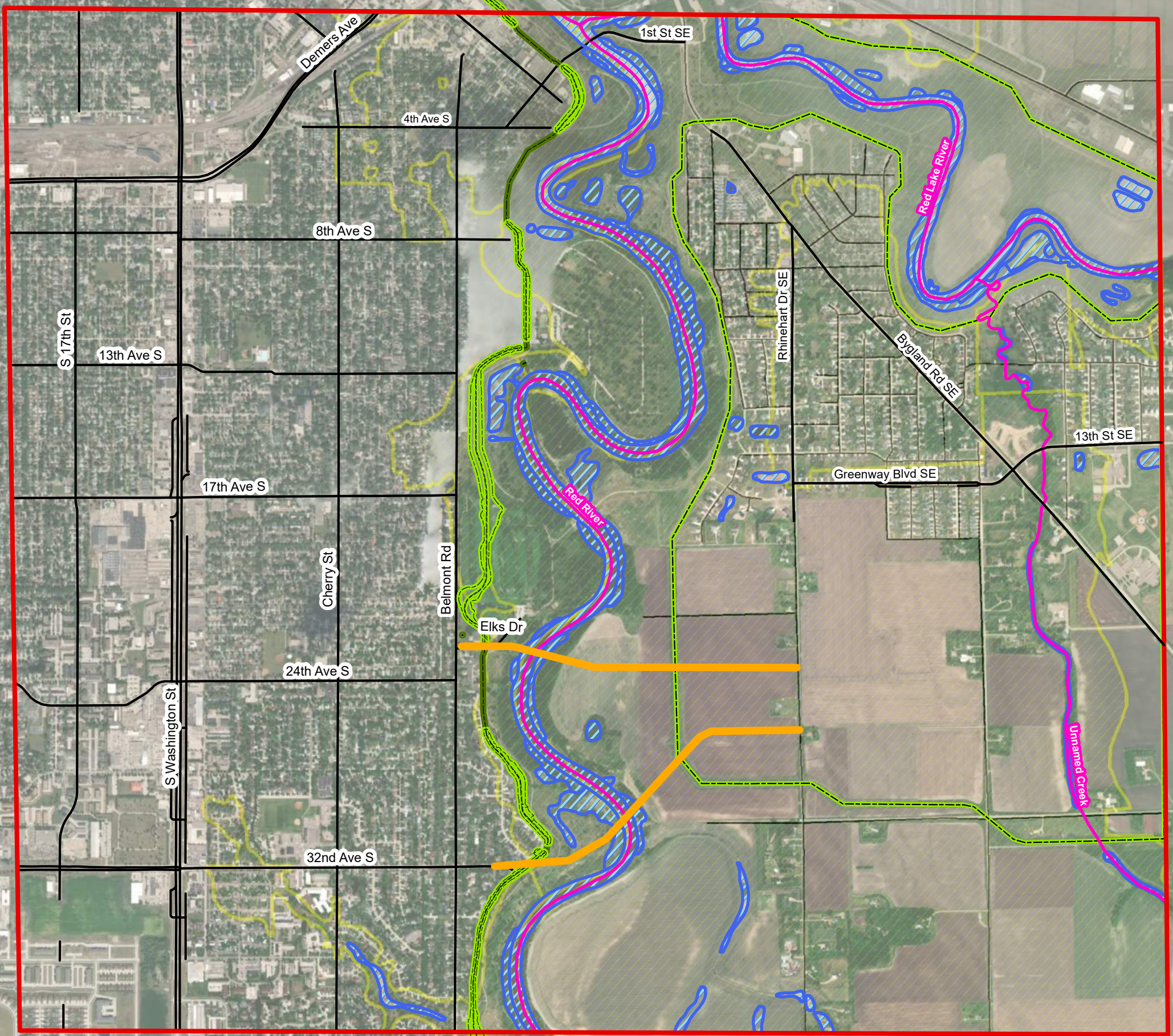
Impacts to the visual quality of the corridor should be considered as alternatives are developed for the corridor. For alternatives that include a new bridge spanning the Red River, visual impacts will be reviewed as part of the NEPA process.

Legend

- Natural Resource Study Area
- Bridge Alternatives
- Watercourse
- Earth Levee
- Flood Protection Wall
- National Wetland Inventory
- 100 YR Floodplain

Miles
0 0.25 0.5

N



2.2.5 Air Quality

The existing factors that impact air quality within the study corridor now are vehicle-related air emissions mostly concentrated within Grand Forks that relate to traffic from the urban residential areas there. Due to the low density residential and agriculture land use in East Grand Forks, the vehicle-related air emissions are lower.

Construction of a new bridge will result in changes to traffic patterns and future traffic growth will result in an increase in traffic which will lead to an increase in carbon monoxide, carbon dioxide, and other vehicle-related air emissions in both Grand Forks and East Grand Forks. For screening purposes, increases in transportation air emissions will be assumed to scale with traffic volumes and will be evaluated in this manner.

During construction, best management practices (BMPs) should be used including the watering of dry, exposed soils to reduce dust in the surrounding area and maintaining construction entrances and exits to limit the tracking of soil onto the local roadways. The construction machinery on the site will be properly maintained to reduce odors such as exhaust from the diesel and gasoline powered machinery. Therefore, impacts from dust and odors during construction will be mitigated during construction.

2.2.6 Noise

The existing factors that impact noise within the study corridor now are local roadway traffic. For the purposes of this analysis, traffic noise will be assumed to scale with traffic volumes and will be evaluated in this manner, with attention to potentially sensitive receptors such as residential areas and schools. This project would be a Type 1 activity and noise analysis would be required if federal funds are used.

Noise will be generated temporarily during construction. The contractors will work in compliance with allowable working hours as established by the City of Grand Forks and the City of East Grand Forks ordinance. Factors affecting the noise level during construction will include the amount of construction that occurs simultaneously, time of operation, and distance between construction equipment and receptors. The nearest sensitive receptors include the adjacent residential parcels in Grand Forks and East Grand Forks. Mitigation of short-term noise impacts should be managed through proper coordination and construction planning.

2.2.7 Hazardous Materials

There is potential for contaminated materials to be encountered during construction activities. The Minnesota Pollution Control Agency's "What's in my Neighborhood" and the U.S. Environmental Protection Agency's (US EPA) Region 8 Enforcement and Compliance History Online (ECHO) for North Dakota are searchable databases of known contaminated sites and environmental permits and registrations.

A Phase I Environmental Site Assessment (ESA) may be warranted to identify potential hazardous waste sites within the project area that may be disturbed during construction. If the results of the Phase I require further investigation, a Phase II environmental Site Assessment may also be needed to further evaluate the extent and composition of the contaminated materials within the project area.

2.3 LAND USE

The study area encompasses a wide variety of existing land uses and density types. Both the City of Grand Forks and the City of East Grand Forks are in the process of evaluating existing land use and developing new plans. These plans are still in progress as of the preparation of this memo and no new maps are available at this time.

This section gives an overview of the land use plans prepared in 2015 and 2016. Updates to the plans will be incorporated into this study (traffic forecasting in particular) as relevant. Existing land use for each city is shown in **Figure 2-10** (Grand Forks) and **Figure 2-11** (East Grand Forks). Planned land use for each city is shown in **Figure 2-12** (Grand Forks) and **Figure 2-13** (East Grand Forks).

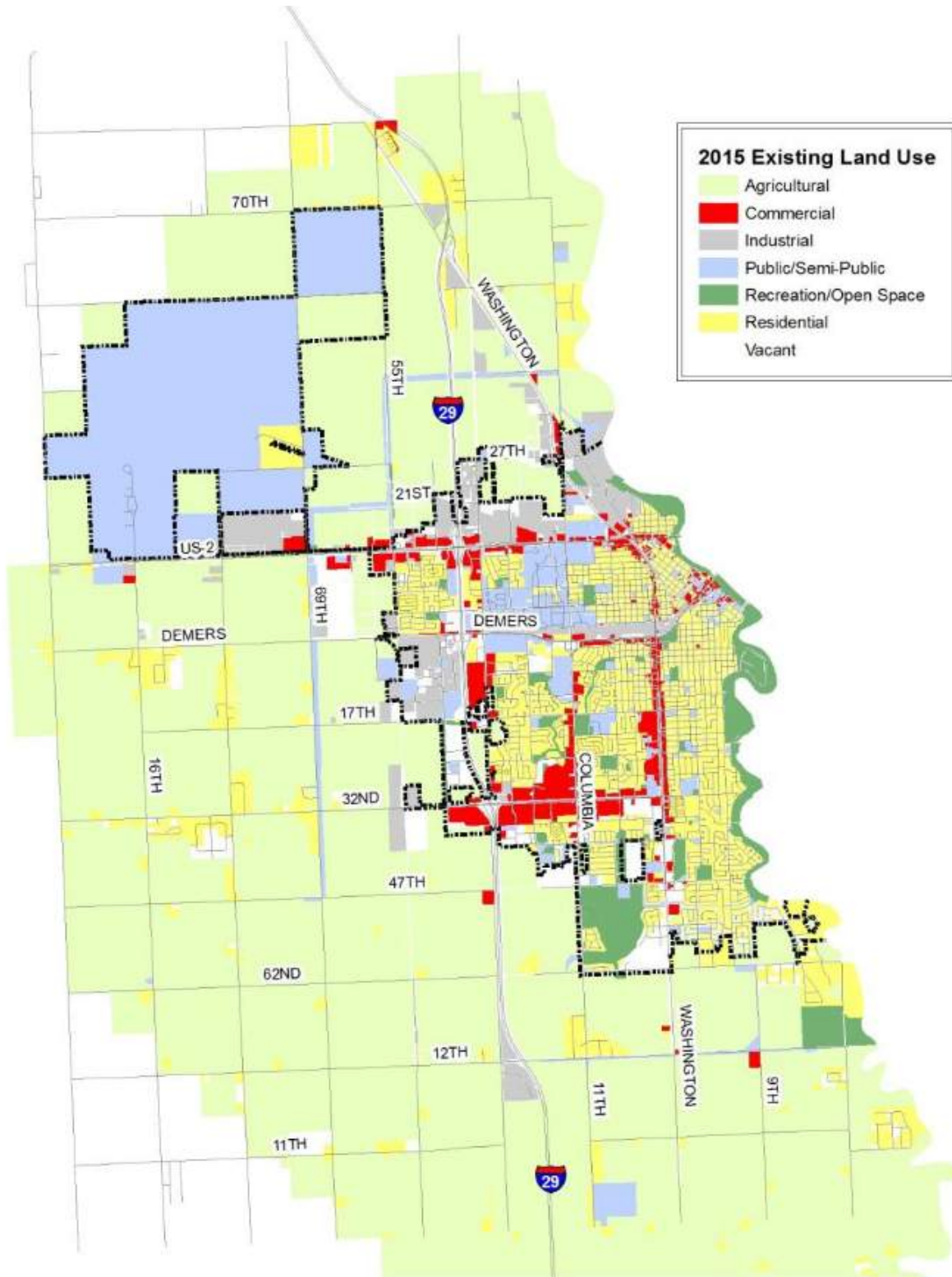


Figure 2-10. Existing Land Use – Grand Forks

Source: 2045 Grand Forks Land Use Plan

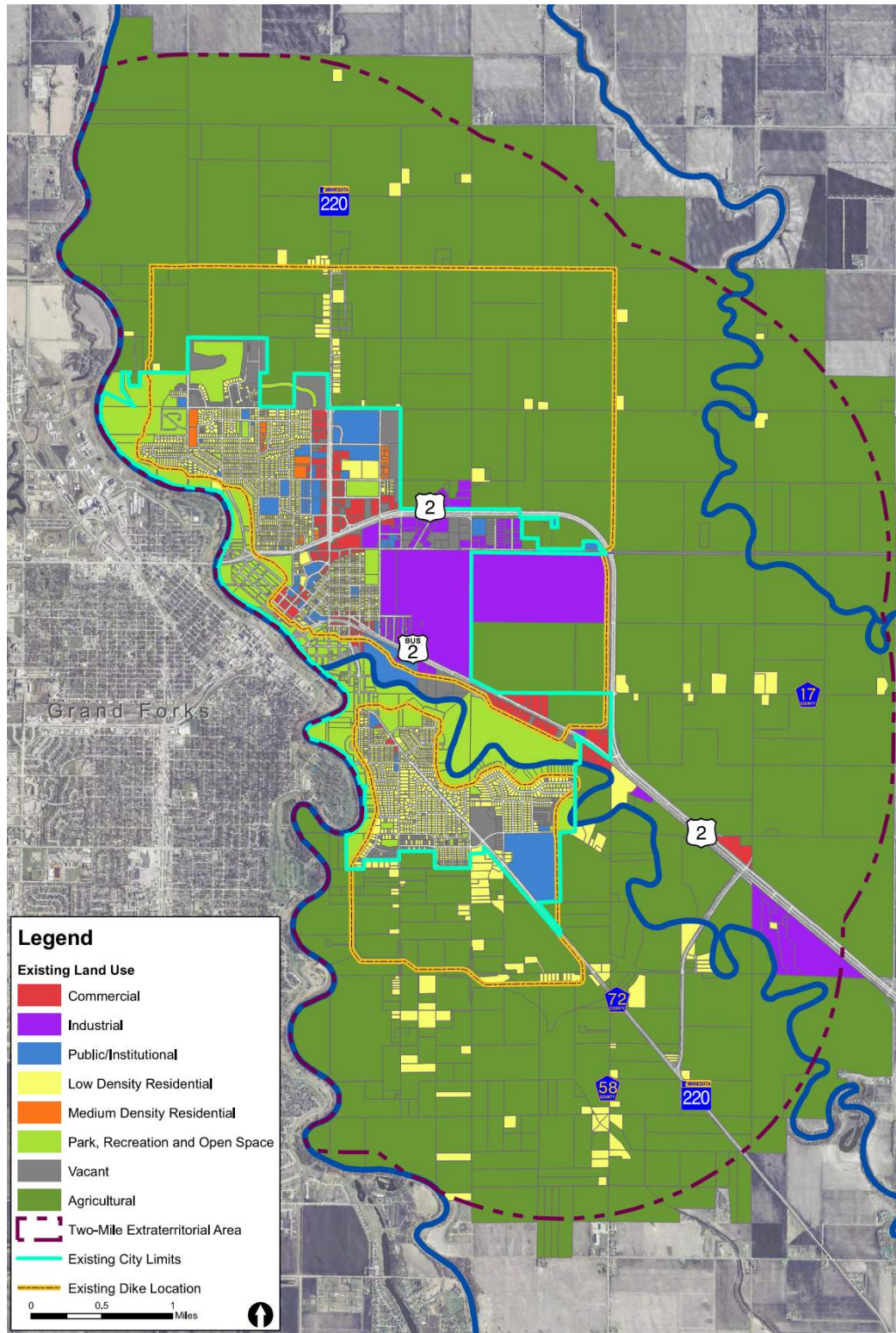


Figure 2-11. Existing Land Use – East Grand Forks

Source: East Grand Forks 2045 Land Use Plan

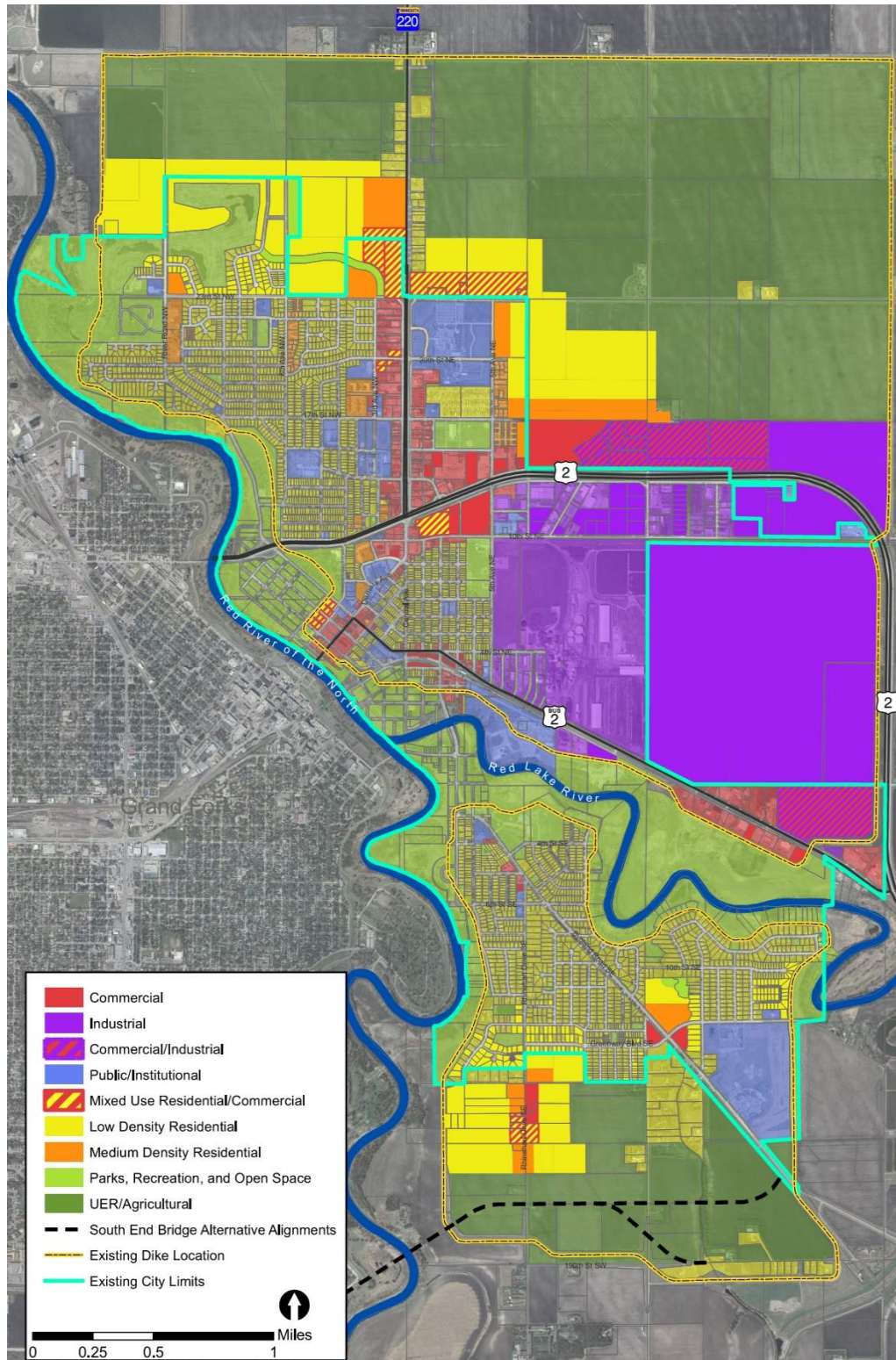


Figure 2-13. Future (2045) Land Use Plan – Grand Forks

Source: East Grand Forks 2045 Land Use Plan

3. Traffic Analysis

A traffic analysis was completed to assess the traffic operations and safety performance of the roadway network on both sides of the Red River in Grand Forks and East Grand Forks to assess existing conditions, forecast 2030 conditions, and forecast 2045 conditions under scenarios with no new bridge (No Build). Scenarios under the same analysis years that include a new river bridge at Elks Dr (Elks Dr Bridge), or at 32nd Ave S (32nd Ave Bridge) are documented in **Section 5.1.2: Future Build Traffic Operations and Mobility**.

3.1 EXISTING AND FORECAST TRAFFIC VOLUMES AND PATTERNS

The data sources, methodology, and resulting existing and forecast traffic volumes along with the regional traffic patterns for trips using the Point Bridge are presented in the following sections.

3.1.1 Existing Traffic Volumes

3.1.1.1 Data Sources

Existing turning movement volumes from prior traffic studies and/or agency counts were used for this analysis at intersections where existing data was available. Turning movement counts for multiple of the study intersections were provided by the Grand Forks-East Grand Forks MPO. Turning movement volumes at the signalized intersections on S Washington St were collected using the Traffic Analysis Tool from the Advanced Traffic Analysis Center (ATAC) within the Upper Great Plains Transportation Institute (UGPTI) located within North Dakota State University (NDSU), which utilizes count data from traffic signal-mounted cameras at signalized intersections. Alliant collected new turning movement counts for intersections and time periods where existing data was not available. Alliant staff collected video data for the new counts locations and was processed by MioVision to develop turning movement volumes for the analysis area. **Table 3-1** shows the turning movement volume data source and count date for each of the study intersections.

Table 3-1. Existing Turning Movement Volume Data Sources

Intersection	City	Source	Data Date
32nd Ave & S Washington St	Grand Forks	NDSU Online Data Tool	Oct 2019
32nd Ave & Cherry St	Grand Forks	New Counts	Feb 2021
32nd Ave & Belmont Rd	Grand Forks	MPO	May 2017
24th Ave & S Washington St	Grand Forks	NDSU Online Data Tool	Oct 2019
24th Ave & Cherry St	Grand Forks	New Counts	Feb 2021
24th Ave & Belmont Rd	Grand Forks	AM-New Counts/PM-MPO	AM-Feb 2021/PM-May 2018
Belmont Rd & Elks Dr	Grand Forks	AM-New Counts/PM-MPO	AM-Feb 2021/PM-May 2018
Demers Ave & S Washington St	Grand Forks	NDSU Online Data Tool	Oct 2019
4th Ave & Cherry St	Grand Forks	MPO	April 2017
4th Ave & Belmont Rd	Grand Forks	MPO	April 2017
Bygland Rd (CR 72) & 1st St	East Grand Forks	New Counts	Feb 2021
Bygland Rd (CR 72) & Rhinehart Dr	East Grand Forks	New Counts	Feb 2021
Rhinehart Dr & Greenway Blvd	East Grand Forks	AM-New Counts/PM-MPO	AM-Feb 2021/PM-May 2018
Rhinehart Dr & 190th St	East Grand Forks	Inferred from Adjacent Int.	N/A
Bygland Rd (CR 72) & Greenway Blvd	East Grand Forks	AM-New Counts/PM-MPO	AM-Feb 2021/PM-April 2017
Bygland Rd (CR 72) & 190th St	East Grand Forks	New Counts	Feb 2021
TH 220 & Harley (CR 72)	East Grand Forks	New Counts	Feb 2021
TH 220 & US 2	East Grand Forks	New Counts	Feb 2021

The intersection of Rhinehart Dr SE & 190th St SW was added to the study area after counts were collected. Daily volumes at this intersection are less than 100 vehicles per day on each approach. Due to the low volumes, peak hour turning movement counts were inferred from the count data at the adjacent intersections where data was available.

3.1.1.2 Existing Volume Development

Adjustment factors were developed to bring all turning movement volumes from the different data sources to a cohesive baseline existing condition. The new turning movement counts collected by Alliant were gathered in February of 2021 during the COVID-19 pandemic. Traffic volumes during the pandemic were generally lower than pre-pandemic levels. Using intersection turning movement volumes from the ATAC Traffic Analysis Tool mentioned above, peak hour turning movement volumes prior to the pandemic (2019) were collected at study intersections on S Washington St. The combined 2019 peak hour volumes were compared to the combined new 2021 peak volumes at the same locations. As shown in **Figure 3-1**, the 2019 volumes were higher in the AM and PM peak periods by 3.5% and 8.7%, respectively. In order to reflect expected “normal” traffic volume conditions, the new 2021 peak hour turning movement counts were scaled up by applying these adjustment factors. For the purposes of this analysis, all existing (2021) conditions traffic volumes reflect 2019 traffic volume levels prior to the COVID-19 pandemic.

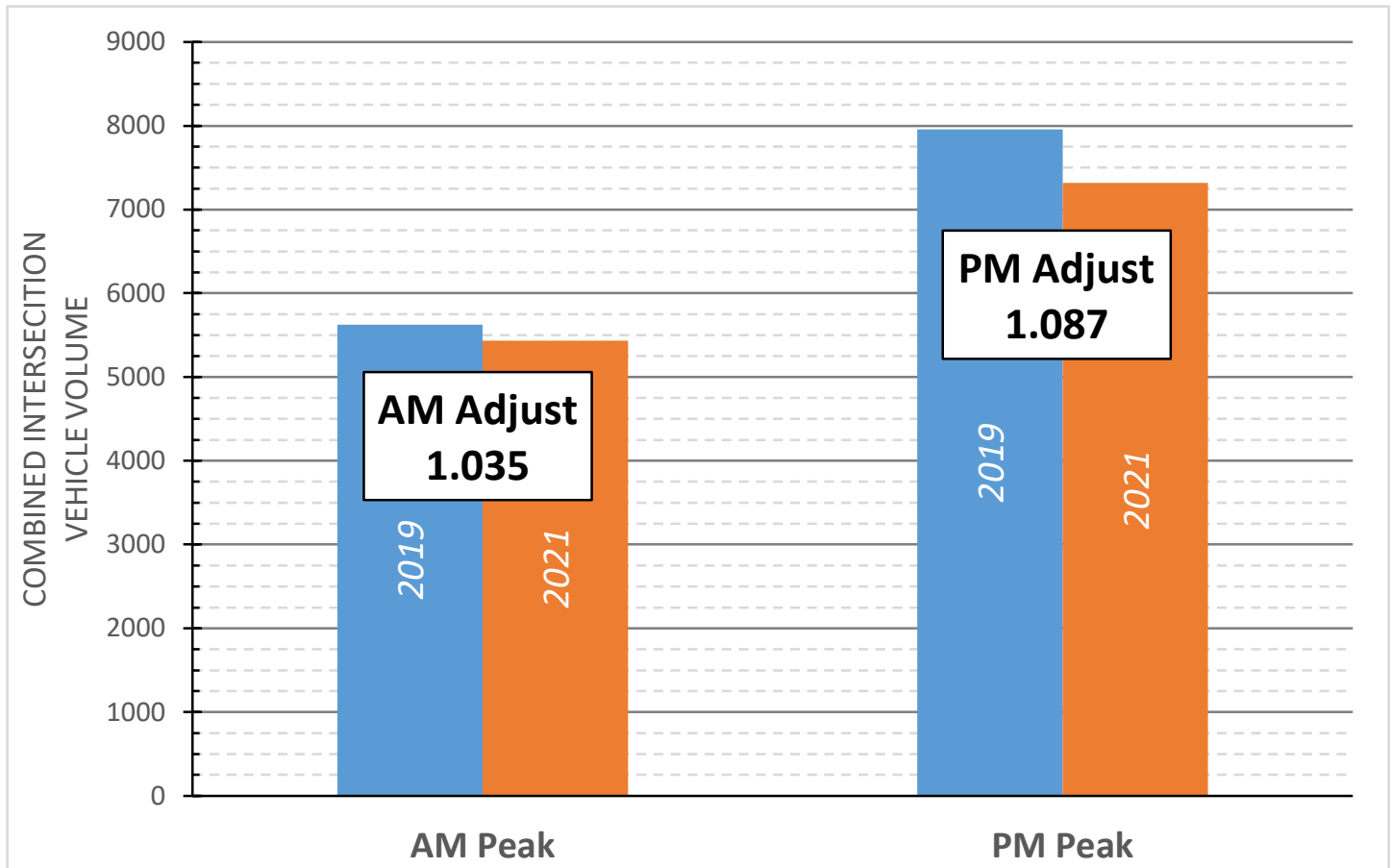


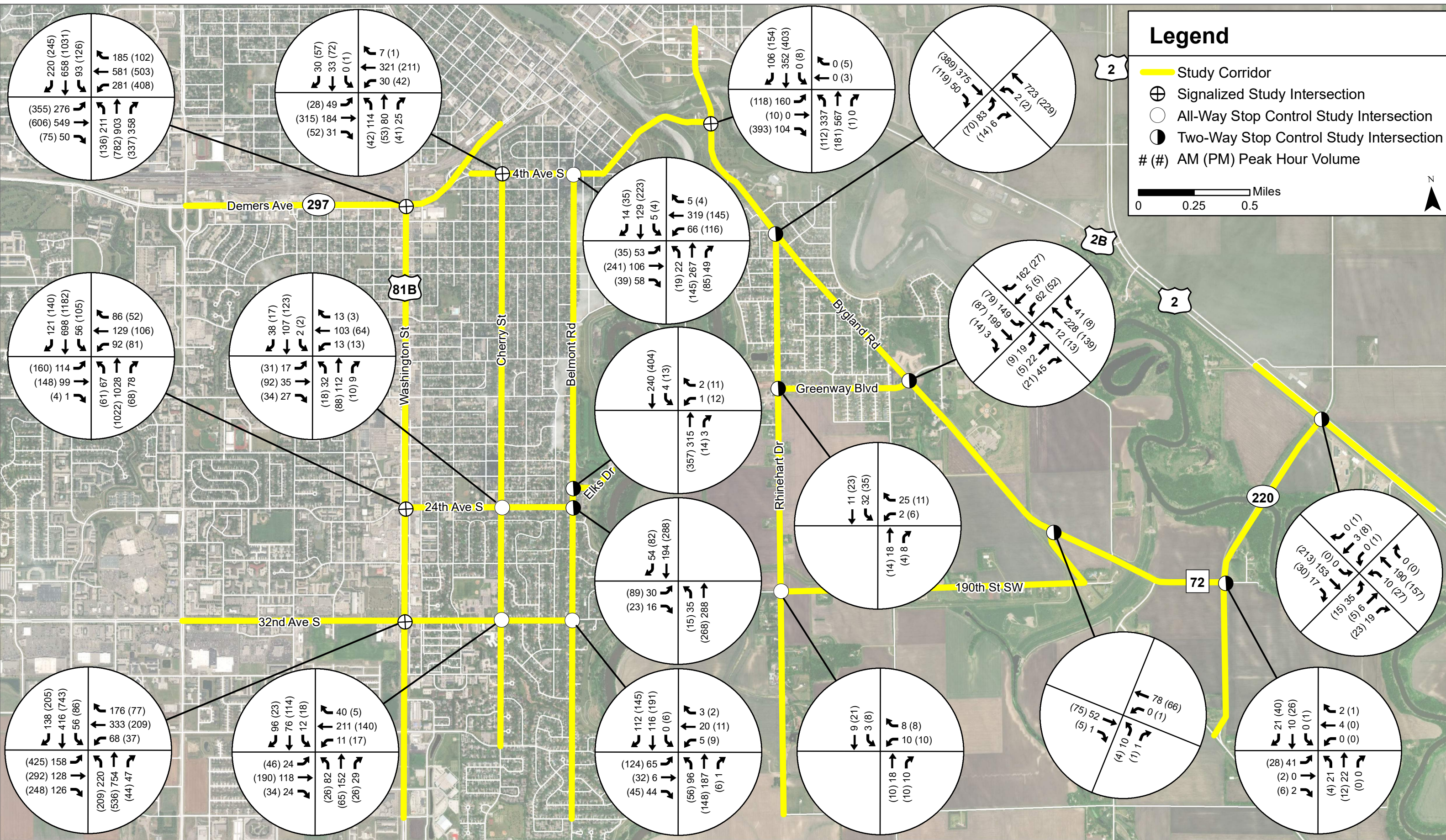
Figure 3-1. COVID-19 Peak Period Volume Adjustment Factors

For intersections that had MPO volume data from 2018 or older, historical AADT data was pulled from the North Dakota Traffic Data and MnDOT Traffic Mapping online applications to grow counts to “normal” existing (2019) volume levels based on historical volume trends. The historical daily traffic volumes collected are shown in **Table 3-2**. The historical volumes were used to develop annual growth rates for each intersection, which were then used to grow the turning movement counts to expected 2019 levels.

Table 3-2. Historical Volume Trend Analysis

Year	Belmont & 32nd	Belmont & 24 th /Elks	Belmont & 4th	Cherry & 4th	Greenway & Rhinehart	Greenway & Bygland
2019	-	-	-	-	2,430	-
2018	11,450	6,200	14,085	16,840	-	-
2017	-	-	-	-	2,430	3,430
2015	11,045	6,760	12,745	16,710	-	-
2013	9,815	6,305	10,660	14,835	2,295	3,340
2010	9,670	6,030	11,040	15,085	-	-
Annual Rate	2.13%	0.35%	3.09%	1.39%	0.96%	0.67%

The adjusted existing turning movement volumes are provided in **Figure 3-2**.



Future Bridge Traffic Impact Study



Figure 3-2
Existing Traffic Volumes

Source: ESRI World Imagery Basemap

3.1.1.3 Existing Traffic Patterns

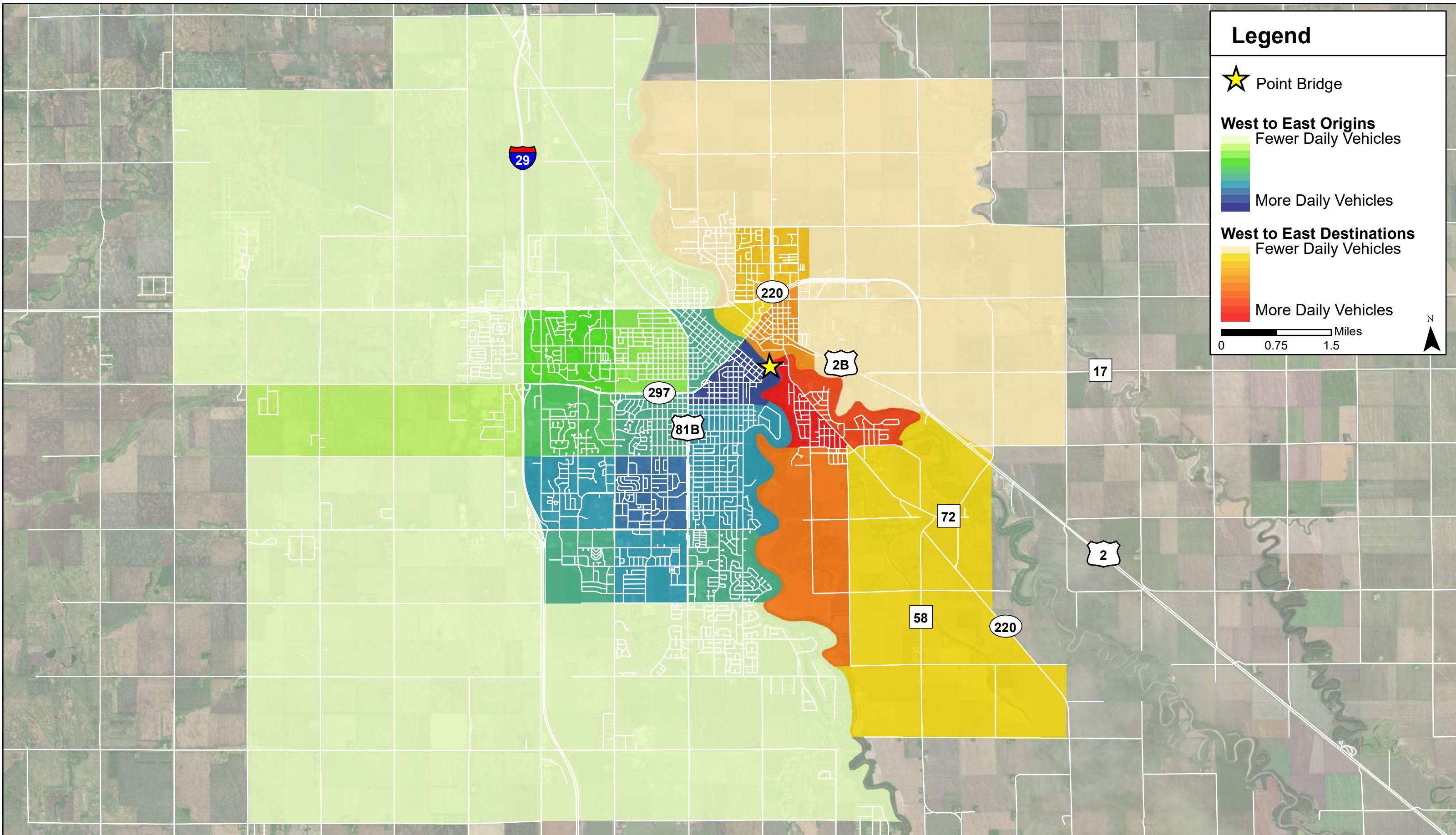
To demonstrate the traffic patterns of travelers crossing the existing bridges between Grand Forks and East Grand Forks, the Advanced Traffic Analysis Center (ATAC) at North Dakota State University ran a StreetLight origin-destination analysis between Grand Forks and East Grand Forks. The analysis determined the average daily vehicle trips that started in each traffic analysis zone (TAZ) on one side of the river, traveled across one of the bridges between the cities, and ended in a TAZ on the opposite side of the river. Of the three bridges near the study area, the data for trips using the Point Bridge was isolated to show the regional traffic patterns that would be influenced by the addition of a new river crossing at Elks Dr or 32nd Ave S.

The results of the analysis are provided in two figures showing origin-destination densities for each direction across the bridge. **Figure 3-3** shows trips starting in Grand Forks and traveling east across the bridge to East Grand Forks, and **Figure 3-4** shows trips starting East Grand Forks traveling west across the bridge to Grand Forks. The darker zones reflect TAZs where more trips begin or end, and the lighter zones reflect TAZs with less trips beginning or ending within them.

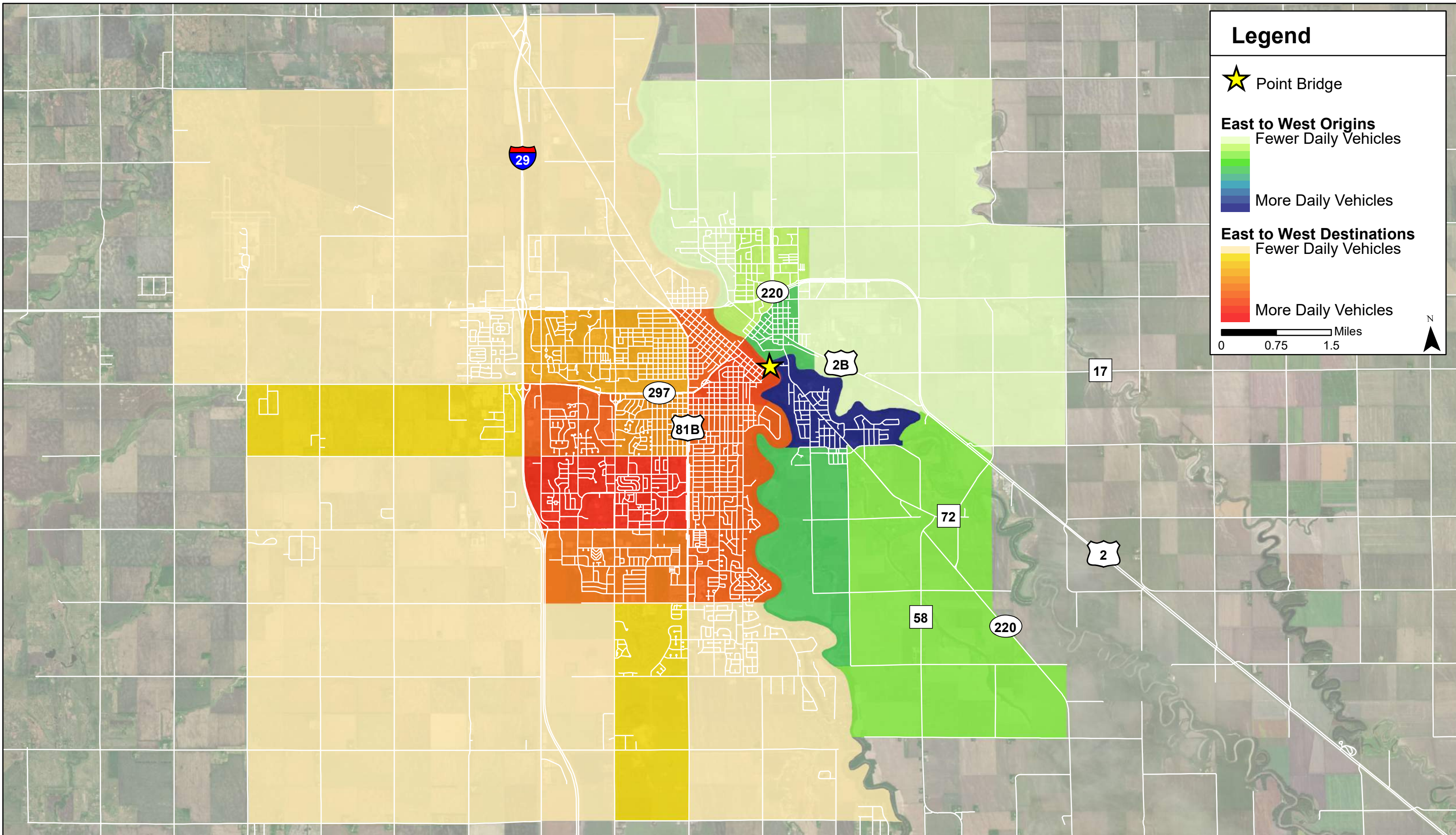
The West to East analysis shows that most trips originated east of I-29 in the southern portion of Grand Forks between Demers Ave (ND 297) and 47th Ave S. The downtown area between Demers Ave and 8th Ave S was the highest trip-generating origin TAZ. The most common destination for these trips were to the neighborhoods south of the Red Lake River, near Bygland Rd SE (old Hwy 220).

The East to West analysis was a near mirror of the West to East analysis, with most trips beginning in the neighborhoods near Bygland Rd SE between 1st St SE and Greenway Blvd SE, and ending south of Demers Ave and east of I-29. The primary destination TAZs were between I-29 and S Washington St to the north of 32nd Ave S and south of 17th Ave S.

These results indicate that a sizeable portion of trips currently using the Point Bridge would be expected to use a new river bridge to the south of the point bridge.



*Figure 3-3
Point Bridge Traffic Patterns
West to East Origins/Destinations*



*Figure 3-4
Point Bridge Traffic Patterns
East to West Origins/Destinations*

3.1.2 Future Traffic Volumes

Future daily traffic volume forecasts for the study roadway segments were developed by ATAC using travel demand modeling for the years 2030 and 2045 for scenarios including no new river bridge (No Build), a new river bridge at Elks Dr (Elks Dr Bridge), and a new river bridge at 32nd Ave S (32nd Ave Bridge). The travel demand model output included AADT volumes for the 2015 base year, 2030 forecast year, and 2045 forecast year along all major street segments in the project area.

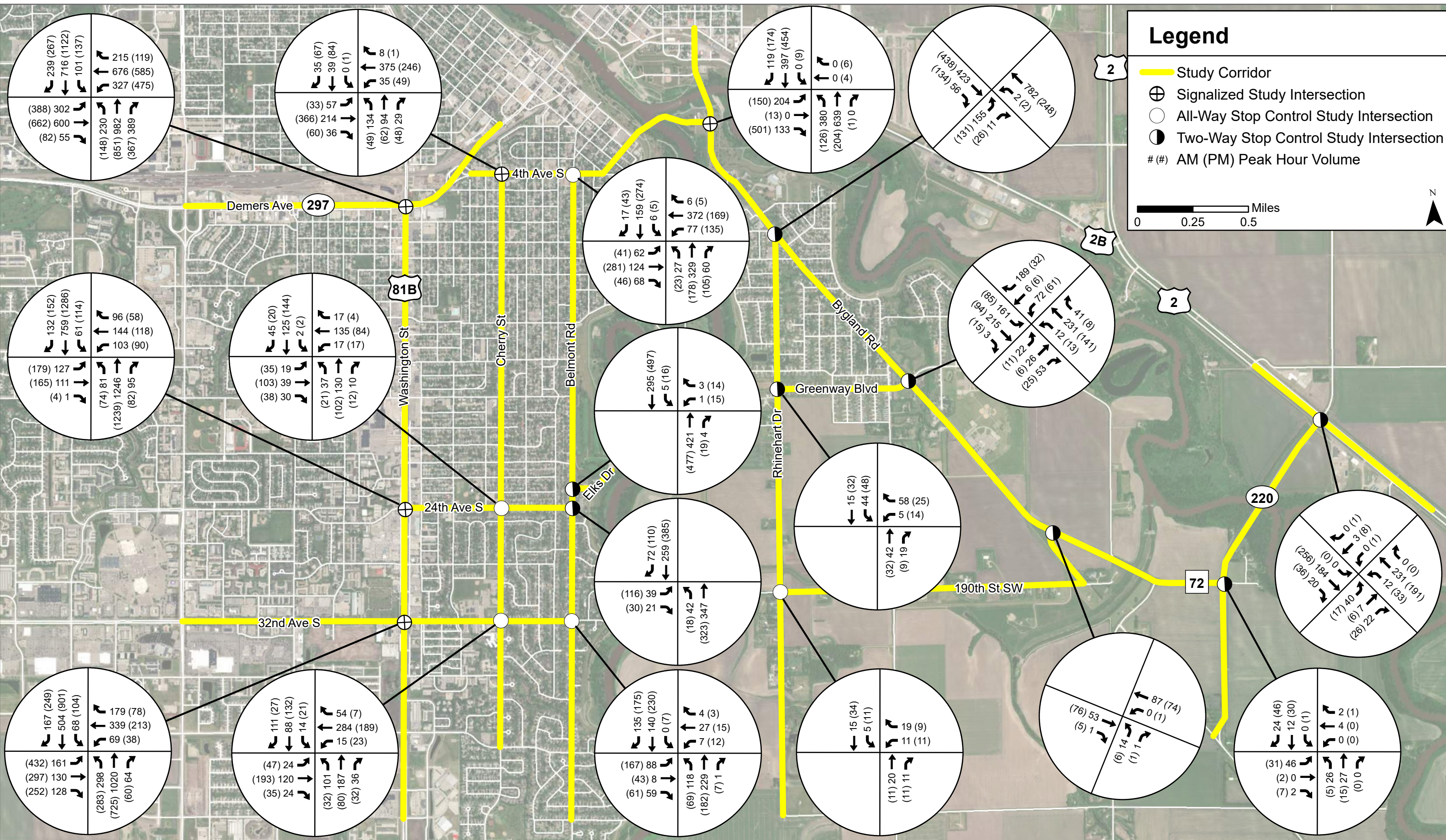
Using the forecast data provided by ATAC, growth rates were developed by comparing the base (2015) modeled segment volumes to the segment volumes for each of the forecast years under the three scenarios. These growth rates were then applied to each intersection approach to scale the existing turning movement volumes to forecast levels in 2030 and 2045 under the three scenarios. Two growth factors were calculated for each segment: one based on model-to-model growth from 2015 to 2030, and one based on model-to-model growth from 2015 to 2045. The growth rates were applied to the 2021 turning movement volumes to develop the forecast turning movement volumes.

In the Elks Dr Bridge and 32nd Ave Bridge scenarios, a new study intersection was added where the bridge would connect to Rhinehart Dr SE in East Grand Forks. Build scenario forecast turning movement volumes for these proposed future intersections and the intersections on Belmont Rd where the new bridge would connect (Elks Dr and 32nd Ave S) were derived from the travel demand model forecast ADTs based on peak hour traffic characteristics for the existing Point Bridge.

The No Build scenario forecast volumes are provided in Figure 3-5 and **Figure 3-6**, the Elks Dr Bridge scenario forecast volumes are provided in Figure 3-7 and Figure 3-8, and the 32nd Ave Bridge scenario forecast volumes are provided in **Figure 3-9** and Figure 3-10.

The changes in traffic volumes from Existing Conditions (2015, see below) to forecast 2030 No Build and forecast 2045 No Build Conditions were illustrated to show the magnitude of the anticipated volume changes on the study area road network with only background traffic growth and no additional river crossing. The average daily traffic (ADT) volume data used was from travel demand modeling provided by the Advanced Traffic Analysis Center (ATAC). The base year of the travel demand modeling was 2015, which are the volumes that are represented for Existing Conditions in the comparison graphics.

A map showing the forecast volume changes from 2015 to 2030 No Build Conditions is provided in **Figure 3-11**, and one showing the forecast volume changes from 2015 to 2045 No Build Conditions is provided in **Figure 3-12**.

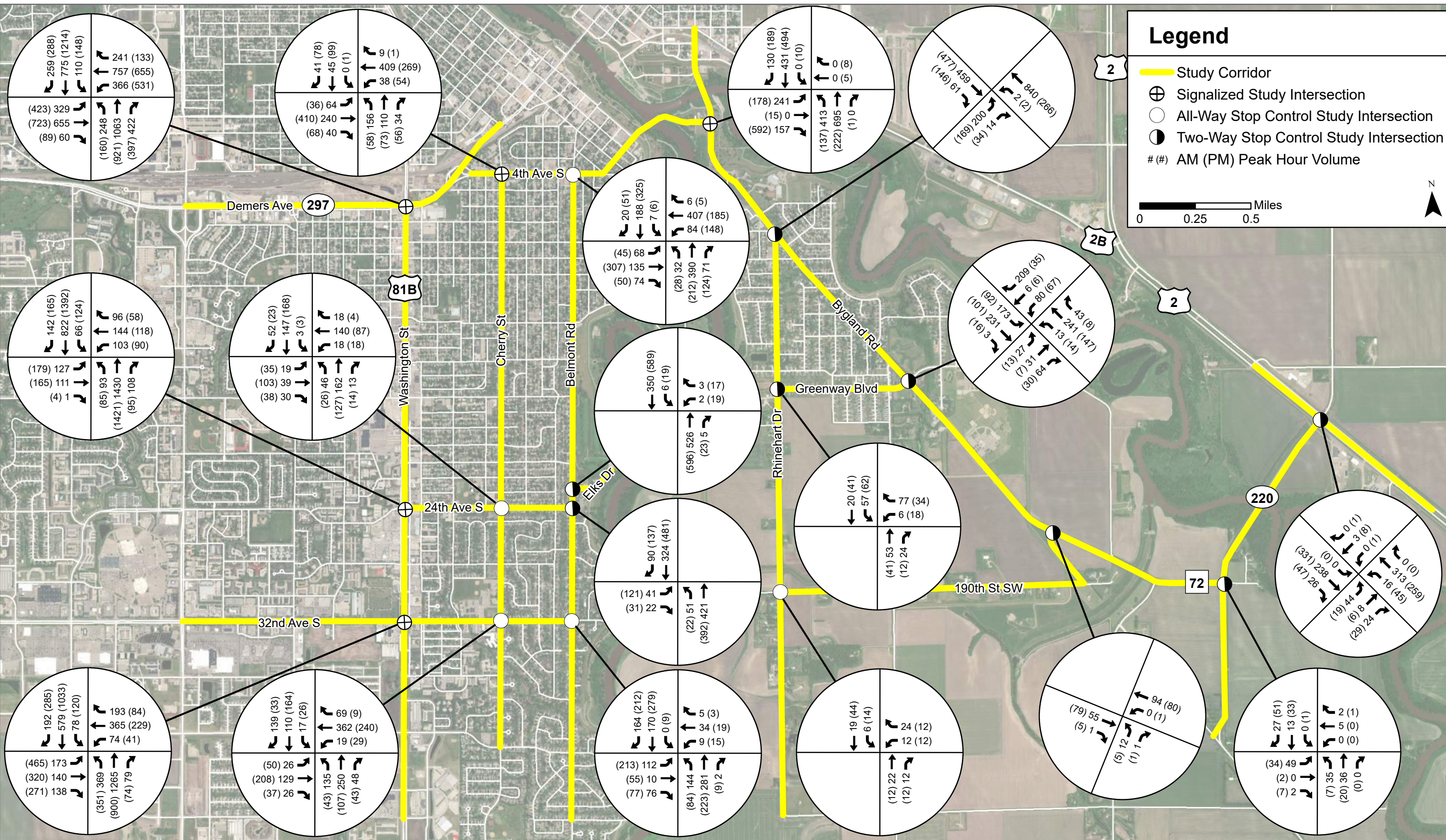


Future Bridge Traffic Impact Study



Figure 3-5
Forecast 2030 No Build Traffic Volumes

Source: ESRI World Imagery Basemap

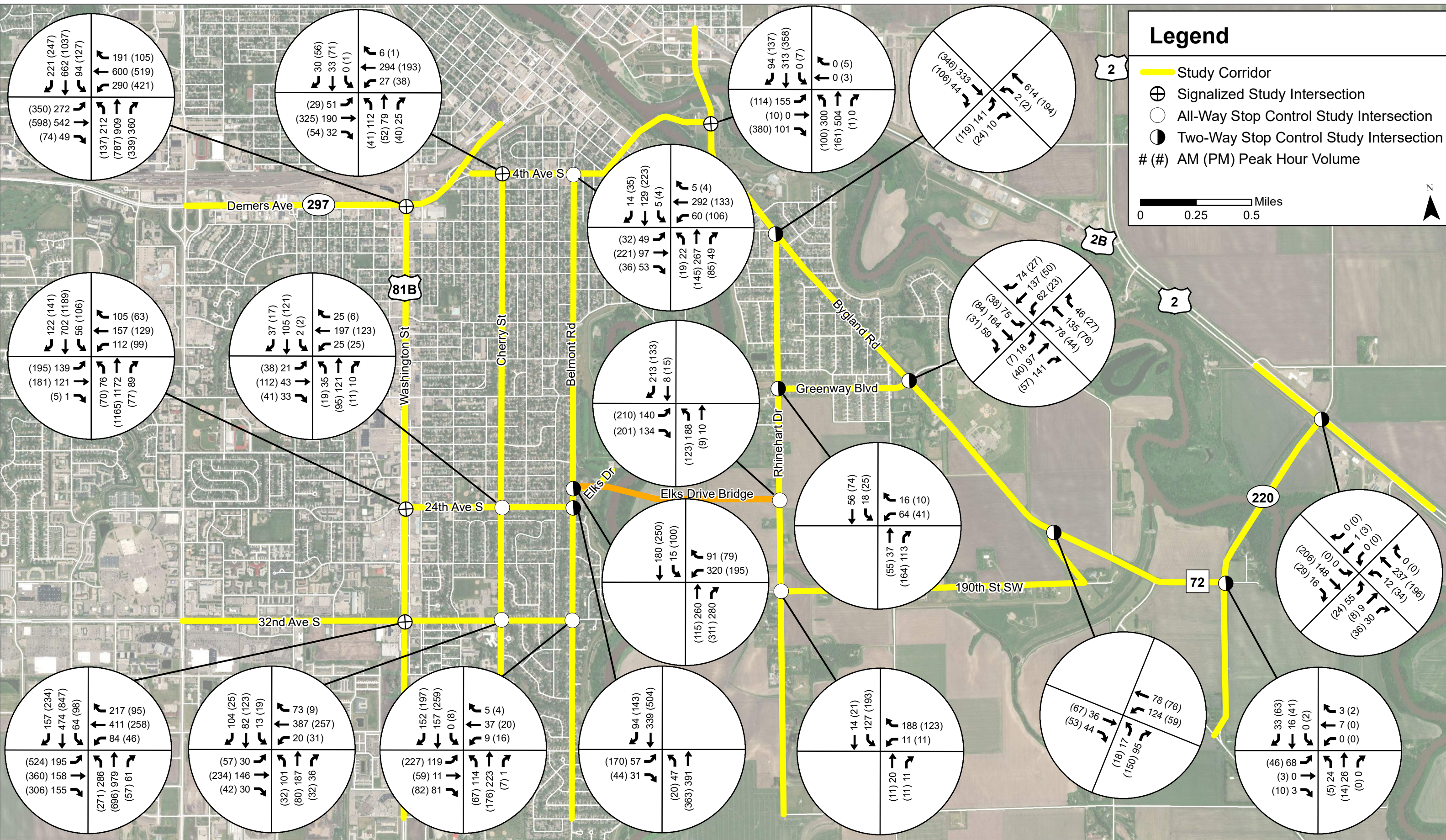


Future Bridge Traffic Impact Study



Figure 3-6
Forecast 2045 No Build Traffic Volumes

Source: ESRI World Imagery Basemap

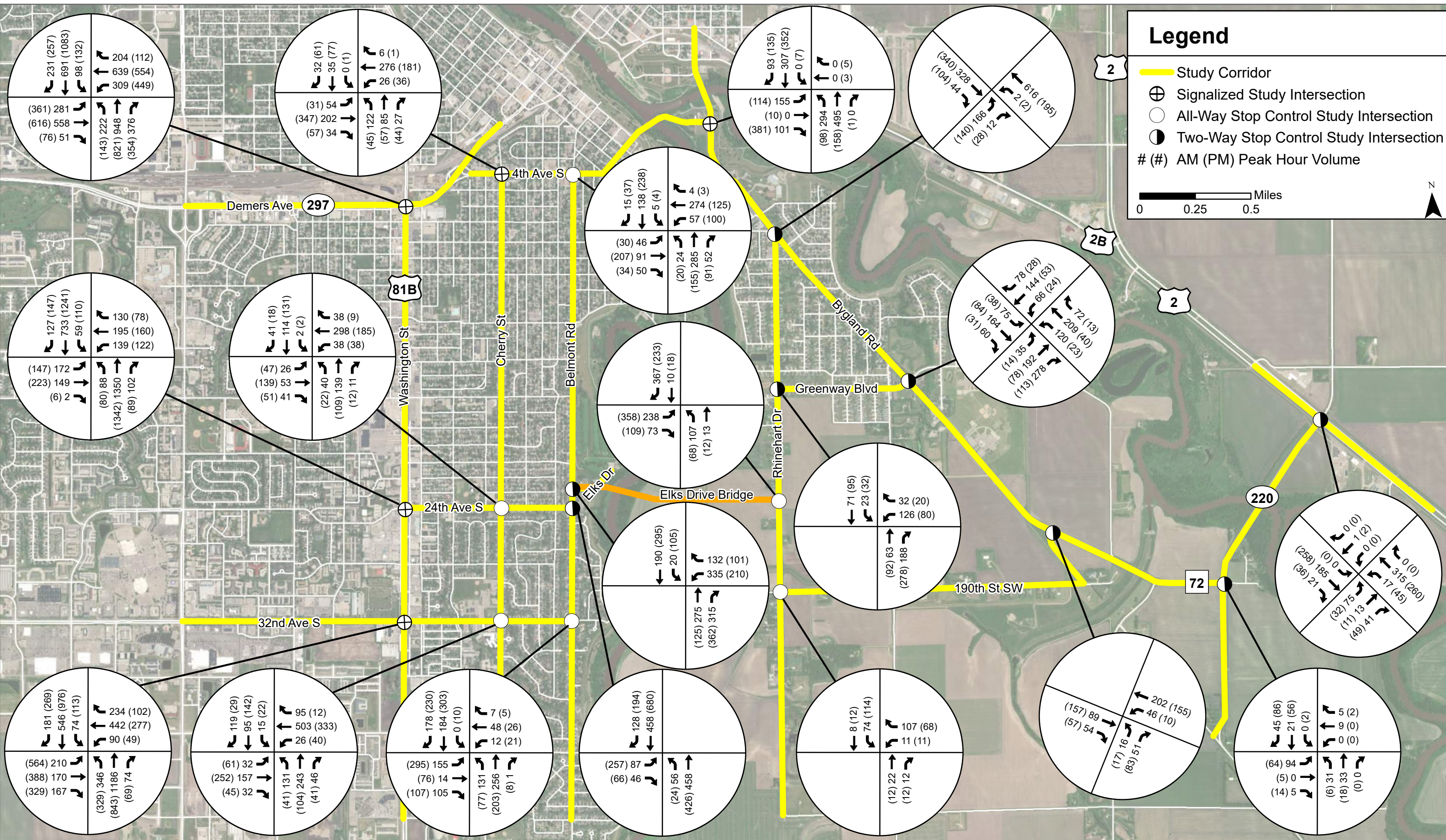


Future Bridge Traffic Impact Study



Figure 3-7
Forecast 2030 Elks Drive Bridge Traffic Volumes

Source: ESRI World Imagery Basemap

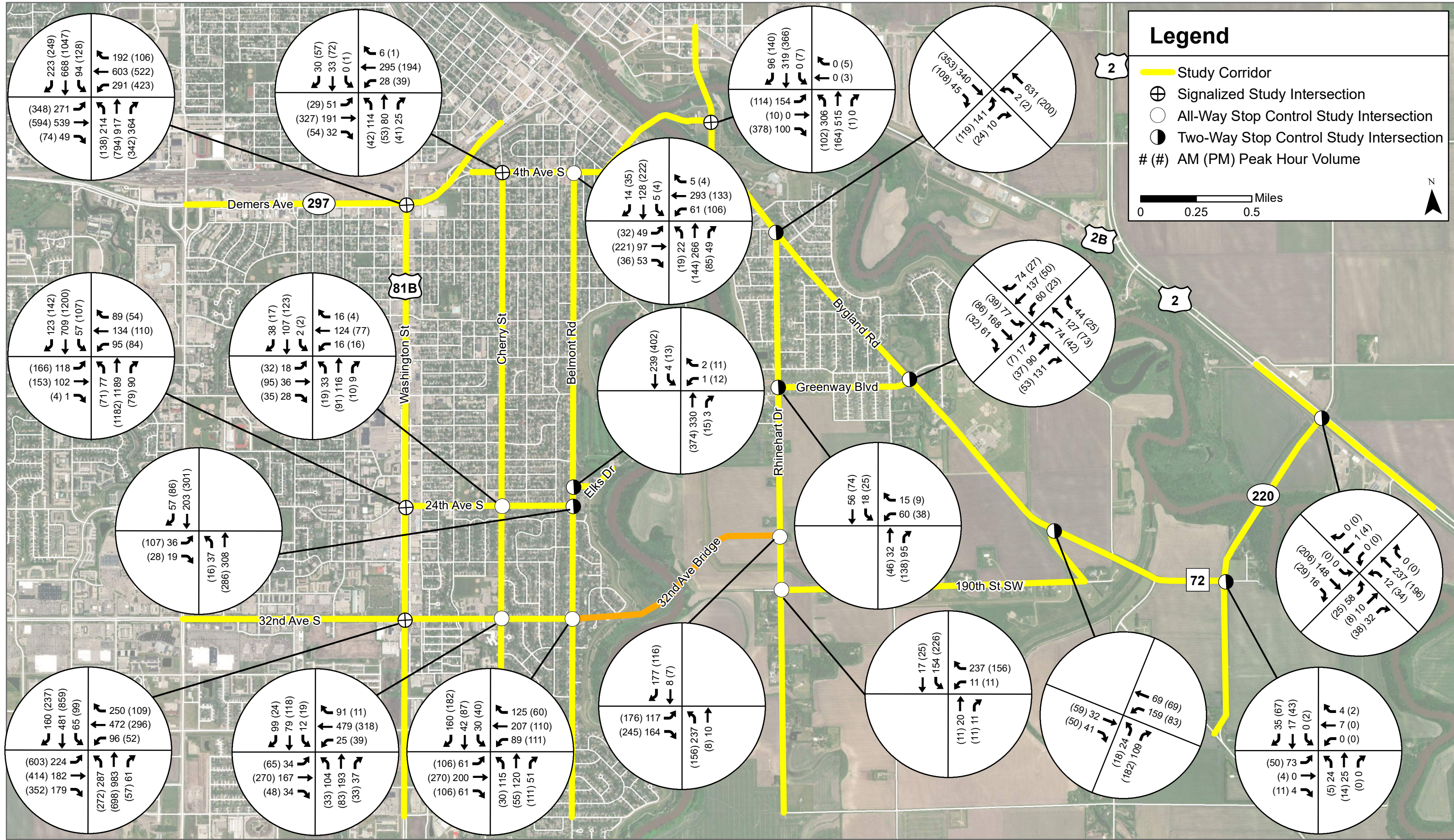


Future Bridge Traffic Impact Study

Figure 3-8
Forecast 2045 Elks Drive Bridge Traffic Volumes



Source: ESRI World Imagery Basemap

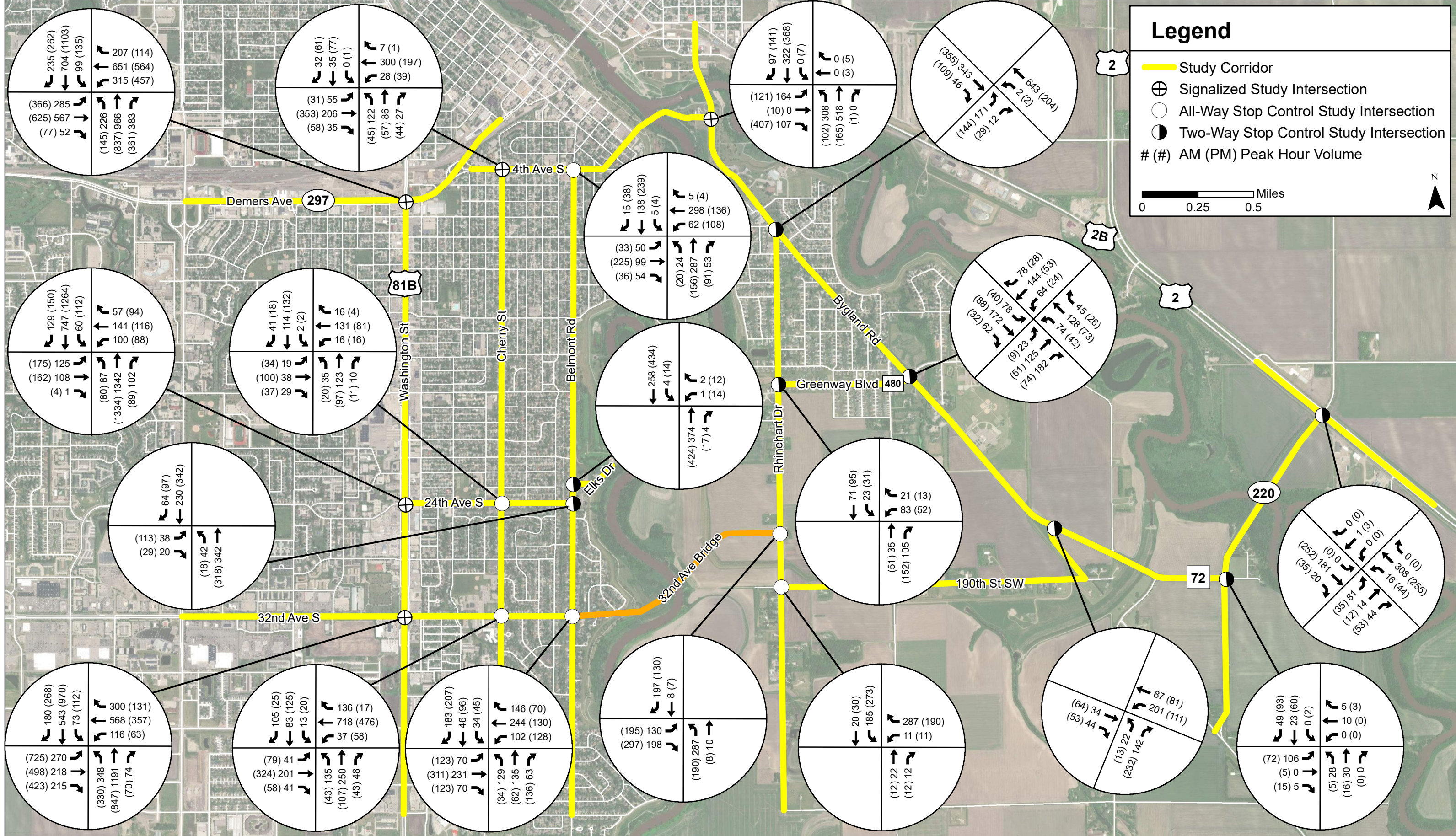


Future Bridge Traffic Impact Study



Figure 3-9
Forecast 2030 32nd Avenue Bridge Traffic Volumes

Source: ESRI World Imagery Basemap

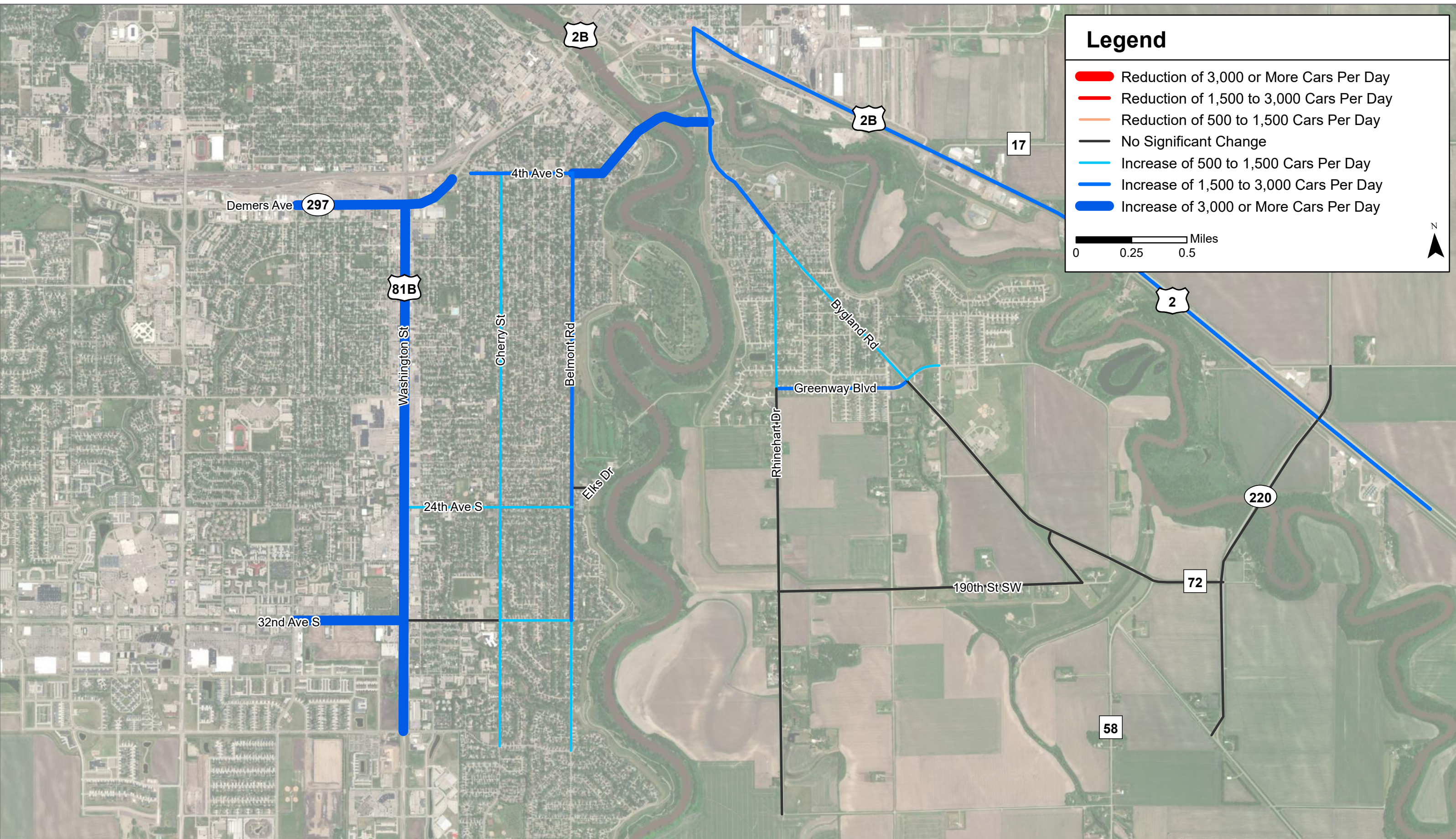


Future Bridge Traffic Impact Study

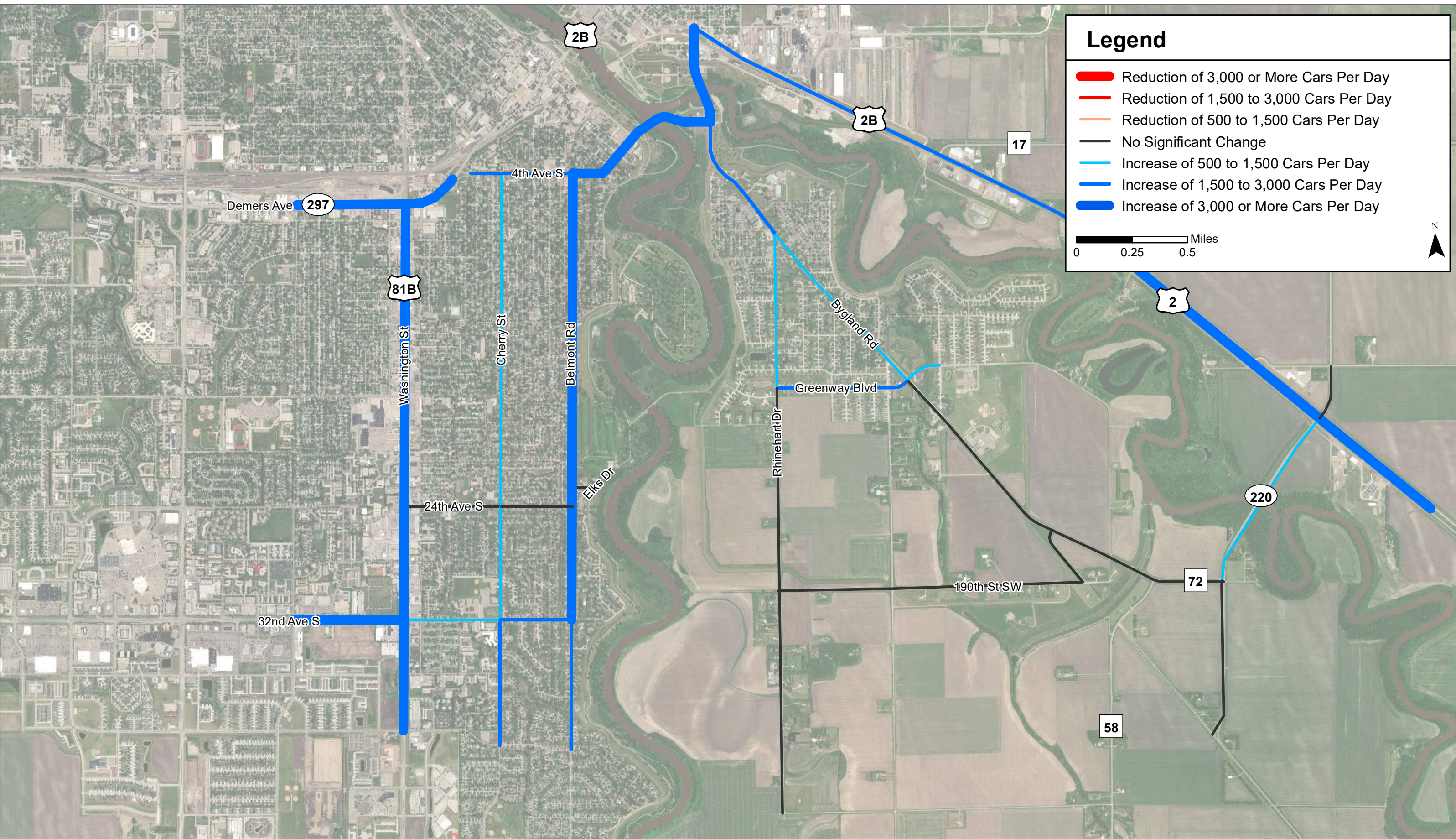
Figure 3-10
Forecast 2045 32nd Avenue Bridge Traffic Volumes



Source: ESRI World Imagery Basemap



*Figure 3-11
2015 to 2030 No Build Traffic Volume Change*



Legend

- █ Reduction of 3,000 or More Cars Per Day
- █ Reduction of 1,500 to 3,000 Cars Per Day
- █ No Significant Change
- █ Increase of 500 to 1,500 Cars Per Day
- █ Increase of 1,500 to 3,000 Cars Per Day
- █ Increase of 3,000 or More Cars Per Day

0 0.25 0.5 Miles



*Figure 3-12
2015 to 2045 No Build Traffic Volume Change*

Source: ESRI World Imagery Basemap

3.2 TRAFFIC SAFETY

A historical crash analysis was completed to identify locations within the study area that have experienced higher than average crashes. Historical crash data from the most recent five years of data available (2016 through 2020) was obtained from the MnDOT Crash Mapping Analysis Tool (MnCMAT2) for East Grand Forks roads and was provided by the Grand Forks-East Grand Forks MPO for Grand Forks roads. The safety analysis will be used along with the results of traffic operations analysis to identify where safety mitigation may be appropriate in addition to mobility mitigation at locations where over-capacity conditions are identified.

In examining the crash data obtained, two key factors were considered: (1) crash rate, (2) fatal and severe crash rate. Statistically significant locations are identified from these factors, and are indicated by comparing crash rates and fatal/severe crash rates to statewide averages for roadways or intersections with similar characteristics.

Crash Rate

History has proven that crashes are a function of exposure. Roadways with higher traffic volumes experience more crashes than similar roadways with lower volumes. Rather than simply documenting the number of crashes that occur at an intersection or over a segment, crash rates must be considered. Crash rates normalize different locations with varying traffic volumes—intersections with high volumes can be compared to intersections with low volumes using the intersection crash rate—providing a useful tool in making comparisons across multiple locations with respect to safety. Intersection crash rates are defined as the number of crashes occurring per million entering vehicles (MEV). Segment crash rates are defined as the number of crashes occurring per million vehicle miles traveled (MVM), which accounts for the volume and length of roadway being analyzed. Observed crash rates at specific locations can also be compared to statewide average or typical values for an intersection or roadway of the same type.

Crash occurrence is somewhat random by nature. Identifying every intersection or segment with a crash rate above the statewide average value in an analysis would produce a large amount of data that may not be statistically relevant with respect to safety deficiencies. The critical crash rate identifies locations that have a crash rate higher than similar facilities by a statistically significant amount. The critical crash rate is calculated by adjusting the system-wide average based on the amount of exposure and a statistical constant indicating level of confidence.¹ The critical crash rate is calculated using a statistical level of confidence of 99.5 percent. For ease of comparison, a critical crash index is utilized, which is the ratio of the observed crash rate to the critical crash rate. All critical crash index values over 1.0 would be considered statistically significant, indicating a historical crash issue.

Fatal and Severe (K/A) Crash Rate

Fatal and severe (K/A) crash rate, the second key factor, quantifies the fatal and incapacitating injury crashes at a location. The purpose for analyzing this statistic is to identify locations that may experience a low crash rate

¹ MnDOT Traffic Safety Fundamentals Handbook, August 2015.

but have a high percentage of fatal or severe injury crashes, which may be the case at high-speed, low-volume rural intersections. Reported crashes are generally categorized into the following severity types:

- Fatal (Type K)
- Incapacitating Injury (Type A)
- Non-Incapacitating Injury (Type B)
- Possible Injury (Type C)
- Property Damage Only (Type PDO)

Due to the lower number of fatal and severe crashes compared to total crashes, the K/A crash rate is calculated per 100 million vehicle miles (100 MVM). Critical K/A rate is based on the same statistical method as critical crash rates but with a lower confidence level of 90 percent as a more conservative cut-off for statistical significance. The critical K/A rate index, which is the ratio of the observed K/A rate to the critical K/A rate, is also utilized for an easier comparison of an intersection or roadway versus the statewide average for similar facility types. All values over 1.0 would be considered statistically significant.

3.2.1 Crash Summaries

The intersection crash analysis for study intersections and locations where school driveways or crossings are present on study roadways are summarized in **Table 3-3**. Cells are highlighted yellow where the crash rate exceeds the statewide average crash rate but is lower than the critical crash rate, and are highlighted red where the crash rate exceeds the critical crash rate. As previously noted, only locations with a crash rate that exceeds the critical crash rate (critical index values greater than 1.0) represent statistically significant crash problems.

Table 3-3. 2016-2020 Intersection Crash Analysis Summary

Intersection	Traffic Control	Total Entering Volume ²	Total Crashes ¹	Crash Rate per MEV	State Average Crash Rate ³	Critical Crash Rate ^{4,5}	Critical Crash Index	K/A Crashes	K/A Rate	State Average K/A Rate	Critical K/A Rate ^{4,5}	Critical K/A Index
32nd Avenue S & S Washington Street	Signalized (XS, HV)	57,601,563	74	1.28	0.70	0.99	1.29	1	1.74	0.76	3.10	0.56
24th Avenue S & S Washington Street	Signalized (LS, HV)	55,721,813	66	1.18	0.70	1.00	1.19	0	0.00	0.76	3.15	0.00
DeMers Avenue & S Washington Street	Signalized (LS, HV)	82,216,250	118	1.44	0.70	0.94	1.52	1	1.22	0.76	2.60	0.47
4th Avenue S & Cherry Street	Signalized (LS, LV)	15,366,500	11	0.72	0.52	1.03	0.70	0	0.00	0.42	5.79	0.00
1st Street SE & 3rd Avenue SE	Signalized (LS, LV)	22,173,750	8	0.36	0.52	0.94	0.39	0	0.00	0.42	4.44	0.00
32nd Avenue S & Cherry Street	All-Way Stop	13,158,250	7	0.53	0.35	0.81	0.66	0	0.00	0.57	7.04	0.00
32nd Avenue S & Belmont Road	All-Way Stop	10,448,125	2	0.19	0.35	0.87	0.22	0	0.00	0.57	8.35	0.00
24th Avenue S & Cherry Street	All-Way Stop	8,080,188	0	0.00	0.35	0.95	0.00	0	0.00	0.57	10.16	0.00
4th Avenue S & Belmont Road	All-Way Stop	17,748,125	13	0.73	0.35	0.74	0.99	0	0.00	0.57	5.68	0.00
24th Avenue S & Belmont Road	Thru/Stop (Urban)	10,762,938	2	0.19	0.18	0.56	0.33	0	0.00	0.33	7.22	0.00
Belmont Road & Elks Road	Thru/Stop (Urban)	9,636,000	2	0.21	0.18	0.58	0.36	0	0.00	0.33	7.89	0.00
Bygland Road SE & Rhinehart Drive SE	Thru/Stop (Urban)	12,181,875	2	0.16	0.18	0.53	0.31	0	0.00	0.33	6.54	0.00
Rhinehart Drive SE & Greenway Boulevard SE	Thru/Stop (Urban)	2,217,375	0	0.00	0.18	1.14	0.00	0	0.00	0.33	27.82	0.00
Rhinehart Drive SE & 190th Street SW	Thru/Stop (Urban)	365,000	0	0.00	0.18	3.36	0.00	0	0.00	0.33	149.51	0.00
Bygland Road SE & Greenway Boulevard SE	Thru/Stop (Urban)	6,259,750	4	0.64	0.18	0.70	0.92	1	15.98	0.33	11.26	1.42
Bygland Road SE & Bygland Road SE/190th Street SW	Thru/Stop (Rural)	3,695,625	0	0.00	0.25	1.06	0.00	0	0.00	1.05	21.41	0.00
TH 220 & Harley Drive	Thru/Stop (Rural)	2,536,750	0	0.00	0.25	1.26	0.00	0	0.00	1.05	29.01	0.00
TH 220 & US 2	Thru/Stop (Rural)	11,060,413	2	0.18	0.25	0.68	0.26	0	0.00	1.05	9.52	0.00
32nd Avenue S & S 10th Street (near Schroeder Middle School)	Thru/Stop (Urban)	13,692,063	5	0.37	0.18	0.51	0.71	0	0.00	0.33	5.97	0.00
Cherry Street & J Nelson Kelly Elementary School North Driveway	Thru/Stop (Urban)	5,657,500	0	0.00	0.18	0.73	0.00	0	0.00	0.33	12.26	0.00

Table 3-3. 2016-2020 Intersection Crash Analysis Summary (Continued)

Intersection	Traffic Control	Total Entering Volume ¹	Total Crashes ²	Crash Rate per MEV	State Average Crash Rate ³	Critical Crash Rate ^{4, 5}	Critical Crash Index	K/A Crashes	K/A Rate	State Average K/A Rate	Critical K/A Rate ^{4, 5}	Critical K/A Index
Cherry Street & Schroeder / J Nelson Kelly Elementary School Driveway	Thru/Stop (Urban)	5,657,500	0	0.00	0.18	0.73	0.00	0	0.00	0.33	12.26	0.00
24th Avenue S & Oak Street (near Viking Elementary School)	Thru/Stop (Urban)	4,991,375	0	0.00	0.18	0.77	0.00	0	0.00	0.33	13.64	0.00
4th Avenue S & Chestnut Street (near Phoenix Elementary School)	Thru/Stop (Urban)	12,172,750	4	0.33	0.18	0.53	0.61	0	0.00	0.33	6.55	0.00
Belmont Road & Phoenix School Driveway	Thru/Stop (Urban)	9,636,000	2	0.21	0.18	0.58	0.36	0	0.00	0.33	7.89	0.00

¹ AADT obtained from MnDOT Traffic Data Map and North Dakota Traffic Data Web App.

² East Grand Forks crash data obtained from MnCMAT2 and Grand Forks crash data was provided by the Grand Forks-East Grand Forks MPO.

³ MnDOT's 2015 Green Sheets were used to determine the state average crash rate.

⁴ The critical rate is a statistically adjusted crash rate to account for random nature of crashes.

⁵ A 99.5% confidence level was assumed for critical crash rate and an 90% confidence level was assumed for critical K/A rate.

The intersection crash analysis shows large volumes of crashes at the three study intersections along S Washington Street, resulting in crash rates that exceed the critical crash rate for each intersection. S Washington Street is a major arterial that provides a north-south connection to a large catchment area, and as such these intersections experience the greatest volumes of any within the study corridor. While the critical crash index indicates an issue with the total volume of crashes occurring at these intersections, the critical K/A index is less than 1.0 at each intersection, indicating that the vast majority of crashes do not result in a severe injury or death to the people involved. Of the K/A crashes, the one at 32nd Avenue S & S Washington Street was an incapacitating injury, and the one at DeMers Avenue & S Washington Street was a fatality. S Washington Street is programmed for reconstruction by 2030; however, this project does not include expansion or capacity improvements to S Washington Street.

The intersection of Bygland Road SE & Greenway Boulevard SE has a K/A rate that exceeds the critical K/A rate, indicating that it has experienced more crashes resulting severe injury or death than other intersections with similar characteristics. The K/A crash at this intersection was an incapacitating injury.

The last five intersections in **Table 3-3** show intersections near schools or at school driveways. There have been no fatal or severe injury crashes at these intersections in the past five years between 2016-2020. The crash rates at 32nd Avenue S & S 10th Street (5 crashes), 4th Avenue S & Chestnut Street (4 crashes), and Belmont Road & Phoenix School Driveway (2 crashes) have crash rates exceeding the statewide average, but do not exceed the critical crash rates, and thus do not represent statistically significant crash issues.

It should be noted that there is a programmed improvement to add a traffic signal at the Bygland Road SE & Greenway Boulevard SE intersection by the 2045 horizon year. Additionally, the intersection of Bygland Road SE & Rhinehart Drive SE is currently programmed to install a single-lane roundabout by the forecast 2030 year; however, this improvement is currently in consideration of being removed from the program. These intersection traffic control changes would influence the safety performance at each of these intersections, and both would be expected to provide improvements to both safety and mobility. North of the study area in East Grand Forks, MnDOT is reconstructing the intersection of US 2 and US 2B to be a Reduced Conflict Intersection (RCI). While

this improvement is not expected to impact a future river crossing, it is identified here in the context of the overall system.

3.2.2 Contributing Factors

An analysis of crash type and contributing factors was conducted for the study intersections with critical indices greater than 1.0. The contributing factors reported for each crash were extracted by category for each intersection with critical index issues. While the majority of the time there are no clear contributing factors reported, contributing factors for the next highest categories can help to show trends in crashes at the intersection. This information along with the breakdown of crashes by type/severity provides additional insight into safety issues at intersections with statistically significant crash issues. **Table 3-4** shows the contributing factor proportions for the four intersections with critical crash or critical K/A crash issues. The breakdowns of crashes by type/severity for these four intersections are provided in **Figure 3-13** through **Figure 3-16**.

The most common contributing factor at the three intersections on S Washington Street was “following too close”, which corresponds with the highest proportion of crashes being rear end crashes. These attributes are common for crashes at signalized intersections, and generally go hand-in-hand. Contributing factor and crash type trends cannot be derived at the Byglund Road SE & Greenway Boulevard SE intersection due to the low number of crashes during the analysis period (4 crashes).

Table 3-4. Contributing Factors at Issue Intersections

Contributing Factor	32nd Avenue S & S Washington St	24th Avenue S & S Washington St	DeMers Avenue & S Washington St
No Clear Factor	61.2%	60.1%	62.0%
Following Too Close	10.9%	12.3%	8.3%
Ran Red Light	6.8%	0.7%	3.7%
Careless/Reckless Driving	5.4%	2.9%	2.1%
Weather	4.8%	7.2%	5.8%
Failure To Keep In Proper Lane	3.4%	1.4%	2.9%
Too Fast For Conditions	3.4%	0.7%	2.5%
Speed	1.4%	0.7%	0.8%
Improper Turn	1.4%	0.7%	2.5%
Wrong Way	-	0.7%	0.8%
Failed To Yield	0.7%	11.6%	7.4%
Defective Equipment	0.7%	-	0.4%
Improper Overtaking	-	-	0.4%
Other	-	0.7%	0.4%

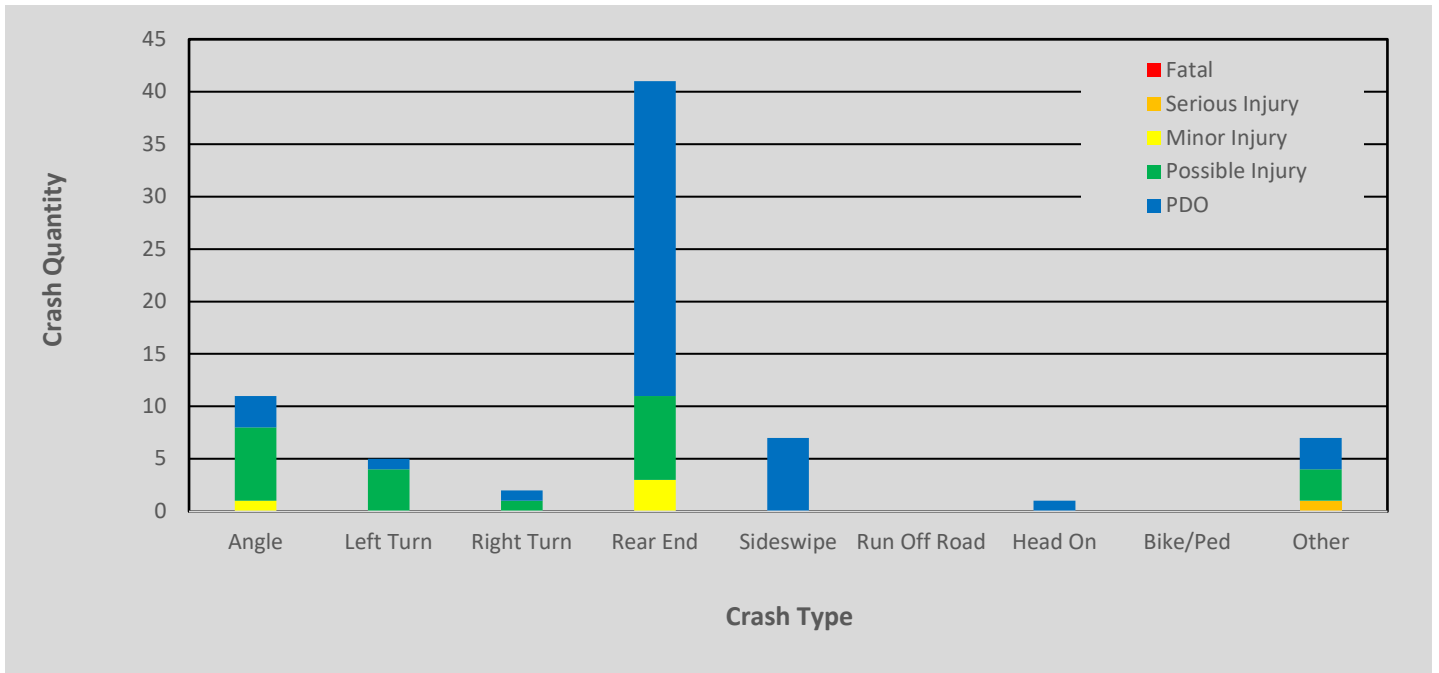


Figure 3-13. 32nd Avenue S & S Washington Street Crash Type/Severity Breakdown

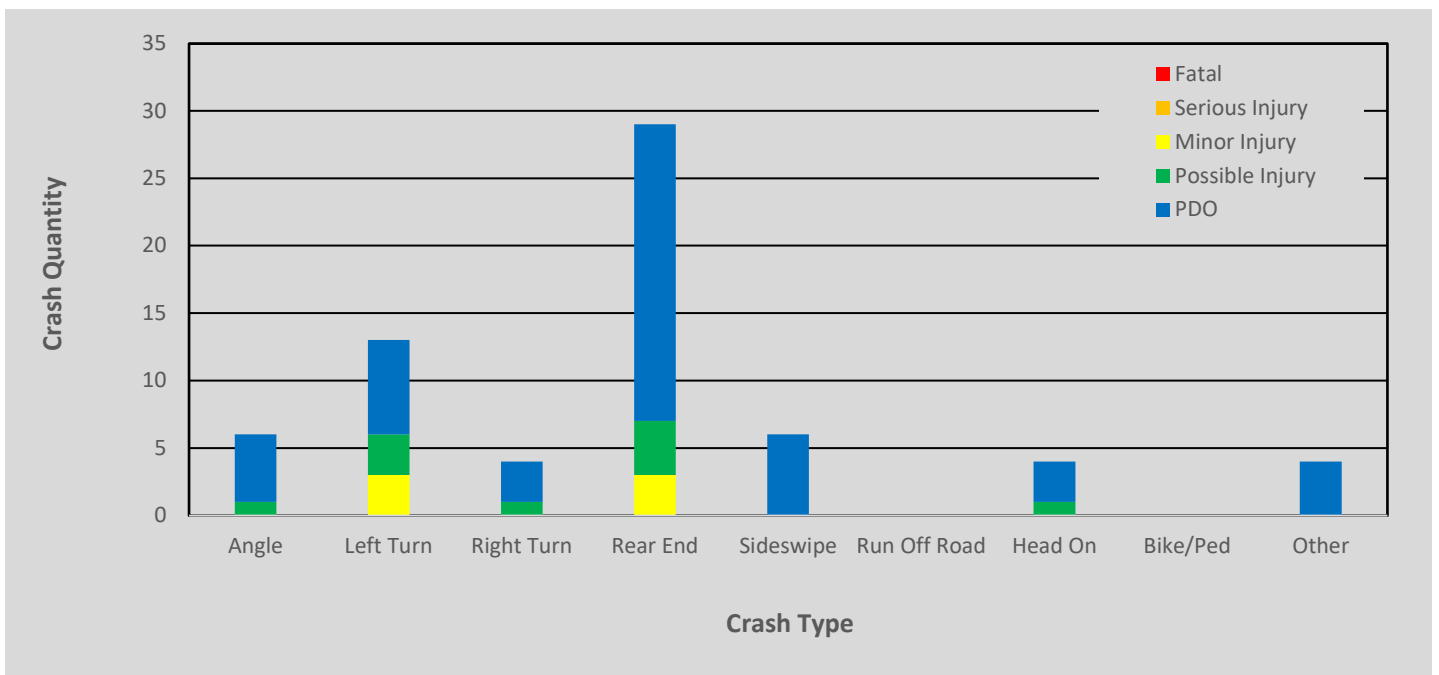


Figure 3-14. 24th Avenue S & S Washington Street Crash Type/Severity Breakdown

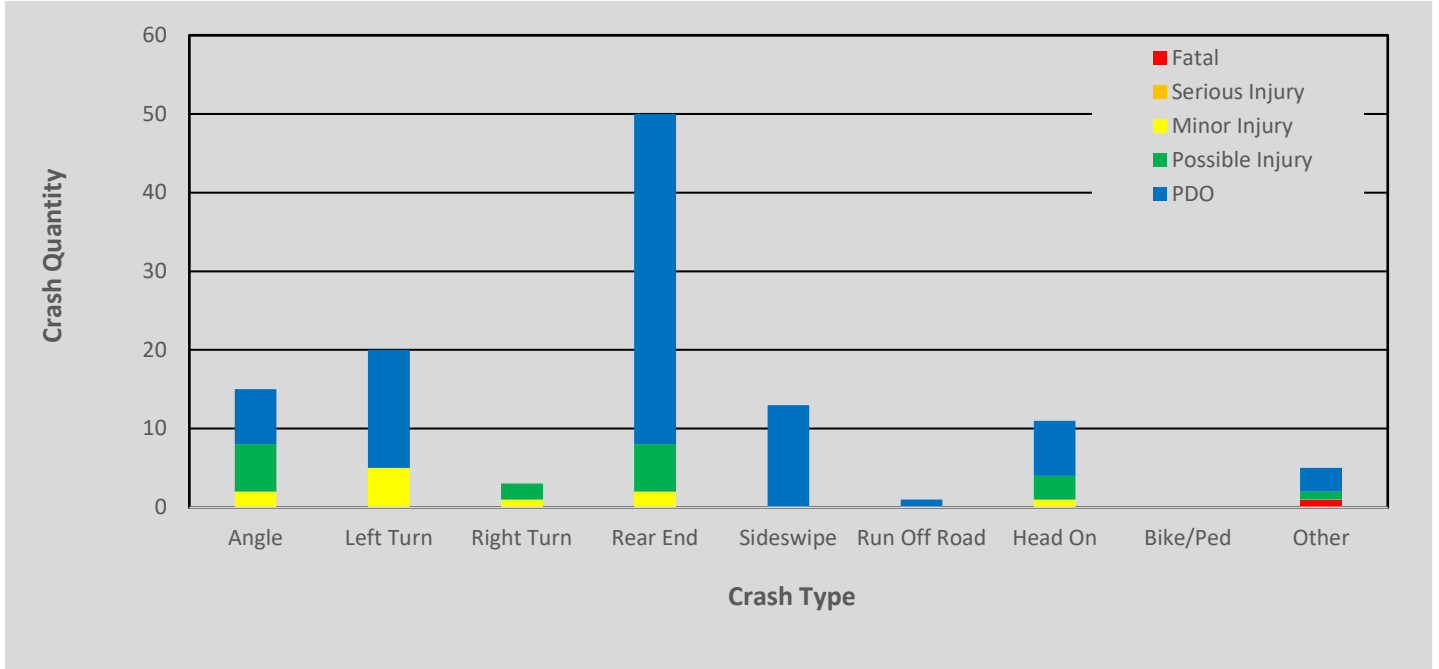


Figure 3-15. DeMers Avenue & S Washington Street Crash Type/Severity Breakdown

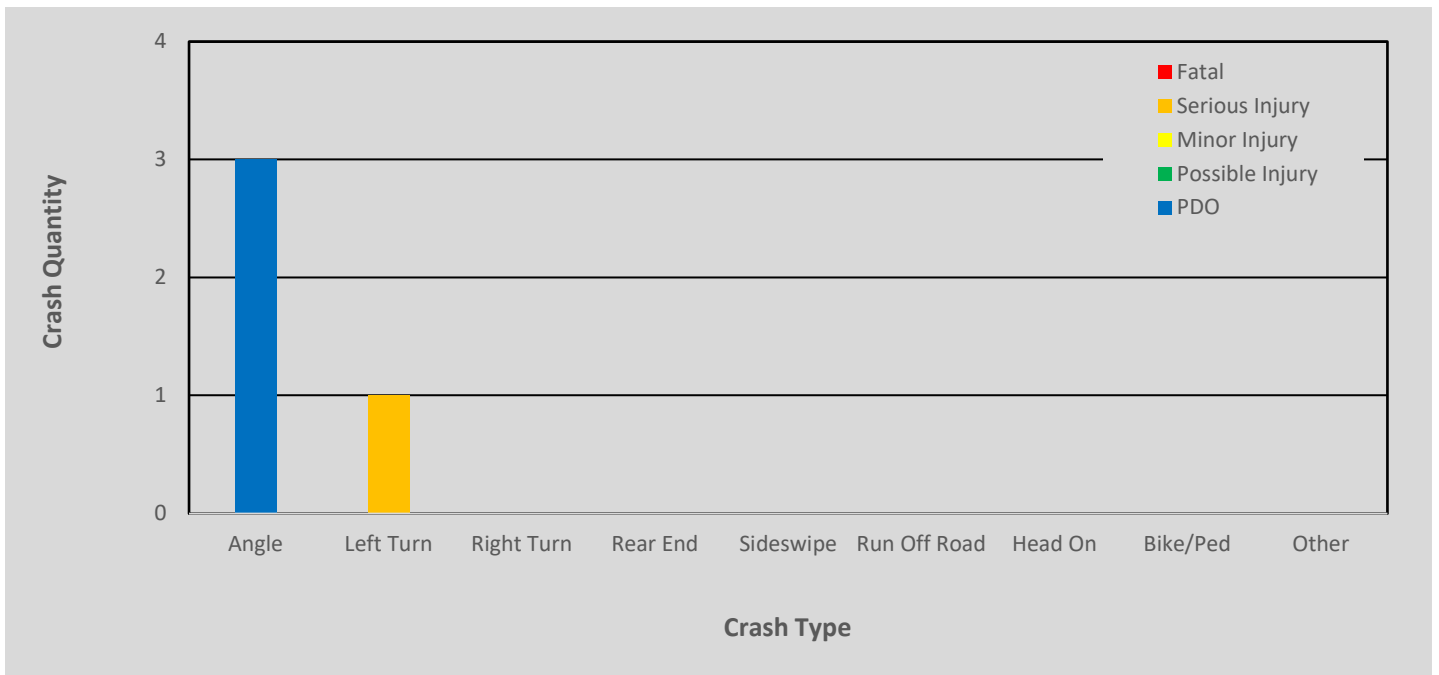


Figure 3-16. Bygland Road SE & Greenway Boulevard SE Crash Type/Severity Breakdown

Table 3-5 summarizes the study roadway segment crash analysis.

Table 3-5. 2016-2020 Segment Crash Analysis Summary

Segment	Segment Extent	Cross-Section	Total VMT ¹	Total Crashes ²	Crash Rate per MVM ^T	State Average Crash Rate ³	Critical Crash Rate ^{4,5}	Critical Crash Index	K/A Crashes	K/A Rate	State Average K/A Rate	Critical K/A Rate ^{4,5}	Critical K/A Index
32nd Avenue S	S 20th Street to S Washington Street	Urban 4-lane Divided	16,185,925	28	1.73	2.76	3.86	0.45	2	12.36	2.91	11.43	1.08
	S Washington Street to Cherry Street	Urban 2-lane (1500-4999 AADT)	3,884,513	7	1.80	1.32	2.95	0.61	0	0.00	2.87	26.76	0.00
	Cherry Street to Belmont Road	Urban 2-lane (1500-4999 AADT)	2,306,800	2	0.87	1.32	3.48	0.25	0	0.00	2.87	38.85	0.00
24th Avenue S	S Washington Street to Cherry Street	Urban 2-lane (1500-4999 AADT)	3,374,425	17	5.04	1.32	3.08	1.64	0	0.00	2.87	29.51	0.00
	Cherry Street to Belmont Road	Urban 2-lane (<1500 AADT)	730,000	2	2.74	1.46	5.79	0.47	0	0.00	10.19	126.58	0.00
DeMers Avenue	S 20th Street to S Washington Street	Urban 4-lane Divided	17,611,250	17	0.97	2.76	3.81	0.25	0	0.00	2.91	10.96	0.00
DeMers Avenue/ 4th Avenue S	S Washington Street to Cherry Street	Urban 4-lane Divided	15,665,800	30	1.91	2.76	3.87	0.49	3	19.15	2.91	11.63	1.65
4th Avenue S	Cherry Street to Belmont Road	Urban 2-lane (5000-7999 AADT)	3,124,400	11	3.52	1.80	3.92	0.90	0	0.00	2.77	30.83	0.00
4th Avenue S/ 1st Street SE	Belmont Road to 3rd Avenue SE/ Bygland Road SE (Point Bridge)	Urban 2-lane (5000-7999 AADT)	9,723,600	40	4.11	1.80	2.96	1.39	1	10.28	2.77	14.74	0.70
2nd Avenue NE	US 2 (Business) to 1st Street SE	Urban 2-lane (>8000 AADT)	5,672,100	2	0.35	2.24	3.94	0.09	0	0.00	2.56	20.00	0.00
Bygland Road SE/ 3rd Avenue SE	1st Street SE to Rhinehart Drive SE	Urban 2-lane (>8000 AADT)	10,575,875	5	0.47	2.24	3.47	0.14	0	0.00	2.56	13.60	0.00
	Rhinehart Drive SE to Greenway Boulevard SE	Urban 2-lane (5000-7999 AADT)	9,154,200	11	1.20	1.80	3.00	0.40	0	0.00	2.77	15.27	0.00
	Greenway Boulevard SE to Bygland Road SE/ 190th Street SW	Urban 2-lane (1500-4999 AADT)	6,060,825	1	0.16	1.32	2.60	0.06	0	0.00	2.87	19.94	0.00
	Bygland Road SE / 190th Street SW to TH 220	Urban 2-lane (<1500 AADT)	1,481,535	1	0.67	1.46	4.36	0.15	0	0.00	10.19	77.56	0.00
US 2	180th Street SW to TH 220	Rural Expressway	3,952,950	2	0.51	0.66	1.84	0.28	1	25.30	1.60	22.40	1.13
	TH 220 to 410th Street SW	Rural Expressway	6,168,500	1	0.16	0.66	1.58	0.10	0	0.00	1.60	16.23	0.00
S Washington Street	DeMers Avenue to 24th Avenue S	5-lane Undivided	64,532,000	327	5.07	2.59	3.11	1.63	3	4.65	2.89	6.38	0.73
	24th Avenue S to 32nd Avenue S	Urban 4-lane Divided	19,162,500	40	2.09	2.76	3.77	0.55	0	0.00	2.91	10.51	0.00
	32nd Avenue S to 40th Avenue S	Urban 4-lane Divided	12,501,250	11	0.88	2.76	4.01	0.22	0	0.00	2.91	13.09	0.00

Table 3-5. 2016-2020 Segment Crash Analysis Summary (Continued)

Segment	Segment Extent	Cross-Section	Total VMT ¹	Total Crashes ²	Crash Rate per MVMt	State Average Crash Rate ³	Critical Crash Rate ^{4,5}	Critical Crash Index	K/A Crashes	K/A Rate	State Average K/A Rate	Critical K/A Rate ^{4,5}	Critical K/A Index
Cherry Street	4th Avenue S to 24th Avenue S	Urban 2-lane (1500-4999 AADT)	7,391,250	40	5.41	1.32	2.48	2.19	0	0.00	2.87	17.62	0.00
	24th Avenue S to 32nd Avenue S	Urban 2-lane (1500-4999 AADT)	2,600,625	5	1.92	1.32	3.35	0.57	0	0.00	2.87	35.57	0.00
	32nd Avenue S to 40th Avenue S	Urban 2-lane (1500-4999 AADT)	3,120,750	3	0.96	1.32	3.16	0.30	0	0.00	2.87	31.19	0.00
Belmont Road	4th Avenue S to 24th Avenue S	Urban 2-lane (1500-4999 AADT)	13,550,625	26	1.92	1.32	2.16	0.89	0	0.00	2.87	12.46	0.00
	24th Avenue S to 32nd Avenue S	Urban 2-lane (1500-4999 AADT)	4,151,875	4	0.96	1.32	2.89	0.33	0	0.00	2.87	25.57	0.00
	32nd Avenue S to 40th Avenue S	Urban 2-lane (1500-4999 AADT)	3,983,975	3	0.75	1.32	2.93	0.26	0	0.00	2.87	26.30	0.00
Elks Drive	East of Belmont Road	Urban 2-lane (<1500 AADT)	54,750	0	0.00	1.46	23.91	0.00	0	0.00	10.19	1098.32	0.00
Rhinehart Drive SE	Bygland Road SE to Greenway Boulevard SE	Urban 2-lane (1500-4999 AADT)	2,455,538	2	0.81	1.32	3.41	0.24	0	0.00	2.87	37.09	0.00
	Greenway Boulevard SE to 190th Street SW	Rural 2-lane (<1500 AADT)	166,075	0	0.00	0.61	8.58	0.00	0	0.00	3.97	367.71	0.00
Greenway Boulevard SE	Rhinehart Drive SE to Bygland Road SE	Urban 2-lane (<1500 AADT)	525,600	2	3.81	1.46	6.71	0.57	0	0.00	10.19	161.76	0.00
190th Street SW	Rhinehart Drive SE to Bygland Road SE	Rural 2-lane (<1500 AADT)	496,400	0	0.00	0.61	4.48	0.00	0	0.00	3.97	140.94	0.00
TH 220	180th Street SW to US 2	Rural 2-lane (<1500 AADT)	78,840	0	0.00	0.61	14.14	0.00	0	0.00	3.97	729.12	0.00
	US 2 to Harley Drive	Rural 2-lane (<1500 AADT)	1,667,138	0	0.00	0.61	2.48	0.00	0	0.00	3.97	53.74	0.00
	Harley Drive to Bygland Road SE	Rural 2-lane (<1500 AADT)	1,360,538	0	0.00	0.61	2.71	0.00	0	0.00	3.97	62.61	0.00

¹ AADT obtained from MnDOT Traffic Data Map and North Dakota Traffic Data Web App.

² East Grand Forks crash data obtained from MnCMAT2 and Grand Forks crash data was provided by the Grand Forks-East Grand Forks MPO. Crashes at non-study intersections are included in segment analysis.

³ MnDOT's 2015 Green Sheets were used to determine the state average crash rate.

⁴ The critical rate is a statistically adjusted crash rate to account for random nature of crashes.

⁵ A 99.5% confidence level was assumed for critical crash rate and an 90% confidence level was assumed for critical K/A rate.

Similar to the intersection crash analysis table, cells are highlighted yellow where the crash rate exceeds the statewide average crash rate but is lower than the critical crash rate, and are highlighted red where the crash rate exceeds the critical crash rate. Only locations with a crash rate that exceeds the critical crash rate (critical index value greater than 1.0) represent statistically significant crash problems.

The following segments were identified as having a greater volume of crashes than segments with similar characteristics, as indicated by a critical crash index greater than 1.0:

- 24th Avenue S between S Washington Street and Cherry Street
- 4th Avenue S / 1st Street SE between Belmont Road and 3rd Avenue SE / Bygland Road (Point Bridge)
- S Washington Street between DeMers Avenue and 24th Avenue S
- Cherry Street between 4th Avenue S and 24th Avenue S

While there are issues with the high volume of crashes at these locations, the severity of the crashes generally resulted in minor or no injuries to those involved, and none of these locations have a critical K/A index exceeding 1.0.

The following three road segments have a K/A rate that exceeds the critical K/A rate, indicating that they have experienced more crashes resulting severe injury or death than other intersections with similar characteristics:

- 32nd Avenue S between S 20th Street and S Washington Street
- DeMers Avenue / 4th Avenue S between S Washington Street and Cherry Street
- US 2 between 180th Street SW and TH 220

Of the two K/A crashes on 32nd Avenue S, one was a fatality and the other was an incapacitating injury. The segment on DeMers Avenue / 4th Avenue S includes a 4-lane divided section on DeMers Avenue east of S Washington Street and a 3-lane undivided section on 4th Avenue S west of Cherry Street, with entry/exit ramps connecting the two. Of the K/A crashes on DeMers Avenue / 4th Avenue S, two of the three were fatalities and the third was an incapacitating injury. All three of these crashes occurred on the Demers Avenue portion of the segment. The US 2 K/A crash was an incapacitating injury.

3.3 EXISTING AND NO BUILD TRAFFIC OPERATIONS AND MOBILITY

To identify the need for improvements and understand the performance of potential bridge options, a baseline must be first established for comparison. This “No Build” traffic operations analysis assesses the existing and projected future mobility in the study area with only the programmed improvements and no additional bridge. Where vehicle mobility is discussed, it is assumed to apply to transit vehicles as well as cars and trucks.

The programmed improvement to convert the existing two-way stop-controlled intersection at Bygland Road SE & Greenway Boulevard SE to a signalized intersection was included in the 2045 No Build Conditions modeling. The programmed conversion of the Bygland Road SE & Rhinehart Drive SE intersection from its current condition as a side street stop-controlled intersection to a single-lane roundabout was evaluated for both 2030 and 2045 No Build Conditions. Because this project is in consideration of being removed from the program, the intersection was also analyzed under its existing geometry and control configuration. The results for both conditions are provided in the 2030 and 2045 No Build Conditions intersection traffic operations analysis tables.

The traffic operations analysis evaluates capacity at the roadway segment and intersection levels to identify locations that are currently or are projected to reach or exceed capacity. Using Level of Service (LOS) methodology, the quality of traffic flow and mobility was measured for the study area under Existing (2021) Conditions, forecast 2030 No Build Conditions, and forecast 2045 No Build Conditions. The traffic volumes used for the traffic operations analysis are from recent peak hour turning movement counts which were adjusted to reflect current 2021 and forecast 2030 and 2045 traffic volume levels. A discussion of the capacity, including LOS, is included in the following sections.

3.3.1 Level of Service Methodology


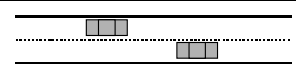




LOS is a concept used to estimate the quality of vehicular traffic flow through intersections and along roadway segments. In general, the capacity of a street is a measure of its ability to accommodate a certain volume of moving vehicles. Typically, street capacity refers to the maximum number of vehicles that can be expected to be accommodated in a given time period under the prevailing roadway characteristics and conditions. The LOS methodology is standardized by the Transportation Research Board (TRB) and is applied uniformly regardless of jurisdictional boundaries. The LOS method for arterial streets assigns an LOS grade based on delay and driver expectations of acceptable delay for the intersection control type.

LOS results are categorized on an A-F scale. LOS A represents high-quality traffic operations where motorists experience little or no delay (i.e., free flow conditions). Conversely, LOS F corresponds to low-quality operations with significant delays and potentially congestion.

The overall intersection LOS grade is based on the weighted average delay of each movement. The delays can vary greatly based on traffic volume, lane geometry, and intersection traffic control (i.e., traffic signal, through-stop, all-way stop). Grades are different at unsignalized and signalized intersections due to drivers' expectations of longer delays at signalized intersections.

Although the measure of effectiveness used in determining LOS for different facility types (e.g., arterial street, rural highway, signalized intersection) may differ, the concept of the LOS grade is the same. The general relationship between capacity and LOS is displayed in **Table 3-6**.

Table 3-6. Level of Service Grade Definitions

LOS	Description	Volume to Capacity Ratio	Signalized Intersection	Unsignalized Intersection
			Intersection Delay (Seconds / Vehicle)	Intersection Delay (Seconds / Vehicle)
A	 Free Flow. Low volumes and little to no delays.	0 - 0.6	0 - 10	0 - 10
B	 Stable Flow. Speeds restricted by travel conditions, minor delays.	0.61 - 0.7	>10 - 20	>10 - 15
C	 Stable Flow. Speeds and maneuverability closely controlled due to higher volumes.	0.71 - 0.8	>20 - 35	>15 - 25
D	 Stable Flow. Speeds considerably affected by change in operating conditions. High density traffic restricts maneuverability, volume near capacity.	0.81 - 0.9	>35 - 55	>25 - 35
E	 Unstable Flow. Low speeds, considerable delay, volume approaching or at capacity.	0.91 - 1.0	>55 - 80	>35 - 50
F	 Forced Flow. Very low speeds, volumes exceed capacity, long delays with stop and go traffic.	> 1.0	> 80	> 50

Sources:

1. Highway Capacity Manual, 6th Edition (Published 2016), Transportation Research Board, Exhibit 18-1 for Signalized Intersections, and Exhibit 19-8 for Unsignalized Intersections, and Chapter 16 for Urban Street Facilities.
2. Transportation Research Board (TRB), Highway Capacity Manual, Special Report 209

3.3.2 Roadway Segment Analysis

The study network consists of varying typical sections and intersection control types. In order to evaluate the mobility of the roadway segments that make up the study network, an assessment was completed to determine whether the capacities of the current facilities are enough to accommodate the existing and projected future traffic volumes. The assessment is a planning-level comparison of the existing and forecast ADT volumes against estimated capacity for each facility type. All information used in the volume-to-capacity (V/C) analysis, including existing and forecast ADTs and roadway capacities, were provided by ATAC. This information included the volume and capacity data from the travel demand modeling of the Grand Forks and East Grand Forks area for the base year (2015), forecast year 2030, and forecast year 2045. The modeling included changes associated with programmed improvements within the study area in the future forecast years.

The segment LOS based on volume-to-capacity ratio for the study road segments under 2015 Existing Conditions, forecast 2030 No Build Conditions, and forecast 2045 No Build Conditions are provided in **Figure 3-17**, **Figure 3-18**, and **Figure 3-19**, respectively.

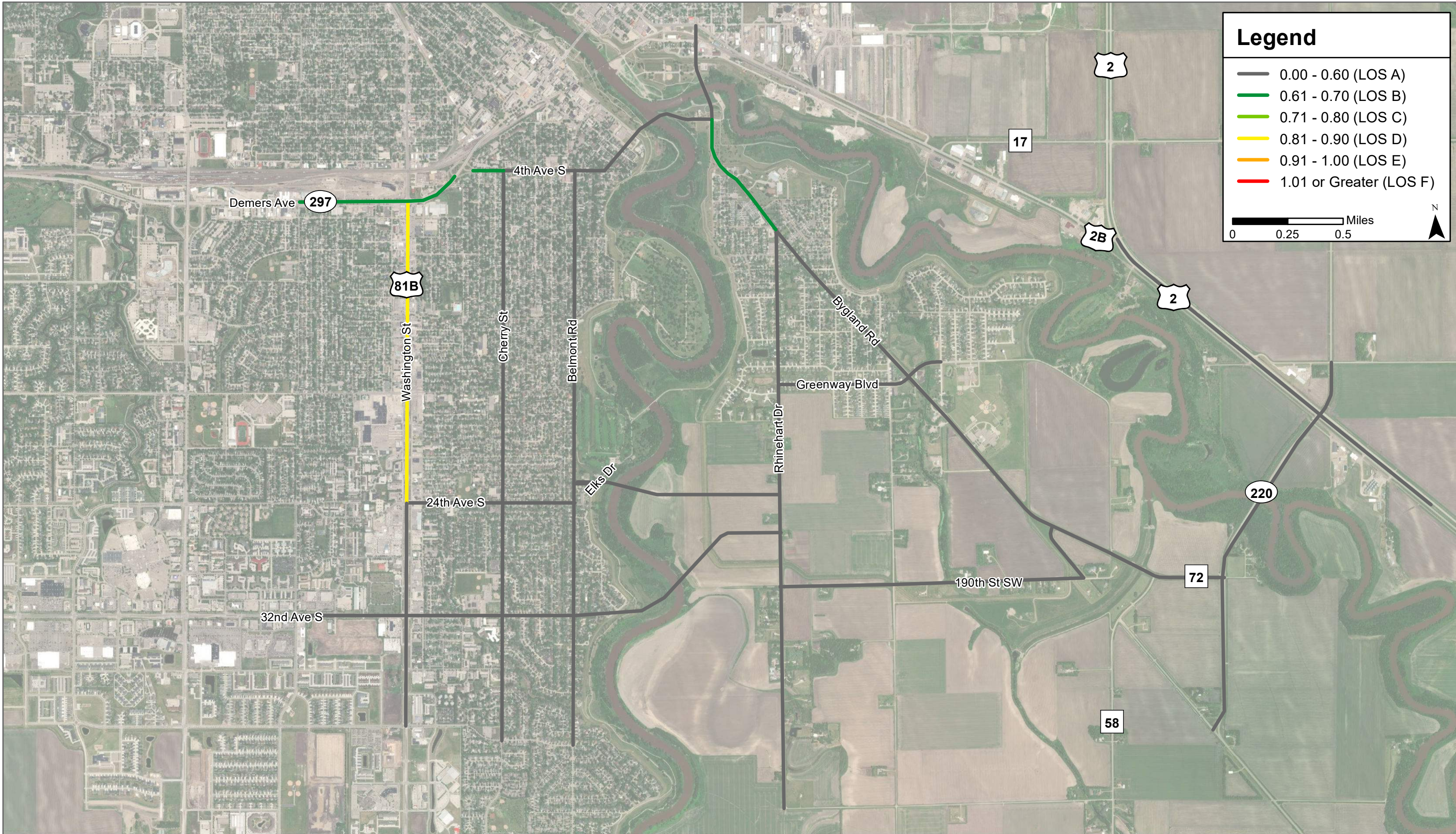
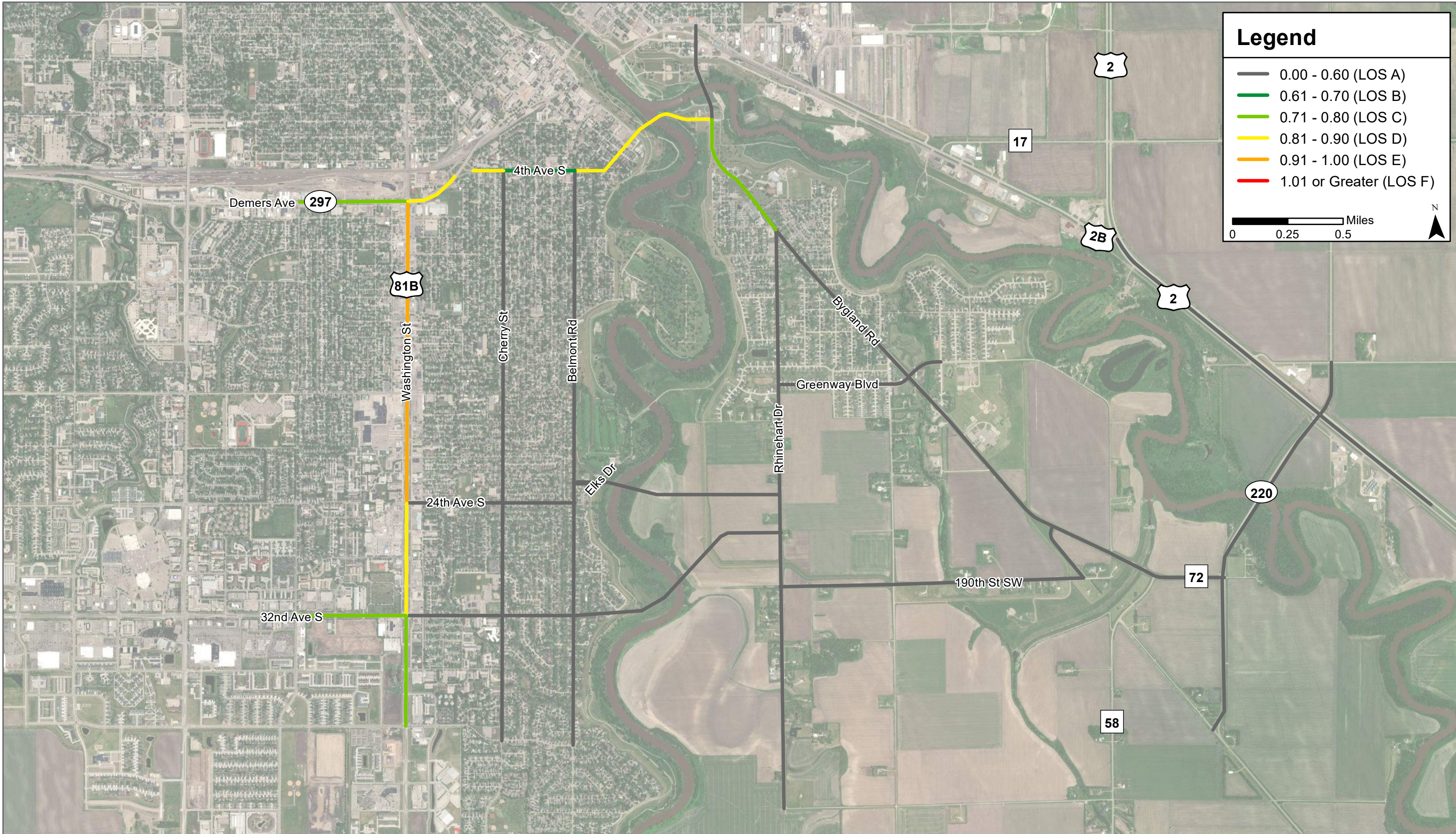


Figure 3-17
2015 Existing Segment Volume/Capacity and Level of Service

Source: ESRI World Imagery Basemap



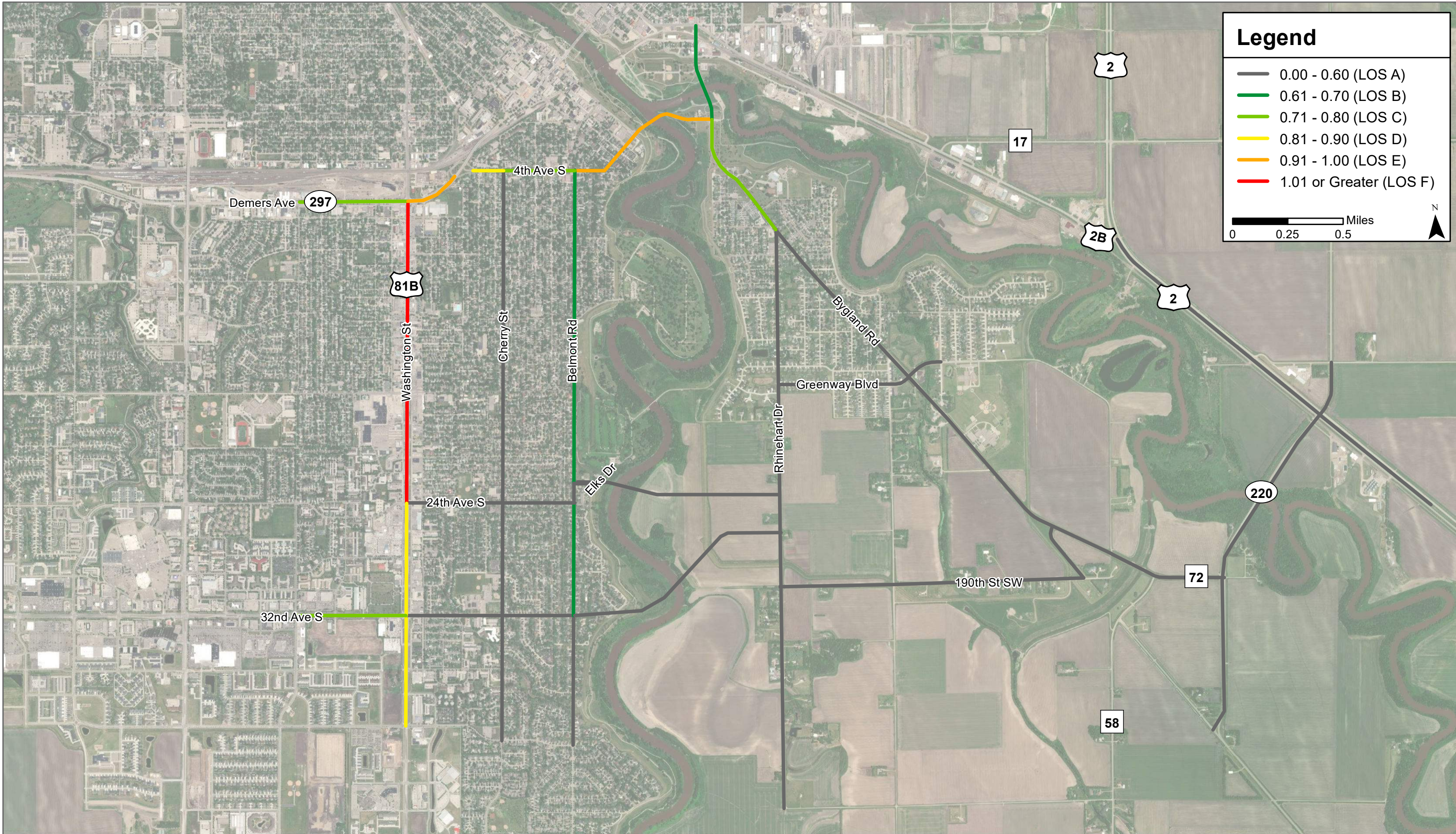


Figure 3-19
2045 No Build Segment Volume/Capacity and Level of Service

Source: ESRI World Imagery Basemap

Based on the existing and forecast ADTs and segment capacities, all roads within the study area currently operate within capacity and are expected to continue to operate within capacity through the 2030 forecast year. The S Washington Street segment between DeMers Avenue / 4th Avenue S and 24th Avenue S is expected to begin to approach capacity in 2030 No Build Conditions, and is forecast to operate at LOS E. By 2045 under No Build Conditions, this segment would be expected to exceed capacity and operate at LOS F, leading to significant congestion and increased safety problems. Additionally, the segments on DeMers Avenue between S Washington Street and 4th Avenue S and on 4th Avenue S / 1st Street SE (Point Bridge) between Belmont Road and 3rd Avenue SE are expected to reach LOS E in the 2045 No Build conditions, approaching their capacity levels.

There are multiple factors that influence segment capacity. These primarily include facility type, number of through lanes, presence of turn lanes, and the presence of and type of median. While intersection capacity plays a critical and often controlling role in the capacity of a roadway network, providing adequate roadway capacity for the anticipated volume levels is critical to providing adequate vehicle mobility.

The following section will discuss the intersection traffic operations analysis.

3.3.3 Intersection Traffic Operations Analysis

The intersection traffic operations analysis for this study uses LOS methodology to assess the quality of each study intersection's performance with respect to vehicular mobility. An overall intersection grade of LOS E indicates an intersection is approaching or is at capacity, and a grade of LOS F indicates an intersection which has exceeded capacity and experiences significant delays. Intersections operating at an unacceptable level (LOS E and F) are identified in the traffic operations analysis.

Trafficware's Synchro 10 software was used to perform the traffic operations analysis at the study intersections using HCM 6th Edition for roundabout results and HCM 2010 for signalized and stop-controlled intersections. The existing signal timings at the signalized study intersections were taken from the Synchro files used for the most recent retiming studies. Signal timings were optimized while maintaining existing cycle lengths for the future year models on S Washington Street.

Unsignalized intersections with high-volume mainlines will frequently perform at an overall LOS A while their side street through and left turn movements perform at a worse LOS. This occurs because mainline traffic does not stop, and thus incurs little to no delay. Overall intersection LOS is the weighted average delay of all movements using the intersection, so the negligible delay experienced by the high mainline volumes skews the weighted average to show minimal delay. Some motorists, especially on the side street, are likely to experience much longer delays. Because of this, the delay and LOS for the worst approach is reported at two-way stop-controlled intersections rather than for the overall intersection.

3.3.3.1 Existing (2021) Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under Existing (2021) Conditions are provided in **Table 3-7**.

Table 3-7. Existing (2021) Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	33.7	C	38.2	D
Cherry St & 32nd Ave S	AWSC	17.9	C	11.3	B
Belmont Rd & 32nd Ave S	AWSC	13.0	B	13.0	B
S Washington St & 24th Ave S	Signal	20.1	C	30.2	C
Cherry St & 24th Ave S	AWSC	9.0	A	9.0	A
Belmont Rd & 24th Ave S	TWSC	14.1	B	15.4	C
Belmont Rd & Elks Drive	TWSC	11.8	B	13.9	B
S Washington St & DeMers Ave	Signal	45.7	D	50.2	D
Cherry St & 4th Ave S	Signal	6.3	A	5.5	A
Belmont Rd & 4th Ave S	AWSC	49.8	E	21.5	C
3rd Ave SE & 1st St SE	Signal	8.4	A	6.7	A
Bygland Rd SE & Rhinehart Dr SE	TWSC	47.3	E	16.5	C
Rhinehart Dr SE & Greenway Blvd SE	TWSC	8.6	A	8.7	A
Bygland Rd SE & Greenway Blvd SE	TWSC	24.6	C	11.9	B
Bygland Rd SE & 190th St SW	TWSC	9.6	A	9.5	A
Bygland Rd SE/Harley Dr & TH 220	TWSC	9.6	A	9.0	A
TH 220 & US 2	TWSC	12.5	B	12.8	B
Rhinehart Dr SE & 190th St SE	AWSC	7.0	A	7.0	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

Under Existing (2021) Conditions, all study intersections operate acceptably at LOS D or better other than the Belmont Road & 4th Avenue S and Bygland Road SE & Rhinehart Drive SE intersections. Belmont Road & 4th Avenue S operates at intersection LOS E in the AM peak hour, which is primarily attributed to the all-way stop-control intersection control type. The side-street stop-controlled intersection of Bygland Road SE & Rhinehart Drive SE operates at LOS E on its worst approach, which is the stop-controlled northbound approach on Rhinehart, in the AM peak hour.

3.3.3.2 2030 No Build Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under 2030 No Build Conditions are provided in **Table 3-8**.

Table 3-8. 2030 No Build Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	29.1	C	43.4	D
Cherry St & 32nd Ave S	AWSC	41.0	E	12.6	B
Belmont Rd & 32nd Ave S	AWSC	20.0	C	20.7	C
S Washington St & 24th Ave S	Signal	20.8	C	30.9	C
Cherry St & 24th Ave S	AWSC	9.7	A	9.6	A
Belmont Rd & 24th Ave S	TWSC	17.7	C	21.7	C
Belmont Rd & Elks Drive	TWSC	13.2	B	17.3	C
S Washington St & DeMers Ave	Signal	58.0	E	41.9	D
Cherry St & 4th Ave S	Signal	7.1	A	5.9	A
Belmont Rd & 4th Ave S	AWSC	121.0	F	69.9	F
3rd Ave SE & 1st St SE	Signal	11.3	B	7.3	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	211.0	F	23.1	C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	14.8	B	7.3	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	9.0	A	9.1	A
Bygland Rd SE & Greenway Blvd SE	TWSC	34.6	D	12.3	B
Bygland Rd SE & 190th St SW	TWSC	9.7	A	9.6	A
Bygland Rd SE/Harley Dr & TH 220	TWSC	9.9	A	9.1	A
TH 220 & US 2	TWSC	13.6	B	14.0	B
Rhinehart Dr SE & 190th St SE	AWSC	7.0	A	7.1	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

The programmed roundabout at Bygland Road SE & Rhinehart Drive SE would be expected to improve the worst approach at the intersection from LOS E under Existing (2021) Conditions AM peak hour to an overall intersection LOS B or better in both peak hours under 2030 No Build Conditions. If no improvements were made to this intersection and the existing geometry and traffic control were maintained, significant delay would be expected on the Rhinehart Drive SE approach, which would be anticipated to operate at LOS F in the AM peak hour under 2030 No Build Conditions.

Operations at the Belmont Road & 4th Avenue S intersection are expected to degrade from LOS E in the Existing (2021) Condition AM peak hour to LOS F in both peak hours under 2030 No Build Conditions. The segment analysis also shows worsening conditions on 4th Avenue S in the future years from increased volumes using the Point Bridge, and by 2030 the all-way stop-control intersection traffic control does not appear to have sufficient capacity to service the projected traffic volumes acceptably.

Two intersections degrade from LOS D or better to LOS E under 2030 No Build Conditions in the AM peak hour: Cherry Street & 32nd Avenue S and S Washington Street & DeMers Avenue. The all-way stop-control at the Cherry Street & 32nd Avenue S intersection is expected to operate unacceptably in the AM peak hour by 2030 with the anticipated traffic growth. The roadway segments surrounding the intersection showed sufficient

capacity for the forecast 2030 volumes, so the unacceptable level of service can be attributed the all-way stop-control intersection control type.

The signalized intersection of S Washington Street & DeMers Avenue degrades from LOS D in Existing (2021) Conditions to LOS E in 2030 No Build conditions in the AM peak hour. The segment analysis indicated several of the surrounding roads would be expected to approach or reach capacity by 2030.

3.3.3.3 2045 No Build Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under 2045 No Build Conditions are provided in **Table 3-9**.

Table 3-9. 2045 No Build Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	31.7	C	42.2	D
Cherry St & 32nd Ave S	AWSC	119.1	F	16.1	C
Belmont Rd & 32nd Ave S	AWSC	56.0	F	57.4	F
S Washington St & 24th Ave S	Signal	22.1	C	30.9	C
Cherry St & 24th Ave S	AWSC	10.6	B	10.3	B
Belmont Rd & 24th Ave S	TWSC	23.5	C	32.9	D
Belmont Rd & Elks Drive	TWSC	16.6	C	23.0	C
S Washington St & DeMers Ave	Signal	85.1	F	56.1	E
Cherry St & 4th Ave S	Signal	8.6	A	6.5	A
Belmont Rd & 4th Ave S	AWSC	202.1	F	132.4	F
3rd Ave SE & 1st St SE	Signal	18.1	B	7.8	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	462.9	F	34.2	D
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	23.1	C	8.2	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	9.2	A	9.3	A
Bygland Rd SE & Greenway Blvd SE	Signal	9.0	A	5.5	A
Bygland Rd SE & 190th St SW	TWSC	9.8	A	9.6	A
Bygland Rd SE/Harley Dr & TH 220	TWSC	10.4	B	9.2	A
TH 220 & US 2	TWSC	16.1	C	17.0	C
Rhinehart Dr SE & 190th St SE	AWSC	7.0	A	7.2	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

Traffic operations at the Bygland Road SE & Greenway Boulevard SE intersection improve from LOS D and B on the highest delay approaches under 2030 No Build Conditions in the AM and PM peak hours, respectively, to overall intersection LOS A in both peak hours under 2045 No Build Conditions with the programmed installation of a traffic signal at the intersection. By 2045, the single-lane roundabout at Byland Avenue SE & Rhinehart Drive SE included as a programmed improvement by 2030 would be anticipated to continue to operate at an acceptable LOS in both the AM and PM peak hours. However, if no improvements were made to this intersection

and the existing geometry and traffic control were maintained, it would be expected to operate with severely high delays (LOS F) on the Rhinehart Drive SE approach in the AM peak hour under 2045 No Build Conditions.

The intersection of Belmont Road & 4th Avenue S was expected to operate at LOS F under 2030 No Build Conditions, and is expected to continue to operate at LOS F with significantly more delay under 2045 No Build Conditions. The segment analysis shows 4th Avenues S / 1st Street SE over the Point Bridge at LOS E, nearing or reaching capacity by 2045. A combination of insufficient roadway capacity and intersection control type (all-way stop-control) are expected to result in substantial delays and unacceptable operations at this intersection by 2045.

The all-way stop-controlled intersections on 32nd Avenue S at Cherry Street and at Belmont Road are anticipated to operate at LOS F in one or both of the peak hours by the 2045 due to traffic volume growth. The segment analysis does not show the surrounding roadways surrounding these intersections at or near capacity. The excessive delay at these intersections can be attributed to the all-way stop-control intersection control type not providing sufficient capacity for future projected volumes.

The intersection of S Washington Street & DeMers Avenue is anticipated to degrade from LOS E and D under 2030 No Build Conditions to LOS F and E under 2045 No Build Conditions in the AM and PM peak hours, respectively. The segment analysis shows multiple approaches at this intersection reaching or exceeding capacity by 2045, indicating that the existing roadway geometry near and at the intersection would be expected to be insufficient to accommodate the forecast 2045 No Build traffic volume levels.

The Red River Crossing Alternatives Analysis in Appendix C of the Grand Forks-East Grand Forks MPO 2045 Street Highway Plan Update completed in 2018 analyzed many of the same intersections in the PM peak hour through 2045 No Build Conditions. While the results of the studies may vary due to different data sources and data dates, analysis methodologies, and signal timing optimization, both studies identify anticipated unacceptable operations at the S Washington Street & DeMers Avenue, 4th Avenue S & Belmont Road, and 32nd Avenue S & Belmont Road intersections under projected 2045 No Build Conditions. The 2018 study also indicates unacceptable operations (LOS E) at the S Washington Street & 32nd Avenue S intersection in the 2045 No Build PM peak hour, while the results of this analysis indicate acceptable operations at LOS D.

4. Purpose and Need

4.1 INTRODUCTION

A Purpose and Need Statement explains why an agency or agencies are undertaking a project and describes the main objectives of the project. The “need” describes the transportation problems to be addressed by the project. The “purpose” is a broad statement of the intended transportation results. Together, the purpose and need are a way to measure and understand to what extent the alternatives being considered meet the project needs.

Alternatives that do not address the transportation needs of the project and do not meet the purpose of the project are documented as such and are not studied further. This Purpose and Need statement, like other products being developed during this planning study, may be adopted or used during a subsequent environmental review process.

4.2 PURPOSE

The following purpose statement has been prepared for the project.

The purpose of the Grand Forks-East Grand Forks Future Bridge Project is to improve mobility and connectivity between Grand Forks and East Grand Forks by reducing congestion on the Point Bridge and connecting roadways while providing a more direct connection for trips between the two cities.

4.3 NEED

The project needs discussion identifies transportation deficiencies that currently exist or are reasonably expected to occur within the project area. The needs section discusses the transportation problems which led to the initiation of the project (primary needs). In addressing these needs, the agencies involved also look for other transportation problems or opportunities for system improvements within the area that may be addressed concurrently (secondary needs).

4.3.1 Primary Needs

The desire for a new multimodal connection between the Cities of Grand Forks and East Grand Forks across the Red River has been under discussion for many years. A key issue identified in the 2045 Metropolitan Transportation Plan (MTP) is the need for an additional southern Red River crossing. An updated review of existing and proposed transportation conditions has identified the following primary needs related to mobility and congestion and system linkage.

4.3.1.1 Mobility/Congestion

Forecast No Build travel demand in years 2030 and year 2045 shows performance (level of service) and congestion on the Point Bridge and on roadway segments and at intersections leading to the bridge.

- The following roadway segments on or near the Point Bridge are expected to operate at or near capacity by 2045:
 - S Washington St
 - DeMers Ave
 - Point Bridge
- The following intersections, including those on or near the Point Bridge, are expected to operate at or near capacity by 2045:
 - S Washington St & 32nd Ave S
 - Cherry St & 32nd Ave S
 - Belmont Rd & 32nd Ave S
 - S Washington St & DeMers Ave
 - Belmont Rd & 4th Ave S
 - Bygland Rd SE & Rhinehart Dr SE (if not improved previously)

4.3.1.2 Multimodal System Linkage

Travel demand modeling demonstrates the travel constraint created by the limited number and location of bridges across the Red River between Grand Forks and East Grand Forks for both motorized and non-motorized traffic.

- There is a demonstrated travel demand south of the Point Bridge on both sides of the river, resulting in longer trips and/or out-of-direction travel due to vehicles, including transit vehicles, traveling north to cross at the Point Bridge and then south again on both sides of the river.
- There is a lack of non-motorized crossings of the Red River in the southern portion of Grand Forks and East Grand Forks. The southmost pedestrian/bicycle facility across the river connects approximately 17th Avenue in Grand Forks with 11th St SE in East Grand Forks. This crossing is primarily a recreational facility and is long and meandering. There are no other crossings south of this point that support multimodal travel between the two cities.

4.3.2 Secondary Needs

Secondary needs are transportation problems or opportunities for improvements within the study area that may be able to be addressed, if feasible, at the same time the primary needs are addressed, but are not the primary issues prompting the study.

4.3.2.1 Crashes

Review of crash history on study area roadway segments and intersections shows locations that have a crash rate that exceeds the critical crash rate or have a K/A (fatal and severe injury) rate that exceeds the critical K/A rate.

- The following segments have critical crash concerns:
 - 24th Avenue S between S Washington Street and Cherry Street
 - 4th Avenue S / 1st Street SE between Belmont Road and 3rd Avenue SE / Bygland Road (Point Bridge)

- S Washington Street between DeMers Avenue and 24th Avenue S
- Cherry Street between 4th Avenue S and 24th Avenue S
- 32nd Avenue S between S 20th Street and S Washington Street
- DeMers Avenue / 4th Avenue S between S Washington Street and Cherry Street
- US 2 between 180th Street SW and TH 220
- The following intersections have critical crash concerns:
 - 32nd Ave S & S Washington Street
 - 24th Ave S & S Washington Street
 - DeMers Ave & S Washington Street
 - Bygland Rd SE & Greenway Blvd SE

4.3.2.2 Social and Economic Factors

The following social and economic issues are important community drivers for the future bridge study.

- Community Quality of Life: Traffic volumes in some locations are high due to congestion and imbalances on the roadway system. A new river crossing is envisioned to achieve a more balanced distribution of trips on the system overall, in turn supporting improved community quality of life.
- Support for Economic Development: Significant growth is anticipated in the southern areas of Grand Forks and East Grand Forks. Improving the quality of access between the cities, and improving mobility and safety at key intersections, is expected to benefit area businesses and provide for redevelopment and economic growth, consistent with approved land use and transportation plans.

4.4 EARLY AGENCY COORDINATION

Consistent with the PEL process, early agency coordination was conducted. A request for statement of views (SOV) or review and comment regarding the Future Bridge Traffic Impact Study was emailed to the agencies listed below on 8/16/2021 with a request for a response by 9/15/2021. The responses are summarized below. The responses highlighted the need for continued coordination and environmental evaluation as the project continues through the environmental and preliminary design process but did not suggest any issues that would modify the purpose and need developed at this stage of the project.

Agency Reviewer	Date/From	Response
North Dakota Game and Fish Department	9/13/2021 – J. D. Schumacher	<ul style="list-style-type: none"> ● Structures should not act as a barrier to the movement of fish and other aquatic organisms in the stream channel under any flow conditions. Recommended that project be designed to facilitate wildlife crossing through the bridge structure. ● Take appropriate precautions to prevent the introduction or movement of Aquatic Nuisance Species. Provide the department a reasonable opportunity to inspect any

		<p>equipment prior to these items being launched or placed into waters of the state.</p> <ul style="list-style-type: none"> • Requested that work not take place within the Red River, a Classified fishery, between April 15 and July 1. • Take steps to prevent construction debris from entering waterway. Restore streambed and banks to pre-project contours unless otherwise planned. Do in kind mitigation of wetland destruction and degradation. Seed disturbed areas with native grass and forb species where appropriate. • If the project results in the removal of native riparian forest, recommended that any loss of trees and shrubs be replaced with similar species on a 2:1 basis. Upland plantings cannot adequately replace this habitat type, so suggested that the mitigation planting be incorporated into the impacted forest or a similar area of woodland adjacent to the Red River.
North Dakota Geological Survey	8/16/21 – Fred Anderson	<ul style="list-style-type: none"> • Shallow surface geology consists of approximately 74-ft of glaciolacustrine silts and clays of the Sherack and Brenna Formations, underlain by subglacial clay till of the Falconer member of the Forest River Formation. <ul style="list-style-type: none"> ○ Brenna Formation – highly plastic and deformable clay, can make for difficult shallow construction conditions. • There are areas where slumping erodes the riverbanks in the study area. • Landslide and LiDAR maps are available.
North Dakota Parks and Recreation	9/14/21 – Kathy Duttenhefner	<ul style="list-style-type: none"> • The project does not appear to affect properties that NDPRD owns, leases, or manages. • Several Land and Water Conservation Fund projects have been identified near the proposed project’s vicinity. These properties have a designated 6(f) property boundary that carries restrictions on modifications to the property. Based on the map provided, none of the resources appear to be within the footprint of the proposed bridge project. • There are no known rare species or significant ecological communities documented within or immediately adjacent to the project site.
North Dakota Department of Water Resources (previously called	9/9/21 – Steven Best	<ul style="list-style-type: none"> • Floodplains within the project area are designated to be in Zone AE. Permitting is done by a local entity.

the State Water Commission)		<ul style="list-style-type: none"> • Project is within a regulatory floodway, so a floodway review should be requested from the State Engineer before authorizing any development. • Any new bridge or other feature that occurs at least partially below the ordinary high-water mark of the Red River would require a Sovereign Land Permit • If the project requires storage of water, a construction permit may be required. • If surface water or groundwater is diverted, water permit is required.
Army Corps of Engineers – St. Paul District	9/14/21 – Ben Orne (voice mail)	<ul style="list-style-type: none"> • Requested a call back at 651-290-5280. <i>Tim Burkhardt spoke with Ben on 10/5/2021. Ben indicated the project was in too early a stage for the agency to have specific comments.</i>
Minnesota Pollution Control Agency	8/30/21 – Karin Kromar (voice mail)	<ul style="list-style-type: none"> • Not able to comment now but would like to stay in the loop once there is more information. <i>Tim Burkhardt left a message with Karin on 10/5/2021.</i>

No responses have been received from the following agencies:

- MN State Historic Preservation Office – Environmental Review
- MN Office of the State Archeologist
- MN Indian Affairs Council – Cultural Resources
- MN Department of Natural Resources – Environmental Review
- MN Department of Health – Health Review
- MN Department of Agriculture – Ag Marketing & Development
- MN Department of Commerce – Environmental Review
- MN Board of Water & Soil Resources – Water Programs
- ND Department of Environmental Quality
- ND Soil Conservation Committee (NDSU Extension Service)
- US Fish & Wildlife Services
- US Army Corps of Engineers
 - Omaha District
 - ND Regulatory Office
- US Coast Guard
- US Department of Agriculture - NRCS
- US Environmental Protection Agency
 - Region 5
 - Region 8
- US Geological Survey – Water Resources Division

5. Alternatives Development and Evaluation

Based on prior studies (the 2018 Metropolitan Transportation Plan and the 2020 Hydraulic Analysis of South End Red River Bridge study), the alternatives to be analyzed in this study were as follows:

- No Build (no new bridge)
- Elks Drive Bridge Corridor
- 32nd Avenue Bridge Corridor

Each of the alternatives would include mitigation needed based on the intersection traffic operations and traffic control warrants analysis discussed in **Section 5.1: Mobility and Congestion**.

In both the Elks Drive and 32nd Avenue bridge options, precise corridor alignments or landing locations were not identified in this study. However, for either location, a new bridge would be expected to have the following characteristics:

- 2 travel lanes for vehicles
- Signed for no trucks
- Bicycle/pedestrian trail on bridge
- Greenway trail routed under bridge (similar to other bridges)
- High point about 3 feet above street level in Grand Forks
- Flood wall closure system would be maintained (assumed to be a street opening similar to Elks Drive today)

Figure 5-1 shows a visualization of what the bridge could look like. The photo was taken at Elks Drive, but the look would be similar at Elks Drive or at 32nd Avenue on the North Dakota side.



Figure 5-1. Potential Future Bridge Visualization

The alternatives were evaluated based on whether they are compatible with the project purpose and how well they meet the project needs. The need categories evaluated were Mobility and Congestion, Multimodal System Linkage, and Community and Economic Factors. Although Safety is an identified need, it was not evaluated specifically due to the amount of analysis needed to forecast results; however, it is assumed that all three options (including No Build) would include safety improvements, especially around schools. Environmental impacts and benefit/cost were also evaluated. The full evaluation matrix is included in **Appendix B**, with a summary of the process and results below.

5.1 MOBILITY AND CONGESTION

A traffic analysis was completed to assess the traffic operations and safety performance of the roadway network on both sides of the Red River in Grand Forks and East Grand Forks to assess existing conditions, forecast 2030 conditions, and forecast 2045 conditions under scenarios with no new bridge (No Build).

5.1.1 Forecast Traffic Volumes and Patterns

The changes in traffic volumes from the forecast 2030 and 2045 No Build scenarios to 2030 and forecast 2045 Build Conditions were illustrated to show the magnitude of the anticipated volume changes on the study area road network with each river crossing alternative compared to if no new river crossing was constructed. The average daily traffic (ADT) volume data for all scenarios was provided by the Advanced Traffic Analysis Center (ATAC) from travel demand modeling in the Grand Forks / East Grand Forks region completed for the Grand Forks-East Grand Forks Metropolitan Planning Organization (MPO).

Maps showing the forecast volume changes between the No Build vs. Elks Drive Bridge Conditions for 2030 and 2045 are provided in **Figure 5-2** and **Figure 5-3**, respectively. Maps showing the forecast volume changes between the No Build vs. 32nd Ave Bridge Conditions for 2030 and 2045 are provided in **Figure 5-4** and **Figure 5-5**, respectively.

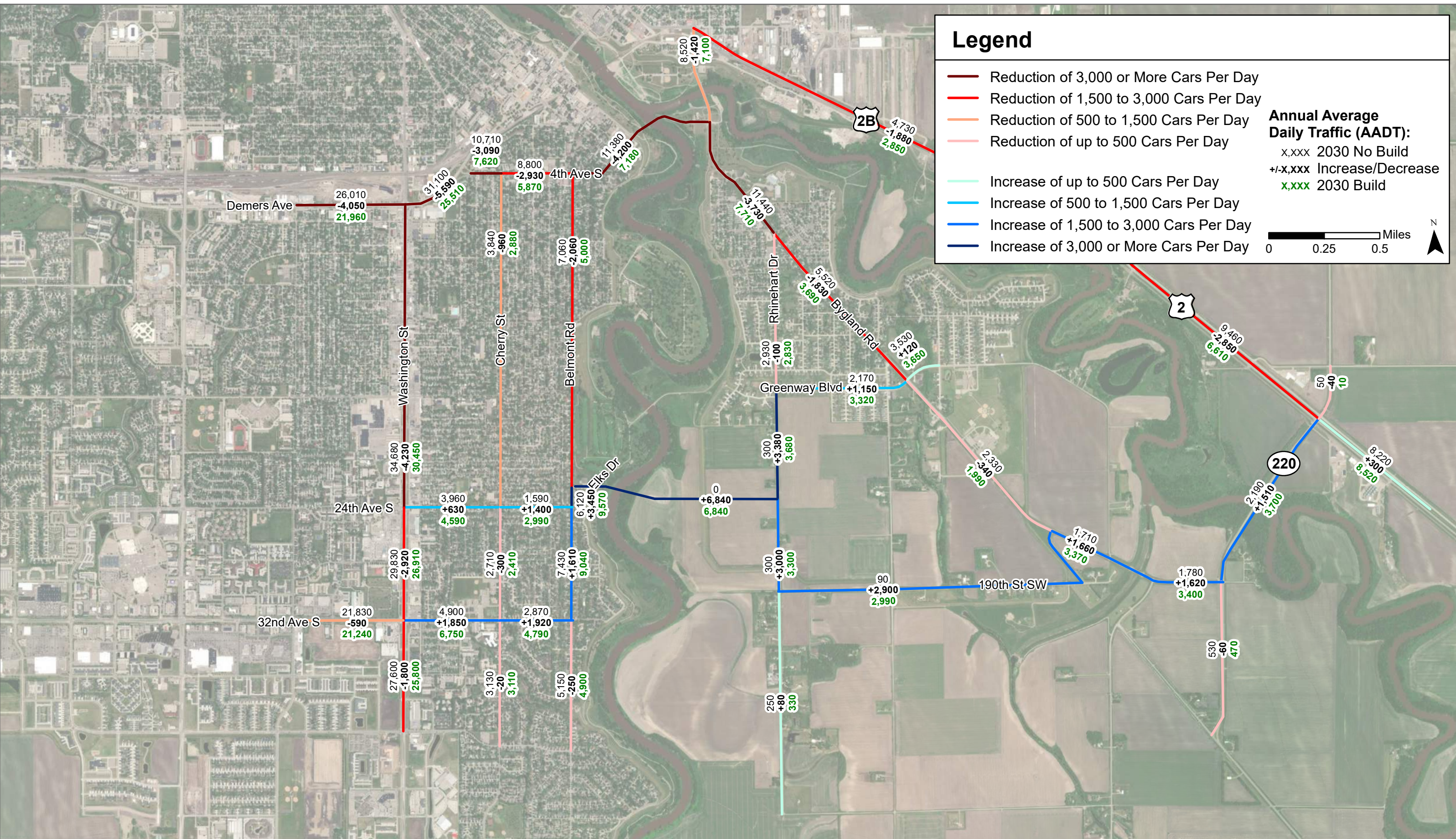


Figure 5-2
Changes in Forecast Traffic Volumes between 2030 No Build and 2030 Elks Drive Bridge Conditions

Legend

- Reduction of 3,000 or More Cars Per Day
- Reduction of 1,500 to 3,000 Cars Per Day
- Reduction of 500 to 1,500 Cars Per Day
- Reduction of up to 500 Cars Per Day
- Increase of up to 500 Cars Per Day
- Increase of 500 to 1,500 Cars Per Day
- Increase of 1,500 to 3,000 Cars Per Day
- Increase of 3,000 or More Cars Per Day

Annual Average Daily Traffic (AADT):
 x,xxx 2045 No Build
 +/-x,xxx Increase/Decrease
 x,xxx 2045 Build

0 0.25 0.5 Miles

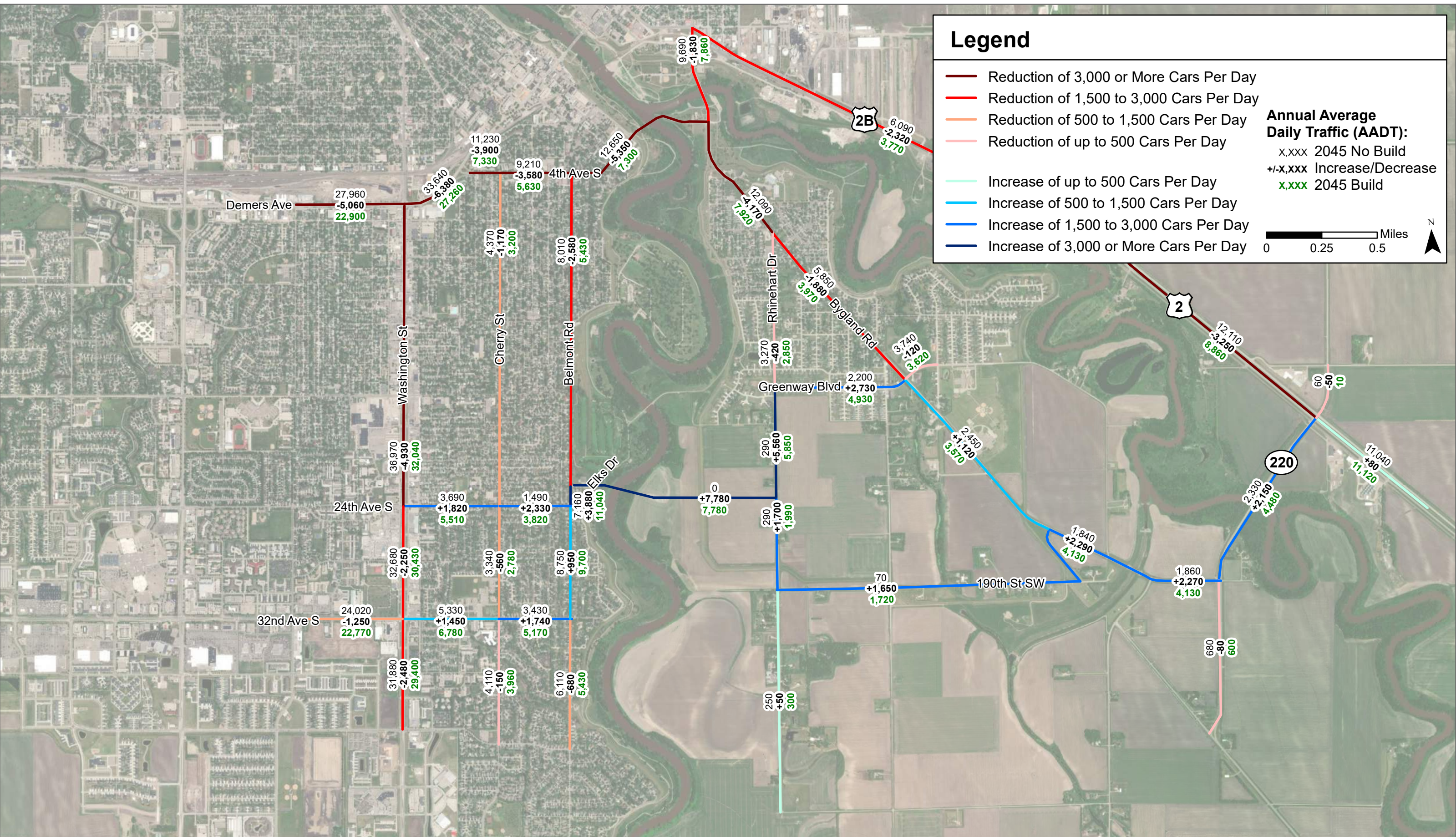
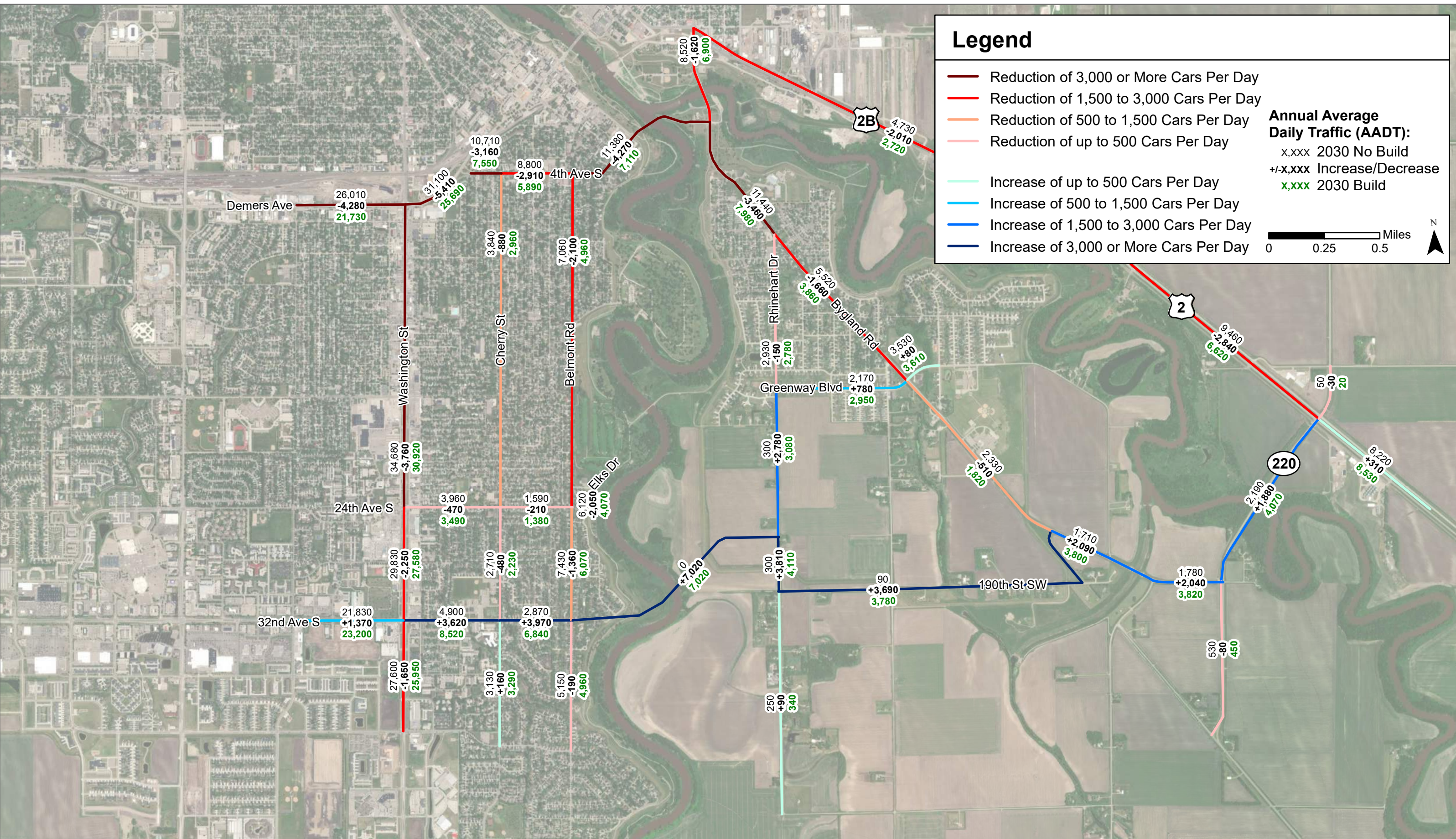


Figure 5-3
Changes in Forecast Traffic Volumes between 2045 No Build and 2045 Elks Drive Bridge Conditions



Legend

- Reduction of 3,000 or More Cars Per Day
- Reduction of 1,500 to 3,000 Cars Per Day
- Reduction of 500 to 1,500 Cars Per Day
- Reduction of up to 500 Cars Per Day
- Increase of up to 500 Cars Per Day
- Increase of 500 to 1,500 Cars Per Day
- Increase of 1,500 to 3,000 Cars Per Day
- Increase of 3,000 or More Cars Per Day

Annual Average Daily Traffic (AADT):
 x,xxx 2030 No Build
 +/-x,xxx Increase/Decrease
 x,xxx 2030 Build

0 0.25 0.5 Miles

Figure 5-4
Changes in Forecast Traffic Volumes between 2030 No Build and 2030 32nd Ave Bridge Conditions

Legend

- Red line: Reduction of 3,000 or More Cars Per Day
- Orange line: Reduction of 1,500 to 3,000 Cars Per Day
- Light orange line: Reduction of 500 to 1,500 Cars Per Day
- Pink line: Reduction of up to 500 Cars Per Day
- Light green line: Increase of up to 500 Cars Per Day
- Blue line: Increase of 500 to 1,500 Cars Per Day
- Dark blue line: Increase of 1,500 to 3,000 Cars Per Day
- Dark red line: Increase of 3,000 or More Cars Per Day

Annual Average Daily Traffic (AADT):
 x,xxx 2045 No Build
 +/-x,xxx Increase/Decrease
 x,xxx 2045 Build

0 0.25 0.5 Miles

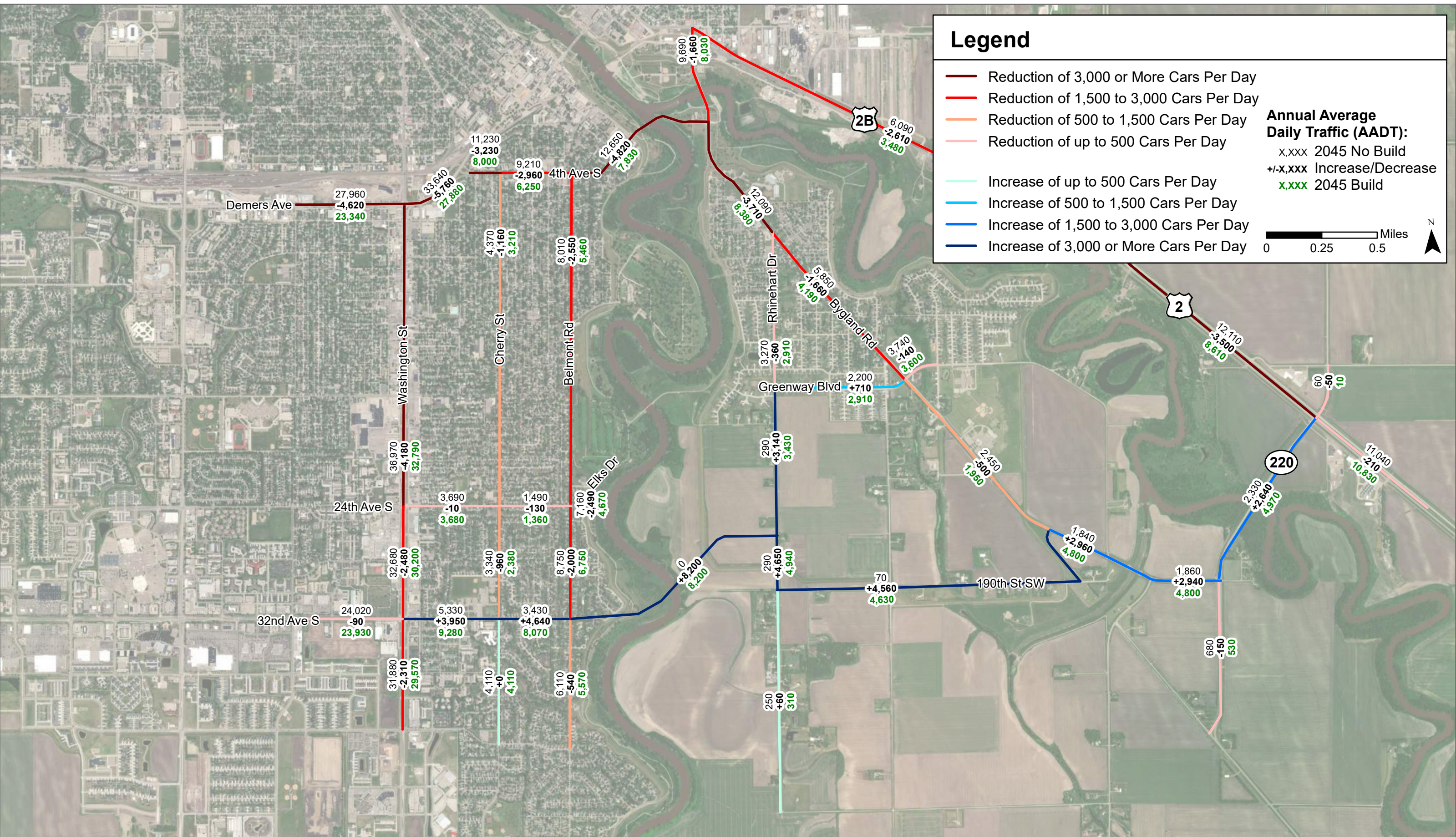


Figure 5-5
Changes in Forecast Traffic Volumes between 2045 No Build and 2045 32nd Ave Bridge Conditions

As shown in the figures, the two bridge options would be expected to significantly reduce traffic in the northern half of the study area, with the most significant reductions occurring along S Washington Street, DeMers Avenue/4th Avenue S, Belmont Road, Minnesota Avenue/1st Street SE across the Point Bridge, Bygland Road SE north of Greenway Boulevard SE, and on US 2. These reductions are important because the roadway segments on S Washington Street, DeMers Avenue/4th Avenue S, and Minnesota Avenue/1st Street SE across the Point Bridge were forecast to approach or exceed capacity by 2045 under No Build conditions (without an additional bridge).

The most significant increases in traffic associated with the bridge options would be expected to occur in the southern half of the study roadway network along Greenway Boulevard SE, Rhinehart Drive SE south of Greenway Boulevard SE, Bygland Road SE south of Greenway Boulevard, 190th Street SW, TH 220, and along 24th Avenue S and 32nd Avenue S. The Elks Drive bridge option spreads the volume increases between the parallel east-west roads of Greenway Boulevard SE and 190th Street SW on the East Grand Forks side of the bridge, and between 24th Avenue S and 32nd Avenue S on the Grand Forks side. The 32nd Avenue S bridge option has more concentrated volume growth along 32nd Avenue S and 190th Street SW. Both bridge options would primarily serve passenger vehicle traffic and not truck traffic.

5.1.2 Future Build Traffic Operations and Mobility

A traffic operations analysis was conducted to identify the need for improvements and understand anticipated traffic operations with the potential bridge options. This Build Conditions traffic operations analysis assesses the projected future mobility in the study area with a new bridge at either Elks Drive or 32nd Avenue S.

The programmed improvement to convert the existing two-way stop controlled (TWSC) intersection at Bygland Road SE & Greenway Boulevard SE to a signalized intersection was included in the 2045 Build Conditions modeling. The programmed conversion of the Bygland Road SE & Rhinehart Drive SE intersection from its current condition as a side-street stop controlled intersection to a single-lane roundabout (RAB) was evaluated for both 2030 and 2045 Build Conditions. Because this project is in consideration of being removed from the program, the intersection was also analyzed under its existing geometry and intersection control configuration. The results for both conditions are provided in the 2030 and 2045 Build Conditions intersection traffic operations analysis tables.

The baseline conditions for the Build alternatives assumed no changes from the 2030 and 2045 No Build conditions other than the addition of the proposed bridges with minimal traffic control and geometric changes at the intersections where the proposed bridges would terminate. The assumed baseline conditions for the new intersections where the proposed bridges would connect to Rhinehart Drive SE included stop control on the new eastbound approach with a left turn lane and a right turn storage lane (same under both options). The intersection on Belmont Road where the Elks Drive Bridge would connect was also assumed to include a left turn lane and a right turn storage lane on the bridge approach, and maintained the current side-street stop control on Elks Drive. The bridge connection for the 32nd Ave Bridge option was assumed to maintain the all-way stop control (AWSC) currently in place at the 32nd Avenue S and Belmont Road intersection and included a single shared left/through/right lane on the westbound bridge approach. The lane geometry and traffic control on all approaches at the new bridge connection intersections other than the new bridge approaches were kept the same as existing conditions.

5.1.2.1 Roadway Segment Analysis

Using the same methodology as outlined in **Section 3.3: Existing and No Build Traffic Operations and Mobility**, a roadway segment analysis was completed for the study area under each of the alternative bridge conditions. The roadway segment analysis is a planning-level comparison of the forecast ADT volumes against the estimated capacity for each facility type. All information used in the volume-to-capacity (V/C) analysis, including forecast ADTs and roadway capacities, were provided by ATAC. This information included the volume and capacity data from the travel demand modeling of the Grand Forks and East Grand Forks area for the 2030 and 2045 forecast year Build Conditions for each bridge alternative.

The segment LOS based on V/C ratio for the study road segments under forecast 2030 Elks Drive Bridge Conditions, 2045 Elks Drive Bridge Conditions, 2030 32nd Ave Bridge Conditions, and 2045 32nd Ave Bridge Conditions are provided in **Figure 5-6** through **Figure 5-9**.

Legend

- 0.00 - 0.60 (LOS A)
- 0.61 - 0.70 (LOS B)
- 0.71 - 0.80 (LOS C)
- 0.81 - 0.90 (LOS D)
- 0.91 - 1.00 (LOS E)
- 1.01 or Greater (LOS F)

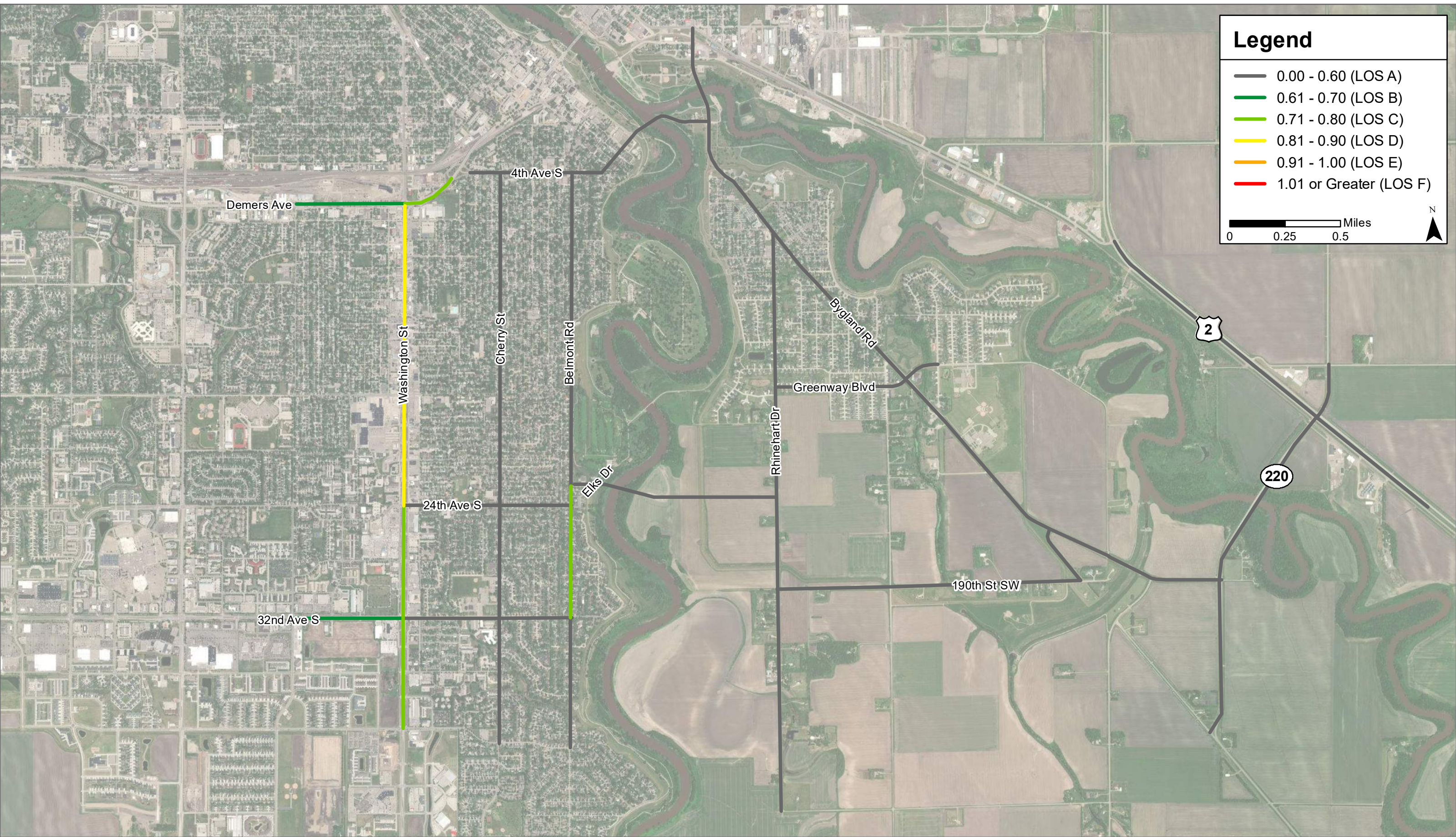
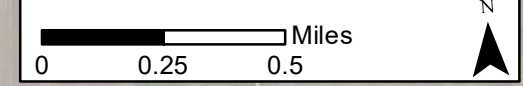


Figure 5-6
2030 Elks Drive Bridge Segment Volume/Capacity and Level of Service

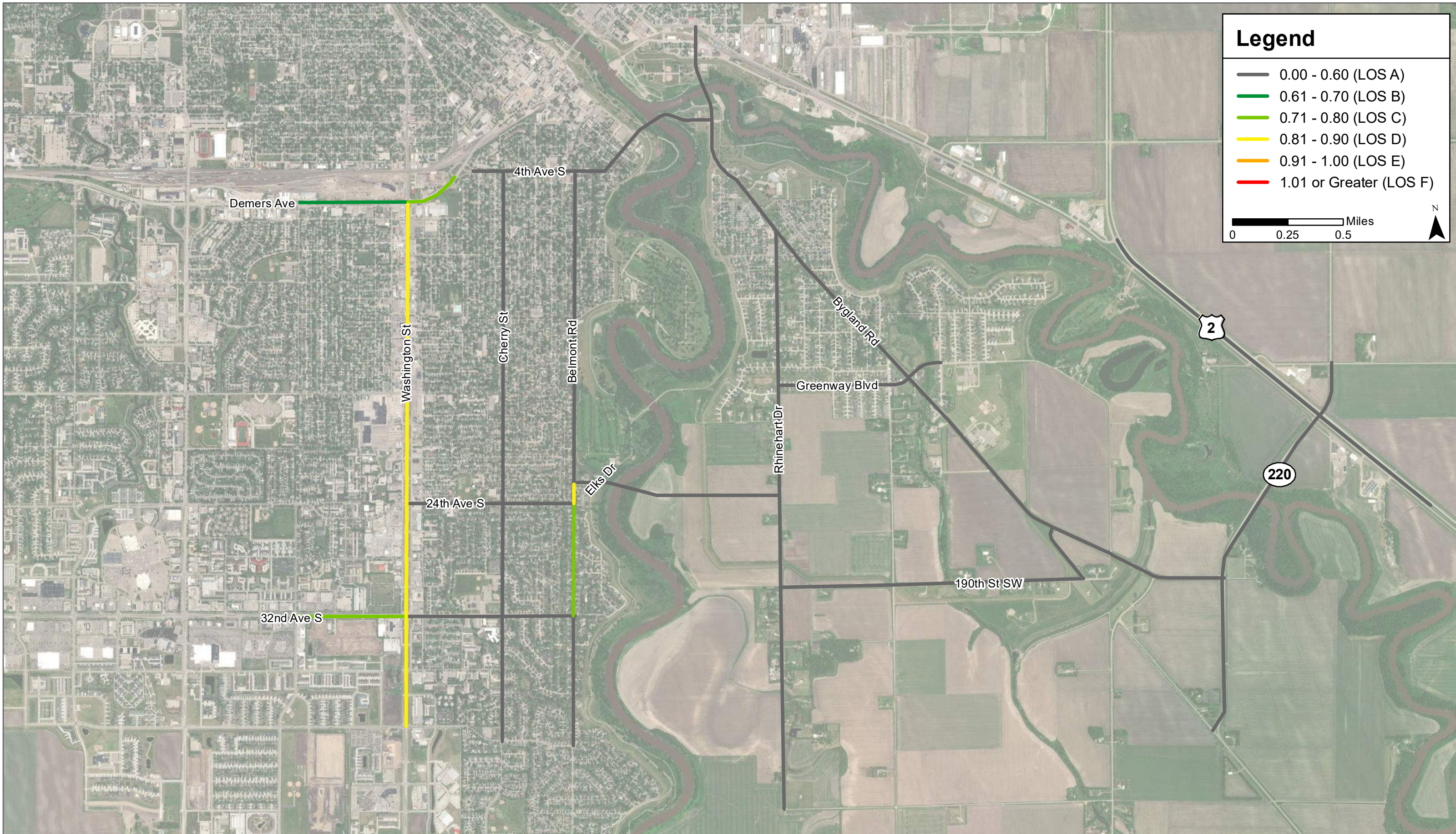
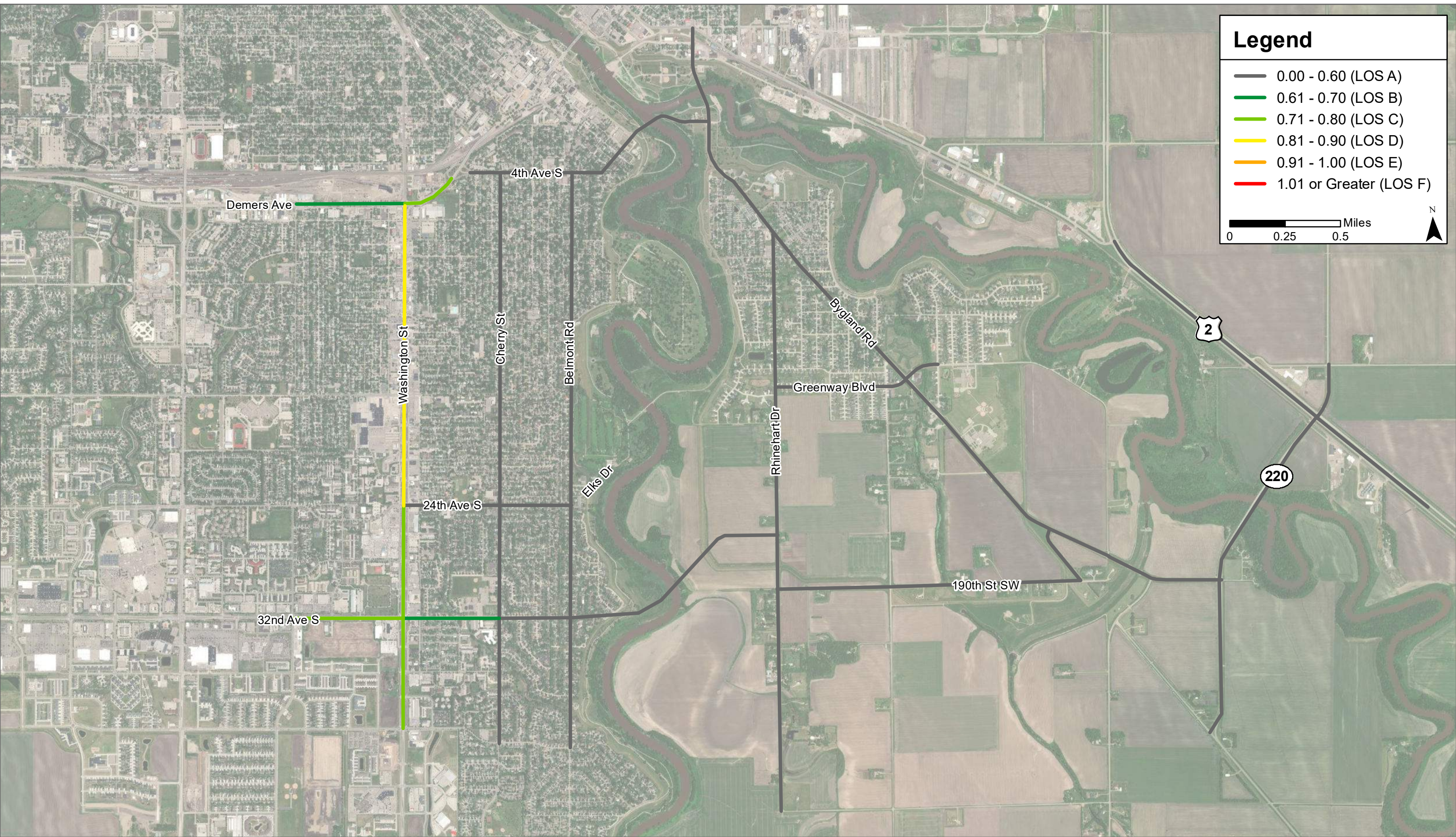
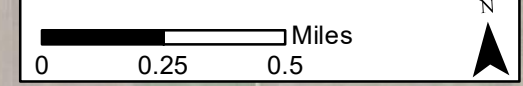


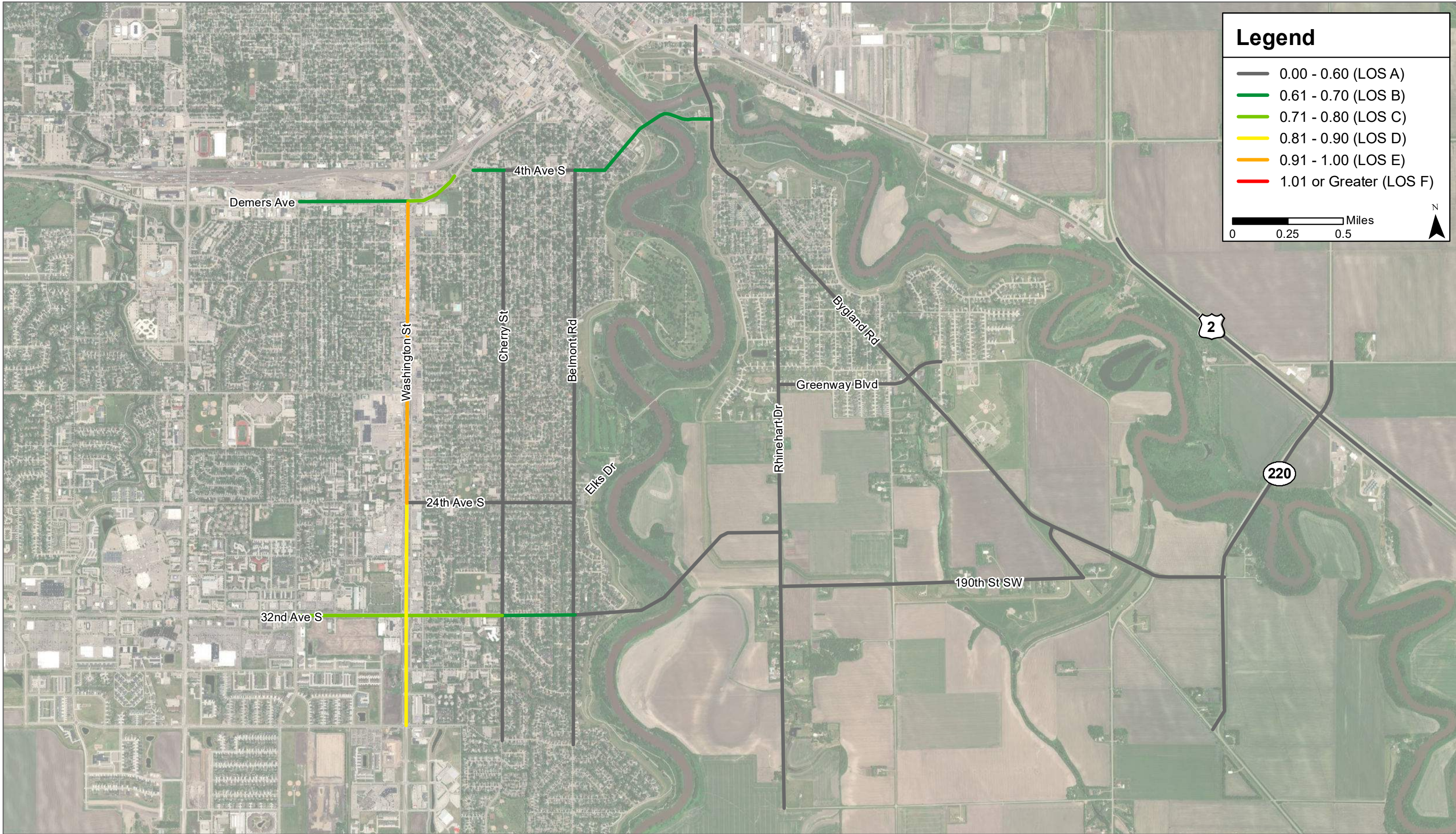
Figure 5-7
2045 Elks Drive Bridge Segment Volume/Capacity and Level of Service

Source: ESRI World Imagery Basemap

Legend

- 0.00 - 0.60 (LOS A)
- 0.61 - 0.70 (LOS B)
- 0.71 - 0.80 (LOS C)
- 0.81 - 0.90 (LOS D)
- 0.91 - 1.00 (LOS E)
- 1.01 or Greater (LOS F)





*Figure 5-9
2045 32nd Ave Bridge Segment Volume/Capacity and Level of Service*

Source: ESRI World Imagery Basemap

Based on the forecast ADTs and segment capacities, all roads within the study area would be expected to operate within capacity through the 2030 forecast year under both bridge alternatives. All roads would be expected to operate within capacity in 2045 under the Elks Drive Bridge alternative; however, the S Washington Street segment between DeMers Avenue / 4th Avenue S and 24th Avenue S would be expected to begin to approach capacity under 2045 32nd Ave Bridge Conditions, when it would be expected to operate at LOS E.

There are multiple factors that influence segment capacity. Some of these include facility type, number of through lanes, presence of turn lanes, and the presence of and type of median. While intersection capacity plays a critical and often controlling role in the capacity of a roadway network, providing adequate roadway capacity for the anticipated volume levels is critical to providing adequate vehicle mobility.

5.1.2.2 Intersection Traffic Operations Analysis

The Build Conditions intersection traffic operations analysis was conducted using the same methodology as was used for the Existing and No Build Conditions analysis. Refer to **Section 3.3: Existing and No Build Traffic Operations and Mobility** for details on the analysis methodology.

5.1.2.2.1 2030 Elks Drive Bridge Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under 2030 Elks Drive Bridge Conditions are provided in **Table 5-1**.

Table 5-1. 2030 Elks Drive Bridge Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	33.2	C	46.6	D
Cherry St & 32nd Ave S	AWSC	96.9	F	15.1	C
Belmont Rd & 32nd Ave S	AWSC	28.3	D	43.9	E
S Washington St & 24th Ave S	Signal	21.8	C	31.7	C
Cherry St & 24th Ave S	AWSC	10.4	B	9.8	A
Belmont Rd & 24th Ave S	TWSC	25.8	D	52.4	F
Belmont Rd & Elks Drive	TWSC	105.8	F	27.5	D
S Washington St & DeMers Ave	Signal	40.5	D	38.2	D
Cherry St & 4th Ave S	Signal	6.2	A	5.5	A
Belmont Rd & 4th Ave S	AWSC	38.2	E	18.2	C
3rd Ave SE & 1st St SE	Signal	7.8	A	6.4	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	63.3	F	20.0	C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	9.4	A	6.2	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	10.2	B	10.4	B
Elks Dr Bridge & Rhinehart Dr SE	TWSC	14.0	B	12.7	B
Bygland Rd SE & Greenway Blvd SE	TWSC	78.8	F	11.8	B
Bygland Rd SE & 190th St SW	TWSC	10.4	B	10.4	B
Bygland Rd SE/Harley Dr & TH 220	TWSC	10.2	B	9.4	A
TH 220 & US 2	TWSC	13.1	B	13.9	B
Rhinehart Dr SE & 190th St SE	AWSC	8.2	A	8.6	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

Given the expectation of traffic shifting from the Point Bridge to the new bridge at Elks Drive, operations at Belmont Road & 4th Avenue S are expected to improve in the Elks Drive Bridge scenario. In 2030 No Build Conditions this intersection was expected to operate at LOS F in both peak hours, but with the traffic diversion to the proposed Elks Drive bridge, the current all-way stop design would be expected to operate at LOS E in the AM peak hour and LOS C in PM peak hour.

Multiple intersections along Belmont Road see degradation in operations compared to the No Build alternative in this scenario. The side-street stop controlled intersections at 24th Avenue S and Elks Drive would be expected to operate unacceptably on the stop controlled approaches, with 24th Avenue S failing (LOS F) in the PM peak hour and Elks Drive failing (LOS F) in the AM peak hour due to the additional traffic using the bridge.

The new intersection on Rhinehart Drive SE with the proposed Elks Drive Bridge would be expected to operate efficiently (LOS B on the stopped approach) with the assumed turn lane and side-street stop control on the eastbound bridge approach. The low northbound and southbound through volumes on Rhinehart Drive SE at this intersection would result in minimal conflicts with the turning movements going to and from the bridge.

The all-way stop controlled intersections on 32nd Avenue S at Belmont Road and Cherry Street would also be expected to reach or exceed capacity with the Elks Drive Bridge. This indicates that the anticipated traffic pattern changes would require improvements in traffic control or additional turn lanes at these intersections.

On the East Grand Forks side of the bridge, AM peak hour operations at the Bygland Road SE and Greenway Boulevard SE intersection would be expected to operate at LOS F in the 2030 Elks Bridge scenario due to increased volume using Greenway Boulevard SE to access the bridge. Operations at Bygland Road SE & Rhinehart Drive SE would be expected to improve with the Elks Drive Bridge, as both the stop control option and roundabout option improve from No Build Conditions in the AM peak hour. However, if no improvements were made to this intersection and the existing geometry and traffic control were maintained, significant delay would be expected on the Rhinehart Drive SE approach, which would be anticipated to operate at LOS F in the AM peak hour under 2030 Elks Drive Bridge Conditions.

5.1.2.2.2 2045 Elks Drive Bridge Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under 2045 Elks Drive Bridge Conditions are provided in **Table 5-2**.

Table 5-2. 2045 Elks Drive Bridge Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	36.6	D	48.2	D
Cherry St & 32nd Ave S	AWSC	222.4	F	23.2	C
Belmont Rd & 32nd Ave S	AWSC	78.8	F	110.3	F
S Washington St & 24th Ave S	Signal	28.5	C	36.4	D
Cherry St & 24th Ave S	AWSC	14.1	B	11.6	B
Belmont Rd & 24th Ave S	TWSC	89.2	F	405.7	F
Belmont Rd & Elks Drive	TWSC	154.6	F	41.3	E
S Washington St & DeMers Ave	Signal	47.7	D	37.2	D
Cherry St & 4th Ave S	Signal	6.5	A	5.7	A
Belmont Rd & 4th Ave S	AWSC	38.3	E	18.6	C
3rd Ave SE & 1st St SE	Signal	7.8	A	6.4	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	88.9	F	21.8	C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	9.6	A	6.1	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	12.1	B	12.2	B
Elks Dr Bridge & Rhinehart Dr SE	TWSC	17.1	C	16.7	C
Bygland Rd SE & Greenway Blvd SE	Signal	14.1	B	6.4	A
Bygland Rd SE & 190th St SW	TWSC	10.8	B	10.9	B
Bygland Rd SE/Harley Dr & TH 220	TWSC	11.1	B	9.8	A
TH 220 & US 2	TWSC	15.1	C	16.2	C
Rhinehart Dr SE & 190th St SE	AWSC	7.4	A	7.7	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

Anticipated traffic operations in the Elks Drive Bridge alternative operate similarly in the 2045 condition as they did in the 2030 condition, though with increased delay due to additional traffic growth. No additional intersections are expected to experience unacceptable operations in 2045 beyond those that did in 2030 with the Elks Drive Bridge. However, where only one peak hour was expected to operate at LOS E or F in the 2030 conditions, both peak hours would be expected to operate unacceptably on Belmont Road at the intersections with Elks Drive, 24th Avenue S, and 32nd Avenue S under 2045 conditions.

The Bygland Road SE and Greenway Boulevard SE intersection is programmed to be signalized by the 2045 forecast year, which would be expected to improve operations at the intersection from unacceptable levels (LOS F in the AM peak hour) with the Elks Drive Bridge in 2030 to LOS B or better in 2045.

5.1.2.2.3 2030 32nd Ave Bridge Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under 2030 32nd Avenue Bridge Conditions are provided in **Table 5-3**.

Table 5-3. 2030 32nd Avenue Bridge Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	37.6	D	48.5	D
Cherry St & 32nd Ave S	AWSC	175.6	F	19.9	C
Belmont Rd & 32nd Ave S	AWSC	173.3	F	78.8	F
S Washington St & 24th Ave S	Signal	19.7	B	29.4	C
Cherry St & 24th Ave S	AWSC	9.3	A	9.2	A
Belmont Rd & 24th Ave S	TWSC	14.9	B	16.9	C
Belmont Rd & Elks Drive	TWSC	12.0	B	14.2	B
S Washington St & DeMers Ave	Signal	41.1	D	38.1	D
Cherry St & 4th Ave S	Signal	6.3	A	5.5	A
Belmont Rd & 4th Ave S	AWSC	38.4	E	18.1	C
3rd Ave SE & 1st St SE	Signal	7.9	A	6.4	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	70.6	F	20.5	C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	9.1	A	6.1	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	10.0	B	10.1	B
32nd Ave Bridge & Rhinehart Dr SE	TWSC	14.2	B	12.5	B
Bygland Rd SE & Greenway Blvd SE	TWSC	67.8	F	11.8	B
Bygland Rd SE & 190th St SW	TWSC	11.4	B	10.7	B
Bygland Rd SE/Harley Dr & TH 220	TWSC	10.3	B	9.4	A
TH 220 & US 2	TWSC	13.1	B	13.9	B
Rhinehart Dr SE & 190th St SE	AWSC	8.7	A	9.1	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

Similar to the Elks Bridge Scenario, the expectation of traffic shifting from the Point Bridge to a new bridge at 32nd Avenue S would be expected to result in improved operations at Belmont Road and 4th Avenue S compared to 2030 No Build Conditions. The current all-way stop control at this intersection would be expected to operate at LOS E in the AM peak hour and LOS C in PM peak hour with the proposed 32nd Avenue Bridge, versus LOS F in both peak hours under 2030 No Build Conditions.

Traffic at the unsignalized study intersections on 32nd Avenue S would be expected to operate unacceptably in this scenario. The Cherry Street and 32nd Avenue S intersection would be expected to fail (LOS F) in the AM peak period, as would the Belmont Road and 32nd Avenue S intersection in both the AM and PM peak hours. Compared to the LOS C operations at these intersections in under 2030 No Build Conditions, these intersections would be expected to operate worse due to the expected shift in traffic from 4th Avenue S / DeMers Avenue to 32nd Avenue S.

Similar to the Elks Drive Bridge scenario, the intersection at Bygland Road SE and Greenway Boulevard SE would be expected to operate at LOS F in the AM peak period in 2030 with the 32nd Avenue Bridge maintaining the current two-way stop control condition on Greenway Boulevard SE. Similarly, the Bygland Road SE and Rhinehart

Drive SE intersection would be expected to operate at LOS F on the stop controlled Rhinehart Drive SE approach under the 32nd Avenue Bridge alternative in 2030 if no improvements were made to the intersection.

5.1.2.2.4 2045 32nd Ave Bridge Conditions

The intersection delay and LOS for the study intersections during the AM and PM peak hours under 2045 32nd Avenue Bridge Conditions are provided in **Table 5-4**.

Table 5-4. 2045 32nd Avenue Bridge Conditions Intersection Delay and LOS

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
S Washington St & 32nd Ave S	Signal	63.2	E	53.6	D
Cherry St & 32nd Ave S	AWSC	448.8	F	72.0	F
Belmont Rd & 32nd Ave S	AWSC	275.1	F	177.5	F
S Washington St & 24th Ave S	Signal	20.4	C	29.7	C
Cherry St & 24th Ave S	AWSC	9.5	A	9.4	A
Belmont Rd & 24th Ave S	TWSC	16.7	C	19.5	C
Belmont Rd & Elks Drive	TWSC	12.7	B	15.5	C
S Washington St & DeMers Ave	Signal	51.4	D	38.3	D
Cherry St & 4th Ave S	Signal	6.6	A	5.7	A
Belmont Rd & 4th Ave S	AWSC	53.4	F	21.2	C
3rd Ave SE & 1st St SE	Signal	8.0	A	6.6	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	118.7	F	23.7	C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	10.3	B	6.3	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	10.5	B	10.7	B
32nd Ave Bridge & Rhinehart Dr SE	TWSC	17.4	C	14.2	B
Bygland Rd SE & Greenway Blvd SE	Signal	9.0	A	6.0	A
Bygland Rd SE & 190th St SW	TWSC	12.3	B	11.3	B
Bygland Rd SE/Harley Dr & TH 220	TWSC	11.2	B	9.8	A
TH 220 & US 2	TWSC	14.8	B	16.0	C
Rhinehart Dr SE & 190th St SE	AWSC	9.4	A	10.0	A

Note: Delay and LOS for TWSC intersections reflect the worst approach

Traffic operations under the 32nd Avenue Bridge alternative in 2045 would be expected to function similarly to the 2030 scenario, with general increases in vehicle delays throughout the network. All intersections that were expected to reach or exceed capacity in 2030 with the 32nd Avenue Bridge would continue to fail. The PM peak hour would be expected to degrade to LOS F at the Cherry Street and 32nd Avenue S intersection by 2045, and the Belmont Road and 4th Avenue S intersection would be expected to degrade from LOS E to LOS F in the AM peak hour between 2030 and 2045. The S Washington Street and 32nd Avenue S intersection would be expected to approach capacity in the AM peak hour under the 2045 32nd Avenue Bridge alternative.

The Bygland Road SE and Greenway Boulevard SE intersection was programmed to be signalized by the 2045 forecast year, which would be expected to improve operations at the intersection from unacceptable levels (LOS F in the AM peak hour) with the 32nd Avenue Bridge in 2030 to LOS A during both peak hours in 2045.

The Red River Crossing Alternatives Analysis in Appendix C of the Grand Forks-East Grand Forks MPO 2045 Street Highway Plan Update completed in 2018 analyzed many of the same intersections in the PM peak hour through 2045 Build Conditions. While the results of the studies may vary due to different data sources and data dates, analysis methodologies, and signal timing optimization, both studies identify anticipated unacceptable operations during the PM peak hour under 2045 Elks Drive Bridge Conditions at the intersections on Belmont Road at Elks Drive, 24th Avenue S, and 32nd Avenue S. The 2018 study also indicated expected LOS E operations at the S Washington Street and 32nd Avenue S intersection, whereas this study indicates that the intersection could operate at LOS D with signal timing optimization with the forecast volumes. Additionally, the 2018 study identified the Bygland Road SE and Greenway Boulevard SE intersection as failing in the 2045 Elks Drive Bridge PM peak hour scenario, which was improved in this study with the programmed signalization of the intersection by the forecast 2045 horizon year.

Under the forecast 2045 32nd Avenue Bridge PM peak hour conditions, both the 2018 study and this study identified expected unacceptable operations at the Belmont Road and 32nd Avenue S intersection. Cherry Street was not included in the prior analysis, but was also shown to have expected failing operations in this study. The intersections on S Washington Street at DeMers Avenue and 32nd Avenue S were shown to operate unacceptably in the 2018 study during the PM peak hour; however, the analysis for this study indicates that both the intersections would be expected to operate at LOS D with signal timing optimization in the PM peak hour with the forecast 32nd Avenue Bridge traffic volumes.

5.1.3 Traffic Control Warrants Analysis

After determining expected intersection delays and level of service in the Existing, No Build, Elks Drive Bridge, and 32nd Avenue Bridge scenarios, a traffic control warrants analysis was conducted to determine possible alternatives for traffic control at locations that exhibited intersection LOS E or F operations in either peak hour in each scenario. All-way stop control warrants and traffic signal warrants were analyzed for existing conditions, 2030 conditions, and 2045 conditions using the existing and forecast traffic volumes for the study intersections. The intersections on S Washington Street where operations are expected to reach LOS E or F were not evaluated for warrants because they are already fully signalized, high-capacity intersections, and would be assumed to remain signalized into the future.

The FHWA Manual on Uniform Traffic Control Devices (MUTCD) outlines thresholds for traffic volumes and delay conditions, among other criteria, that must be met for all-way stop control and traffic signal control to be warranted at a given intersection. Additionally, if an intersection is located next to a school and has significant schoolchildren crossings, all-way stop control may be considered. To meet the warrants for a signalized intersection, any one of the warrants must be met. The volume-based signal warrants (1-3) were evaluated for this analysis. If signal warrants are met for an intersection, all-way stop control is also warranted for the intersection. In order to satisfy all-way stop control warrants where signal warrants are not met, both a minimum volume criterion and delay criterion must be met.

There are no definitive warrants for converting an intersection to a roundabout. Roundabouts were considered as a potential mitigation measure at all intersections where all-way stop control warrant or traffic signal warrants were satisfied. Additionally, roundabouts were considered as a potential mitigation measure at locations where no warrants were met where they may provide a benefit to intersection or segment traffic operations or safety.

Table 5-5 through Table 5-12 summarize the signal and all-way stop control warrants for Existing, 2030, and 2045 conditions.

Table 5-5. Existing Signal and All-Way Stop Warrant Analysis Summary

Scenario	Intersection	Warrants Met	Signal Warrants			All-Way Stop Control Warrants			
			Warrant 1 - 8-Hour Vehicle Volumes	Warrant 2 - 4-Hour Vehicle Volumes	Warrant 3 - Peak Hour	Criteria A - Signal Justified	Criteria C - Minimum Volumes	Criteria C - Minor Approach Max Delay	School Pedestrian Crossing ⁽¹⁾
Existing	4th Ave & Belmont Rd	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	32nd Ave & Belmont Rd	-	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET

Notes:
(1) Multiway stop control may be considered at locations where pedestrian crossings for a school are present, per the "Optional" consideration items in the Manual on Uniform Traffic Control Devices (MUTCD)

Table 5-6. 2030 Signal and All-Way Stop Warrant Analysis Summary

Scenario	Intersection	Warrants Met	Signal Warrants			All-Way Stop Control Warrants			
			Warrant 1 - 8-Hour Vehicle Volumes	Warrant 2 - 4-Hour Vehicle Volumes	Warrant 3 - Peak Hour	Criteria A - Signal Justified	Criteria C - Minimum Volumes	Criteria C - Minor Approach Max Delay	School Pedestrian Crossing ⁽²⁾
No Build	4th Ave & Belmont Rd	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET	MET
	32nd Ave & Cherry St	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	Bygland Rd & Rhinehart Dr	Signal, AWSC	MET	MET	MET	MET	NOT MET	NOT MET	NOT MET
Elks Bridge	4th Ave & Belmont Rd	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	24th Ave & Belmont Rd	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET
	32nd Ave & Belmont Rd	Signal, AWSC	NOT MET	MET	MET	MET	MET	MET	NOT MET
	32nd Ave & Cherry St	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	Elks Dr & Belmont Rd	Signal, AWSC	NOT MET	NOT MET	MET	MET	NOT MET	MET	NOT MET
	Bygland Rd & Rhinehart Dr	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET
	Bygland Rd & Greenway Blvd ⁽¹⁾	Signal, AWSC	NOT MET	NOT MET	MET	MET	NOT MET	MET	NOT MET
32nd Bridge	4th Ave & Belmont Rd	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	32nd Ave & Belmont Rd	Signal, AWSC	NOT MET	NOT MET	MET	MET	NOT MET	MET	NOT MET
	32nd Ave & Cherry St	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	Bygland Rd & Rhinehart Dr	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET
	Bygland Rd & Greenway Blvd ⁽¹⁾	Signal, AWSC	NOT MET	NOT MET	MET	MET	NOT MET	MET	NOT MET

Notes:
(1) Intersection programmed to be signalized by the 2045 horizon year
(2) Multiway stop control may be considered at locations where pedestrian crossings for a school are present, per the "Optional" consideration items in the Manual on Uniform Traffic Control Devices (MUTCD).

Table 5-7. 2045 Signal and All-Way Stop Warrant Analysis Summary

Scenario	Intersection	Warrants Met	Signal Warrants			All-Way Stop Control Warrants			
			Warrant 1 - 8-Hour Vehicle Volumes	Warrant 2 - 4-Hour Vehicle Volumes	Warrant 3 - Peak Hour	Criteria A - Signal Justified	Criteria C - Minimum Volumes	Criteria C - Minor Approach Max Delay	School Pedestrian Crossing ⁽¹⁾
No Build	4th Ave & Belmont Rd	Signal, AWSC	NOT MET	NOT MET	MET	MET	MET	MET	MET
	32nd Ave & Belmont Rd	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET
	32nd Ave & Cherry St	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET	MET
	Bygland Rd & Rhinehart Dr	Signal, AWSC	MET	MET	MET	MET	NOT MET	NOT MET	NOT MET
Elks Bridge	4th Ave & Belmont Rd	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	24th Ave & Belmont Rd	Signal, AWSC	MET	MET	MET	MET	NOT MET	MET	NOT MET
	32nd Ave & Belmont Rd	Signal, AWSC	NOT MET	MET	MET	MET	MET	MET	NOT MET
	32nd Ave & Cherry St	Signal, AWSC	NOT MET	MET	MET	MET	MET	MET	MET
	Elks Dr & Belmont Rd	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET
	Bygland Rd & Rhinehart Dr	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET
32nd Bridge	4th Ave & Belmont Rd	AWSC	NOT MET	NOT MET	NOT MET	NOT MET	NOT MET	MET	MET
	32nd Ave & Belmont Rd	Signal, AWSC	NOT MET	MET	MET	MET	MET	MET	NOT MET
	32nd Ave & Cherry St	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	MET
	Bygland Rd & Rhinehart Dr	Signal, AWSC	NOT MET	MET	MET	MET	NOT MET	MET	NOT MET

Notes:
 (1) Multiway stop control may be considered at locations where pedestrian crossings for a school are present, per the "Optional" consideration items in the Manual on Uniform Traffic Control Devices (MUTCD)

5.1.4 Intersection Mitigation

After the intersection traffic operations and traffic control warrants were evaluated, intersections that presented insufficient traffic operations (LOS E or F) were evaluated for potential mitigation options. A summary of the forecast 2045 intersection operations for each intersection under each alternative scenario is provided in **Table 5-8**, with intersections requiring mitigation highlighted in orange or pink.

Table 5-8. 2045 Intersection LOS Summary

Intersection	Traffic Control	2045 No Build (AM/PM)	2045 Elks Bridge (AM/PM)	2045 32nd Ave Bridge (AM/PM)
S Washington St & 32nd Ave S	Signal	C/D	D/D	E/D
Cherry St & 32nd Ave S	AWSC	F/C	F/C	F/F
Belmont Rd & 32nd Ave S	AWSC	F/F	F/F	F/F
S Washington St & 24th Ave S	Signal	C/C	C/D	C/C
Cherry St & 24th Ave S	AWSC	B/B	B/B	A/A
Belmont Rd & 24th Ave S	TWSC	C/D	F/F	C/C
Belmont Rd & Elks Drive	TWSC	C/C	F/E	B/C
S Washington St & DeMers Ave	Signal	F/E	D/D	D/D
Cherry St & 4th Ave S	Signal	A/A	A/A	A/A
Belmont Rd & 4th Ave S	AWSC	F/F	E/C	F/C
3rd Ave SE & 1st St SE	Signal	B/A	A/A	A/A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	F/D	F/C	F/C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	C/A	A/A	B/A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	A/A	B/B	B/B
Bygland Rd SE & Greenway Blvd SE	Signal	A/A	B/A	A/A
Bygland Rd SE & 190th St SW	TWSC	A/A	B/B	B/B
Bygland Rd SE/Harley Dr & TH 220	TWSC	B/A	B/A	B/A
TH 220 & US 2	TWSC	C/C	C/C	B/C
Rhinehart Dr SE & 190th St SE	AWSC	A/A	A/A	A/A
Elks Dr Bridge & Rhinehart Dr SE	TWSC	-	C/C	-
32nd Ave Bridge & Rhinehart Dr SE	TWSC	-	-	C/B

Notes:

Bygland Rd SE & Greenway Blvd SE intersection is planned to be signalized by 2045

LOS for worst approach is shown at TWSC intersections

Only intersections operating at an expected LOS E or LOS F (highlighted) were evaluated for mitigation

Possible traffic control alternatives were identified at each intersection based on which traffic control warrants would be met. Any mitigation must be adequate to acceptably process projected traffic volumes through the 2045 horizon year, so the intersection mitigation analysis was completed using the 2045 volume conditions for the No Build and Build alternatives. The intersection mitigation analysis is summarized in **Table 5-9**. The summary table presents the unmitigated LOS, warrants met, special considerations for schools or crash history, and identifies options for mitigation that are warranted and would be expected to provide acceptable traffic operations.

Table 5-9. Intersection Mitigation Summary

Scenario	Intersection	Existing Traffic Control	2030 Unmitigated LOS	2045 Unmitigated LOS	Traffic Control Warrants Met	School Adjacent	Identified Crash Issues	Acceptable Mitigation Control Options ⁽²⁾
No Build	4th Ave & Belmont Rd	AWSC	F/F	F/F	Signal, AWSC	X		Signal/RAB (mini)
	32nd Ave & Belmont Rd	AWSC	C/C	F/F	Signal, AWSC			AWSC/Signal/RAB
	32nd Ave & Cherry St	AWSC	E/B	F/C	AWSC	X		RAB
	DeMers Ave & Washington St	Signal	E/D	F/E	Signal, AWSC		X	Signal
	Bygland Rd & Rhinehart Dr ⁽¹⁾	TWSC	F/C	F/D	Signal, AWSC			Signal/RAB
Elks Drive Bridge Build	4th Ave & Belmont Rd	AWSC	E/C	E/C	AWSC	X		AWSC/RAB (mini)
	24th Ave & Belmont Rd ⁽¹⁾	TWSC	D/F	F/F	Signal, AWSC			Signal/RAB
	32nd Ave & Belmont Rd	AWSC	D/E	F/F	Signal, AWSC			AWSC/Signal/RAB
	32nd Ave & Cherry St	AWSC	F/C	F/C	Signal, AWSC	X		Signal/RAB
	Belmont Rd & Elks Dr ⁽¹⁾	TWSC	F/D	F/E	Signal, AWSC			Signal/RAB
	Bygland Rd & Rhinehart Dr ⁽¹⁾	TWSC	F/C	F/C	Signal, AWSC			Signal/RAB
32nd Ave Bridge Build	4th Ave & Belmont Rd	AWSC	E/C	F/C	AWSC	X		AWSC/RAB (mini)
	32nd Ave & Belmont Rd	AWSC	F/F	F/F	Signal, AWSC			Signal/RAB
	32nd Ave & Cherry St	AWSC	F/C	F/F	Signal, AWSC	X		Signal
	32nd Ave & Washington St	Signal	D/D	E/D	Signal, AWSC		X	Signal
	Bygland Rd & Rhinehart Dr ⁽¹⁾	TWSC	F/C	F/C	Signal, AWSC			Signal/RAB

Notes:

(1) Results for worst approach are reported for two-way stop-controlled intersections

(2) Mitigation options that were warranted and would be expected to result in acceptable intersection level of service

For the purposes of developing a cost estimate for each bridge option, a single mitigation option is assumed for each location requiring mitigation. For the purposes of the cost estimate, the lowest-cost option that the traffic modeling showed would provide acceptable traffic operations was selected. When determining the mitigated control option assumed for cost estimating, the following hierarchy of changes was followed:

1. Add turn lanes without changes in traffic control
2. Convert to all-way stop control with minimum required turn lane additions (if existing TWSC)
3. Convert to signalized control with minimum required turn lane additions
4. Convert to a single-lane roundabout

Locations near schools with pedestrian crossings and intersections where the safety analysis identified a safety issue were identified and considered when evaluating mitigation options. At these locations, mitigation options with additional lanes (which would increase crossing distances) and stop controlled operations (as opposed to higher levels of traffic control) were deprioritized over signal or roundabout options that would provide improved pedestrian crossing conditions by providing controlled crossings, shorter crossing distances, reduced

vehicle speeds, and/or median pedestrian refuge areas. Crash issues, right-of-way availability, and previous study recommendations were also factored into design feasibility and potential effectiveness. For consistency of approach, the “assumed mitigation for cost estimate” reflects the lowest-cost option that would be expected to provide acceptable operations and address pedestrian/safety issues where identified. This would be the first option on the established hierarchy that would provide acceptable intersection operations. The mitigation options assumed for cost estimating are summarized in **Table 5-10**.

Table 5-10. Summary of Intersection Mitigation Assumed for Cost Estimate

Scenario	Intersection	Existing Traffic Control	Assumed Mitigation Option for Cost Estimate				
			Assumed Traffic Control for Cost Estimate	2045 LOS with Assumed Mitigation	Mitigation Description	Consider Additional Pedestrian Accommodations	Notes and Considerations
No Build	4th Ave & Belmont Rd	AWSC	Signal	B/B	Signalized intersection with no additional turn lanes	X	Intersection was previously signalized until 2015. May consider adding turn lanes if signalized based on prior signalized operations observations. Limited ROW, potential impacts should be considered.
	32nd Ave & Belmont Rd	AWSC	AWSC	C/C	Maintain AWSC and add SB right and NB left turn lanes (see concept sketch in Appendix)		May impact ROW
	32nd Ave & Cherry St	AWSC	RAB	B/A	Single-lane RAB	X	May impact ROW
	DeMers Ave & Washington St	Signal	Signal	F/E	No lane additions feasible—consider CFI		Additional lanes likely infeasible, CFI design recommended in prior study showed operational improvements ⁽¹⁾
	Bygland Rd & Rhinehart Dr	TWSC	RAB	C/A	Single-lane RAB		Based on detailed 2015 Bygland Road Study results and 2016 Intersection Control Evaluation
Elks Drive Bridge Build	4th Ave & Belmont Rd	AWSC	Mini-RAB	A/A	Single-lane mini-RAB	X	AWSC may be considered based on vehicle/pedestrian conflicts. Limited ROW, potential impacts should be considered.
	24th Ave & Belmont Rd	TWSC	Signal	A/B	Signalized intersection with no additional turn lanes		
	32nd Ave & Belmont Rd	AWSC	AWSC	C/D	Maintain AWSC and add SB right, NB left, and EB left turn lanes (see concept sketch in Appendix)		May impact ROW
	32nd Ave & Cherry St	AWSC	Signal	B/A	Signalized intersection with restriped NB approach to include a left turn storage lane and thru/right lane (see concept sketch in Appendix)	X	
	Belmont Rd & Elks Dr	TWSC	Signal	B/A	Signalized intersection with WB left turn lane and right turn storage lane (see concept sketch in Appendix)		
	Bygland Rd & Rhinehart Dr	TWSC	RAB	A/A	Single-lane RAB		Based on detailed 2015 Bygland Road Study results and 2016 Intersection Control Evaluation
32nd Ave Bridge Build	4th Ave & Belmont Rd	AWSC	Mini-RAB	A/A	Single-lane mini-RAB	X	AWSC may be considered based on vehicle/pedestrian conflicts, though left and right turn lanes would be needed on all approaches which would increase crossing distance. Limited ROW, potential impacts should be considered.
	32nd Ave & Belmont Rd	AWSC	Signal	C/C	Signalized intersection with additional NB left turn lane		May impact ROW
	32nd Ave & Cherry St	AWSC	Signal	D/A	Signalized intersection with restriped NB approach to include a left turn storage lane and thru/right lane, new EB and WB left turn lanes (see concept sketch in Appendix)	X	Single-lane RAB would be expected to operate at LOS F in AM peak hour. Additional turn lanes may impact ROW.
	32nd Ave & Washington St	Signal	Signal	D/D	Existing signalized control with new SB and WB left turn lanes (see concept sketch in Appendix)		Additional WB left turn lane may not be feasible due to limited ROW
	Bygland Rd & Rhinehart Dr	TWSC	RAB	B/A	Single-lane RAB		Based on detailed 2015 Bygland Road Study results and 2016 Intersection Control Evaluation

Notes:

(1) Additional lanes are likely infeasible due to right-of-way constraints. Prior studies showed potential operational improvements with a Continuous Flow Intersection (CFI) design (Washington St. Corridor Study, 2012).

The S Washington Street and DeMers Avenue intersection does not require mitigation for either the Elks Drive or 32nd Avenue bridge scenarios. As shown in **Table 5-10**, however, it does require mitigation under the 2045 No Build scenario but was not able to be feasibly mitigated with conventional improvements such as signal timing/phasing changes, additional through lanes, or additional turn lanes. The Washington Street Reconstruction Traffic Operations Report completed in 2020 recommended adding one through lane in the northbound and southbound directions on S Washington Street. While these improvements would mitigate traffic operations at the intersection, they may not be feasible due to the limited available right-of-way and large costs and impacts associated with acquiring it to expand the road. A decision was made at that time to not modify the existing intersection geometry. The Washington Street Corridor Study completed in 2012 showed operational benefits to reconstructing the intersection as a Continuous Flow Intersection (CFI) at this location. The CFI design was also included as an alternative in the Metropolitan Transportation Plan (MTP). The North Dakota Department of Transportation, in conjunction with local agencies, is planning to conduct a Road Safety Review (RSR) for the S Washington Street and DeMers Avenue intersection that will evaluate safety conditions further and will provide recommendations based on its findings.

Of the intersections that would need mitigation by 2045 listed in **Table 5-10**, four of them would be expected to operate with an intersection LOS D or worse in one or both peak hours with the mitigation assumed for cost estimating. These intersections include S Washington Street & DeMers Avenue under 2045 No Build Conditions, the 32nd Avenue S & Belmont Road intersection under 2045 Elks Drive Bridge Conditions, and the 32nd Avenue S & Cherry Street and 32nd Avenue S & S Washington Street intersections under 2045 32nd Avenue Bridge Conditions.

At the request of the City of Grand Forks, these intersections were analyzed with the mitigation assumed for cost estimating using the forecast 2030 traffic volumes to evaluate if they would be expected to operate at LOS C or better upon the opening of a new bridge if one were to be constructed by or before 2030. The analysis indicated that the 32nd Avenue S & Belmont Road intersection (Elks Drive Bridge Conditions) and the 32nd Avenue S & Cherry Street intersection (32nd Avenue Bridge Conditions) would be expected to operate at LOS C or better in 2030. The two intersections on S Washington Street would be expected to operate at LOS D or worse with 2030 volumes.

The 4th Avenue S and Belmont Road intersection does not meet signal warrants under the 2045 Elks Drive Bridge or 2045 32nd Avenue Bridge options, but all way stop control would be warranted due to the pedestrian crossings associated with Phoenix Elementary School. A single-lane mini-roundabout would be expected to mitigate the delay issues and operate at LOS A in both peak hours for both bridge alternatives. This option would also provide traffic calming by forcing vehicles to slow down to traverse the roundabout, which would be beneficial due to the proximity to the elementary school. A mini-roundabout would provide improved pedestrian crossing conditions by providing a single lane in each direction and providing a median refuge at the crosswalks, allowing pedestrians to cross one direction of traffic at a time. As shown in **Table 5-9**, the degree of mitigation needed at 4th and Belmont is substantially less with either the 32nd Avenue or Elks Drive options than with the 2045 No Build option.

Locations with high pedestrian traffic near schools should consider additional pedestrian accommodations such as curb extensions (to reduce crossing distance), signalized pedestrian crossings, and/or adding median pedestrian refuges to improve crossing conditions. These may be considered at any location where pedestrian

demand substantiates a need for safer crossing conditions, but particularly should be considered at the intersections adjacent to schools. This includes the intersections at 4th Avenue S and Belmont Road and at 32nd Avenue S and Cherry Street. This level of intersection design is not being conducted as part of this system-level planning study. It is assumed that more detailed design of options would be conducted as next steps beyond this planning study.

Intersection mitigation concept sketches and school/pedestrian safety strategies are provided in **Appendix C**.

5.2 MULTIMODAL SYSTEM LINKAGE

A new bridge would be expected to reduce out-of-direction travel on the regional transportation system due to increased system linkage. To evaluate the amount of travel reduction on the regional urban system, Vehicle Miles Traveled (VMT) and Vehicle Hours Traveled (VHT) were compared for the 3 alternatives in the year 2045. The results are shown in **Table 5-11**, and were obtained from the Red River Crossing Analysis Report².

Table 5-11. Daily VMT and VHT on the Regional Urban System

Metric	No Build	Elks Drive	32 nd Avenue
VMT (daily)	1,054,784 miles	14,600 less than No Build	24,721 less than No Build
VHT (daily)	59,702 hours	522 less than No Build	831 less than No Build

To better understand what the impacts would be in the study area, forecast VMT and VHT for just the study corridors in 2045 were also evaluated. The results are shown in **Table 5-12**, and were obtained from the Advanced Traffic Analysis Center (ATAC) at North Dakota State University.

Table 5-12. Daily VMT and VHT on Study Corridors

Metric	No Build	Elks Drive	32 nd Avenue
VMT (daily)	205,490 miles	314 less than No Build	3,448 less than No Build
VHT (daily)	3,430 hours	66 less than No Build	112 less than No Build

For pedestrians and bicyclists, a qualitative analysis was completed. Currently, there are 4 river crossings that can be used by pedestrians and bicyclists, and this is not expected to change under No Build conditions. A new bridge would add a 5th connection, with the Elks Drive option having less spread (closer to the existing pedestrian bridge, with less system-wide benefit) and the 32nd Avenue option having more spread (farther from the existing pedestrian bridge with greater system-wide benefit).

² Red River Crossing Analysis Technical Report (Grand Forks-East Grand Forks Metropolitan Planning Organization, September 2018) Available at <https://theforksmppo.org/common/pages/DisplayFile.aspx?itemId=16339495>.

5.3 COMMUNITY AND ECONOMIC FACTORS

5.3.1 Total Travel on Study Corridors

With increased multimodal system linkage comes a more balanced transportation system. A new bridge would be expected to reduce traffic on some roads (a positive impact) and increase traffic on other roads (a negative impact). To evaluate these tradeoffs, the level of positive or negative impact was measured using the percent change in VMT on each segment. A decrease in more than 25% is considered a more positive impact, and an increase in more than 25% is considered a more negative impact. The results are shown in **Table 5-13**.

Table 5-13. Total Travel on Study Corridors

Evaluation Criteria	Measure	Alternatives					
		No Build		Elks Drive		32nd Ave	
		Measurement	Rating	Measurement	Rating	Measurement	Rating
Total miles of travel on study corridors (distance)	Vehicles x Miles of Travel (VMT; from ATAC Travel Demand Model)	205,490	N	314 less	+	3,448 less	++
S Washington St (Principal Arterial)	Demers to 24th	44,101	N	42,356 (-4%)	+	43,159 (-2%)	+
S Washington St (Principal Arterial)	24th to 32nd	15,337	N	15,717 (+2%)	-	15,431 (+1%)	-
S Washington St (Principal Arterial)	32nd to 40th	13,624	N	14,093 (+3%)	-	14,238 (+5%)	-
Belmont Rd (Minor Arterial)	4th to Elks Dr	9,717	N	7,019 (-28%)	++	6,802 (-30%)	++
Belmont Rd (Minor Arterial)	Elks to 24th	553	N	981 (+77%)	--	415 (-25%)	+
Belmont Rd (Minor Arterial)	24th to 32nd	3,701	N	3,812 (+3%)	-	2,285 (-38%)	++
Belmont Rd (Minor Arterial)	32nd to 40th	2,996	N	2,400 (-20%)	+	2,483 (-17%)	+
32nd Ave S (Principal Arterial)	20th to Washington	12,118	N	14,045 (+16%)	-	14,322 (+18%)	-
32nd Ave S (Minor Arterial)	Washington to Cherry	2,423	N	3,149 (+30%)	--	4,225 (+74%)	--
32nd Ave S (Minor Arterial)	Cherry to Belmont	1,316	N	1,761 (+34%)	--	2,698 (+105%)	--
24th Ave S (Major Collector)	Washington to Cherry	1,635	N	2,570 (+57%)	--	1,790 (+9%)	-
24th Ave S (Major Collector)	Cherry to Belmont	189	N	1,221 (+546%)	--	441 (+133%)	--
4th Ave S (Minor Arterial)	Demers to Cherry	973	N	755 (-22%)	+	822 (-16%)	+
4th Ave S (Minor Arterial)	Cherry to Belmont	2,687	N	1,791 (-33%)	++	1,989 (-26%)	++
4th Ave S (Minor Arterial)	4th & Belmont to 1st & 3rd	8,070	N	4,789 (-41%)	++	5,210 (-35%)	++
Cherry St (Major Collector)	4th to 24th	4,634	N	3,546 (-23%)	+	3,619 (-22%)	+
Cherry St (Major Collector)	24th to 32nd	1,419	N	1,392 (-2%)	+	1,233 (-13%)	+
Cherry St (Major Collector)	32nd to 40th	2,044	N	1,904 (-7%)	+	1,931 (-6%)	+
2nd Ave NE (Minor Arterial)	2nd & US 2 to 3rd & 1st	4,075	N	3,359 (-18%)	+	3,395 (-17%)	+
3rd Ave SE (Minor Arterial)	3rd & 1st to Bygland & Rhinehart	7,412	N	5,075 (-32%)	++	5,358 (-28%)	++
Bygland Rd SE (Minor Arterial)	Rhinehart to Greenway	5,056	N	3,681 (-27%)	++	3,845 (-24%)	+
Bygland Rd SE (Minor Arterial)	Greenway to Bygland	1,896	N	2,812 (+48%)	--	1,507 (-21%)	+
Bygland Rd SE (Minor Arterial)	190th to Bygland	495	N	1,180 (+138%)	--	1,369 (+177%)	--
Bygland Rd SE/Harley Dr (Minor Arterial)	Bygland & Bygland to TH 220 & Harley Dr	1,089	N	2,130 (+96%)	--	2,454 (+125%)	--
Rhinehart Dr SE (Major Collector)	Bygland to Greenway	2,663	N	2,078 (-22%)	+	2,126 (-20%)	+
Rhinehart Dr SE (Minor Collector/Local Road)	Greenway to Elks Bridge	116	N	874 (+653%)	--	512 (+341%)	--
Rhinehart Dr SE (Local Road)	Elks Bridge to 32nd Bridge	141	N	1,807 (+1182%)	--	1,761 (+1149%)	--
Rhinehart Dr SE (Local Road)	32nd Bridge to 190th	58	N	425 (+633%)	--	732 (+1162%)	--
Rhinehart Dr SE (Local Road)	South of 190th	115	N	144 (+25%)	--	149 (+30%)	--
Greenway Blvd SE (Major Collector)	Rhinehart to Bygland	965	N	2,332 (+142%)	--	1,146 (+19%)	-
Greenway Blvd SE (Minor Collector)	East of Bygland	912	N	535 (-41%)	++	531 (-42%)	++
TH 220 (Minor Arterial)	South of Harley	457	N	416 (-9%)	+	367 (-20%)	+
TH 220 (Minor Arterial)	Harley to US 2	2,103	N	3,878 (+84%)	--	4,298 (+104%)	--
TH 220 (Major Collector)	North of US 2	14	N	3 (-79%)	++	3 (-79%)	++
Demers Ave (Principal Arterial)	20th to Washington	13,040	N	11,682 (-10%)	+	11,906 (-9%)	+
Demers Ave (Principal Arterial)	Washington to 4th	6,883	N	5,900 (-14%)	+	6,036 (-12%)	+
190th St SW (Local Road)	East of Rhinehart	88	N	2,308 (+2523%)	--	5,861 (+6560%)	--
US 2 (Principal Arterial)	West of 220	15,187	N	11,066 (-27%)	++	10,725 (-29%)	++
US 2 (Principal Arterial)	East of 220	571	N	570 (-0%)	+	555 (-3%)	+
US 2B (Minor Arterial)	2nd to US 2	12,422	N	7,082 (-43%)	++	6,668 (-46%)	++

5.3.2 Traffic Change on the Study Corridors Adjacent to Schools

Impacts to roadways adjacent to schools are especially important to the community. To understand how traffic near study area schools would change with the bridge options, the level of positive or negative impact was measured using the percent change in average annual daily travel (AADT) on each block adjacent to a school. A decrease in more than 25% is considered a more positive impact, and an increase in more than 25% is considered a more negative impact. The results are shown in **Table 5-14**.

Table 5-14. Traffic Change Near Schools

Evaluation Criteria	Measure	Alternatives					
		No Build		Elks Drive		32nd Ave	
		Measurement	Rating	Measurement	Rating	Measurement	Rating
Traffic change on study corridors adjacent to schools	Based on traffic exposure at all schools in study area (see measures below)	55,170	N	53,684 (-3%)	+	54,896 (-0%)	N
Phoenix Elementary School	2045 AADT on adjacent road (4th Ave S, Belmont Rd)	17,220	N	11,060 (-36%)	++	11,710 (-32%)	++
Lewis & Clark Elementary School	2045 AADT on adjacent road (13th Ave S)	5,546	N	5,448 (-2%)	+	5,420 (-2%)	+
Holy Family-St. Mary's Private School	2045 AADT on adjacent road (17th Ave S)	5,184	N	5,356 (+3%)	-	5,216 (+1%)	-
Viking Elementary School	2045 AADT on adjacent road (24th Ave S)	3,690	N	5,510 (+49%)	--	3,680 (-0%)	+
Kelly Elementary School	2045 AADT on adjacent road (Cherry St, 32nd Ave S)	8,670	N	9,560 (+10%)	-	11,660 (+34%)	--
Schroeder Middle School	2045 AADT on adjacent road (Cherry St, 32nd Ave S)	8,670	N	9,560 (+10%)	-	11,660 (+34%)	--
South Point Elementary School	2045 AADT on adjacent road (13th St SE)	3,740	N	3,620 (-3%)	+	3,600 (-4%)	+
Central Middle School	2045 AADT on adjacent road (Bygland Rd)	2,450	N	3,570 (+46%)	--	1,950 (-20%)	+
Consistency with approved transportation plans	Is the alternative consistent with LRTP and city plans?	No	-	No	N	Yes	+
Support for economic development	Degree of improved regional accessibility provided (qualitative)	No Change	N	Improve	+	Improve	+
Impact to the Greenway (a protected Section 4(f) resource)	Level of impact	None	N	Smaller footprint	-	Larger footprint	-

5.3.3 Consistency with Approved Transportation Plans

Each alternative was evaluated based on its consistency with the Long-Range Transportation Plan (LRTP) and City plans. The key piece of criteria is that plans all call for a new bridge at 32nd Ave., which has been previously identified in local and regional transportation plans as a preferred corridor. The results are as follows:

- No Build: Not consistent with plans (negative)
- Elks Drive: Somewhat consistent with plans (neutral)
- 32nd Avenue: Consistent with plans (positive)

5.3.4 Support for Economic Development

Both bridge alternatives would be expected to improve regional accessibility and therefore have a positive impact on economic development. The No Build option would have no impact (neutral).

5.3.5 Impact to the Greenway

The Greenway is a federally protected Section 4(f) resource. The No Build option would have no impact on the greenway and is considered neutral. Both bridge options would represent a new crossing of the Greenway and therefore considered to have a negative impact, with the Elks Drive alternative having a smaller footprint (slightly smaller impact) than the 32nd Avenue alternative. However, it is noted that the new bridge also would provide increased accessibility to the Greenway from the adjacent neighborhoods compared to today.

With respect to meeting Section 4(f) regulatory requirements, however, as part of the original Greenway planning, potential future bridge corridors at 17th Avenue, Elks Drive, and 32nd Avenue were identified with the understanding that recreational development and use of these corridors would be avoided so as to allow a future bridge to be constructed without interfering with the Greenway (see The Greenway Master Development and Restoration Plan, July 2000, Greenways Incorporated). Because the future corridors were identified in the master planning for reuse as part of the flood protection system’s environmental documents, the Section 4(f) restriction is relaxed.

5.4 ENVIRONMENTAL IMPACTS

Flood protection system, soil stability, community resources, natural resources, farmland, visual, air quality, and noise impacts were evaluated at a high level to identify any fatal flaws, understanding that a detailed environmental analysis would be completed as a part of the subsequent NEPA process. This analysis was conducted as a comparative analysis against the No Build alternative, which was considered the baseline condition. The following summarizes the analysis for the two new bridge options:

- Flood protection system (Grand Forks side only as East Grand Forks bridge landing would not penetrate flood protection system)
 - Elks Drive: no change – assumed to use current opening (neutral)
 - 32nd Avenue: potential impact – assumed to require relocated opening (negative)
- Soil stability
 - Elks Drive: might be less stable, based on prior study (negative)
 - 32nd Avenue: might be more stable, based on prior study (neutral)
- Impacts to community resources, including environmental justice, historic and cultural resources, parks, open space, and recreational areas. Based on the understanding that a new bridge approach at Elks Drive would be constructed within the footprint of the existing Elks Drive roadway, no impacts to the Lincoln Golf Course or the Grand Forks Historical Society (the two other identified Section 4(f) resources), are anticipated. The only potential Section 4(f) impact would be the Greenway (discussed above).
 - Elks Drive: no change (neutral)
 - 32nd Avenue: no change (neutral)
- Impacts to natural resources including water bodies, wetlands, wildlife, floodplain, threatened and endangered species, non-invasive plants, soils, and trees
 - Elks Drive: some impact (negative)
 - 32nd Avenue: some impact (negative)
- Farmland

- Elks Drive: some impact (negative)
- 32nd Avenue: some impact (negative)
- Visual
 - Elks Drive: some intrusion (negative)
 - 32nd Avenue: some intrusion (negative)
- Air Quality
 - Elks Drive: improved (positive)
 - 32nd Avenue: improved (positive)
- Noise. Both crossing options received a “positive” rating based on the understanding that either option would decrease traffic on study corridors somewhat overall by dispersing traffic to a greater degree on the overall system. It should be noted, however, that both corridors also include the introduction of a new road and potential traffic noise on the East Grand Forks side where there is no road today.
 - Elks Drive: somewhat less (positive)
 - 32nd Avenue: somewhat less (positive)

5.5 BENEFIT-COST

An estimated benefit-cost analysis was completed using a range of potential values based on the analysis completed to date. The cost of a bridge (medium height for both Elks Drive and 32nd Avenue) was obtained from the 2020 Hydraulics Analysis of South End Red River Bridge study.³

The intersection mitigation costs included a range of values, as cost estimates were prepared at the planning level only.

The transportation benefits were estimated using prior estimates (adjusted for inflation) from the 2045 Metropolitan Transportation Plan⁴. The benefits estimates are primarily based on savings on annual VHT and VMT. An estimated benefit-cost ratio is provided based on the total estimated costs and benefits and shown in **Table 5-15**.

Table 5-15. Benefit-Cost Analysis

	No Build	Elks Drive	32 nd Avenue
Bridge Cost (\$ millions)	N/A	\$30.0	\$36.4
Intersection Mitigation Cost (\$ millions)	\$17.2 - \$25.8	\$2.4 - \$3.6	\$3.1 - \$4.7
Total Planning Level Cost Estimate (\$ millions)	\$17.2 - \$25.8	\$32.4 - \$33.6	\$39.5 - \$41.4

³ Hydraulic Analysis of South End Red River Bridge (City of Grand Forks and City of East Grand Forks, September 2020) Available at <https://www.grandforksgov.com/government/city-departments/engineering/south-end-bridge-hydraulic-study-report>.

⁴ 2045 Metropolitan Transportation Plan, Street/Highway Plan Update (Grand Forks-East Grand Forks Metropolitan Planning Organization, December 2018) Available at <https://theforksmpl.org/common/pages/DisplayFile.aspx?itemId=16339532>.

Transportation Benefits	N/A	\$30.3	\$48.5
Benefit-Cost Ratio	N/A	Less than 1	Greater than 1

5.6 KEY DIFFERENTIATORS

Table 5-16 shows the higher order criteria where the two alternatives had different scores. The criteria that are not shown had the same score for both Elks Drive and 32nd Avenue options.

Table 5-16. Evaluation Summary Key Differentiators

Evaluation Criteria		Alternatives Rating		
		No New Bridge	Elks Drive	32 nd Avenue
Purpose and Need	Multimodal System Linkage			
	Total miles of travel on the system (distance)	N	+	++
	Total hours of travel on the system (time)	N	+	++
	Total miles of travel on study corridors (distance)	N	+	++
	Total hours of travel on study corridors (time)	N	+	++
	Ped/bike connectivity	-	+	++
	Community and Economic Factors			
	Total miles of travel on study corridors (distance)	N	+	++
	Traffic change on study corridors adjacent to schools	N	+	N
Consistency with approved transportation plans	-	N	+	
Env. Impacts	Environmental Impacts			
	Potential impact on flood protection system	N	N	-
	Soil stability	N	-	N
Cost	Benefit/Cost			
	Bridge Cost (\$millions)	N/A	\$30.0	\$36.4
	Intersection Mitigation Cost (\$ millions)	\$17.2 - \$25.8	\$2.4 - \$3.6	\$3.1 - \$4.7
	Total Planning Level Cost Estimate (\$ millions)	\$17.2 - \$25.8	\$32.4 - \$33.6	\$39.5 - \$41.4
	Transportation Benefits (\$ millions)	N/A	\$30.3	\$48.5
	Benefit-Cost Ratio	N/A	<1	>1

Rating	++	+	N	-	--
---------------	----	---	---	---	----

6. Next Steps

This report presents the evaluation results and background, without specific recommendations for advancement of any of the three alternatives (No Build, New Bridge at Elks Drive, or New Bridge at 32nd Avenue). Based on the evaluation presented, the City of Grand Forks and the City of East Grand Forks may decide when or how to advance the study in coordination with state and other local agencies. If there is local interest in advancing a project, the next step would be a formal environmental process with National Environmental Policy Act (NEPA) documentation and preliminary engineering design.