Grand Forks - East Grand Forks
METROPOLITAN
PLANNING ORGANIZATION

SPECIAL TECHNICAL ADVISORY COMMITTEE MEETING

WEDNESDAY, JUNE 23RD, 2021 – 1:30 P.M.

East Grand Forks City Hall Training Room/Zoom

PLEASE NOTE: Due to ongoing public health concerns related to COVID-19 the Grand Forks/East Grand Forks Metropolitan Planning Organization (GF/EGF MPO) is encouraging citizens to provide their comments for public hearing items via e-mail at info@theforksmpo.org. The comments will be sent to the Technical Advisory Committee members prior to the meeting and will be included in the minutes of the meeting. To ensure your comments are received and distributed prior to the meeting, please submit them by 5:00 p.m. one (1) business day prior to the meeting and reference the agenda item your comments addresses.

MEMBERS

Peterson/Kadrmas _____	Mason/Hopkins_____	West _____
Ellis _____	Zacher/Johnson _____	Magnuson _____
Bail/Emery _____	Kuharenko/Williams _____	Sanders _____
Brooks/Halford _____	Bergman _____	Christianson _____
Riesinger _____		

1. CALL TO ORDER

2. CALL OF ROLL

3. DETERMINATION OF A QUORUM

4. MATTER OF UPDATE ON FUTURE BRIDGE TRAFFIC IMPACT STUDY ..... ALLIANT

5. OTHER BUSINESS

6. ADJOURNMENT

INDIVIDUALS REQUIRING A SPECIAL ACCOMMODATION TO ALLOW ACCESS OR PARTICIPATION AT THIS MEETING ARE ASKED TO NOTIFY EARL HAUGEN, TITLE VI COORDINATOR, AT (701) 746-2660 OF HIS/HER NEEDS FIVE (5) DAYS PRIOR TO THE MEETING. IN ADDITION, MATERIALS FOR THIS MEETING CAN BE PROVIDED IN ALTERNATIVE FORMATS: LARGE PRINT, BRAILLE, CASSETTE TAPE, OR ON COMPUTER DISK FOR PEOPLE WITH DISABILITIES OR WITH LIMITED ENGLISH PROFICIENCY (LEP) BY CONTACTING THE TITLE VI COORDINATOR AT (701) 746-2660

Grand Forks - East Grand Forks
METROPOLITAN
PLANNING ORGANIZATION

MPO Staff Report

Technical Advisory Committee:

June 23, 2021

RECOMMENDED ACTION: Update on Future Bridge Traffic Impact Study

Matter of the Update on Future Bridge Traffic Impact Study.

Background: Alliant Engineering will be participating in the TAC meeting The focus of the meeting is to present the draft findings of Tech Memo 3B, which focuses on the Existing and Future No Build (no added bridge at either Elks or 32nd) safety and traffic operations.

The 2045 MTP performed an analysis on traffic operations. This is detailed in Appendix C. How this Tech Memo 3 is different is in two major additions. First it looked at both the AM Peaks and the PM peaks (some intersections the AM Peak is more than PM). Second, it includes a detailed safety analysis.

After presenting this, we are asking our local/state/federal partners to review and provide feedback on this memo. The next Ad Hoc Group meeting is scheduled for July 20th in the morning. Tech Memos 3A and 3B will be the focus of that meeting. The July TAC meeting will be an opportunity to further refine and improve these Tech Memos.

The presentation will also introduce the concept of drafting a Purpose and Need Statement. Further work during our July TAC meetings will also focus on drafting these.

Findings and Analysis:

- NONE

Support Materials:

- Presentation.
- Draft Tech Memo on Traffic Counts.

Future Bridge Traffic Impact Study

TAC Meeting #3

JUNE 23, 2021 (1:30-3:00)

Agenda

TIME	TOPIC
1:30	Welcome and Introductions (Earl Haugen/Tim Burkhardt)
1:35	Schedule, Tasks and Deliverables Update (Tim Burkhardt)
1:45	Traffic Operations and Safety (Mike Kondziolka)
2:15	Draft Project Purpose and Need (Tim Burkhardt)
3:00	Adjourn

Schedule Overview

Task	F	M	A	M	J	J	A	S	O	N	D
1. Project Management											
2. Public Involvement											
3. Existing/Future Conditions											
4. Traffic Analysis											
5. Issues and Needs											
6. Alternatives Development											
7. Alternatives Evaluation											
8. Implementation Plan											
9. Study Report											

Tasks & Deliverables Status

Task	Completed Deliverables	In Progress	Upcoming
1. Project Management	TAC Update #1, #2, #3	TAC Update #4	Monthly TAC Updates
2. Public Involvement	Public Involvement Plan Committee Decision Process Ad Hoc Group #1, #2	Maintain Web Site Planning for Public Event #1	Ad Hoc Group #3 (July) Public Event #1 (July/Aug)
3. Existing and Future Conditions	Tech Memo #2		
4. Traffic Analysis	Tech Memo #3-A	Tech Memo #3-B	Tech Memo #3-C
5. Issues and Needs	N/A	Draft Purpose and Need	
6. Alternatives Development	N/A	N/A	
7. Alternatives Evaluation	N/A	N/A	
8. Implementation Plan	N/A	N/A	
9. Study Report	N/A	N/A	

Tech Memo #3-A – Traffic Volumes

Topics include:

- Data sources
- Existing volume development methodology
- Existing regional traffic patterns
- Existing turning movement volumes
- Forecast volume development methodology
- Forecast turning movement volumes

GRAND FORKS-EAST GRAND FORKS
FUTURE BRIDGE TRAFFIC IMPACT STUDY

PAGE 1

Transmittal Information

To:	Earl Haugen (Grand Forks-East Grand Forks MPO)
From:	Tim Burkhardt, AICP (Alliant Engineering) Mike Kondziolka, PE, PTOE (Alliant Engineering)
Date:	5/5/2021
Subject:	Technical Memorandum #3-A: Existing and Forecast Future Traffic Volumes

1. Introduction

This is the third in a series of technical memorandums for the Grand Forks-East Grand Forks Future Bridge Traffic Impact Study. It presents the first portion of the traffic analysis—a summary of the data and methodology used to develop the existing and future traffic volumes for the analysis. A fourth technical memorandum (Technical Memorandum #3-B) will follow, completing section 3 with the results of the traffic operations and safety analysis.

2. Existing and Future Conditions

Refer to Technical Memorandum #2 for documentation of the existing and future conditions assessment, including the transportation system and infrastructure, the built and natural environment, and land use.

3. Traffic Analysis

A traffic analysis is being 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), a new river bridge at Elks Drive (Elks Drive Bridge), or a new bridge at 32nd Avenue (32nd Avenue Bridge).

3.1 EXISTING 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 Washington Avenue were collected using the online NDSU Traffic Analysis tool, 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

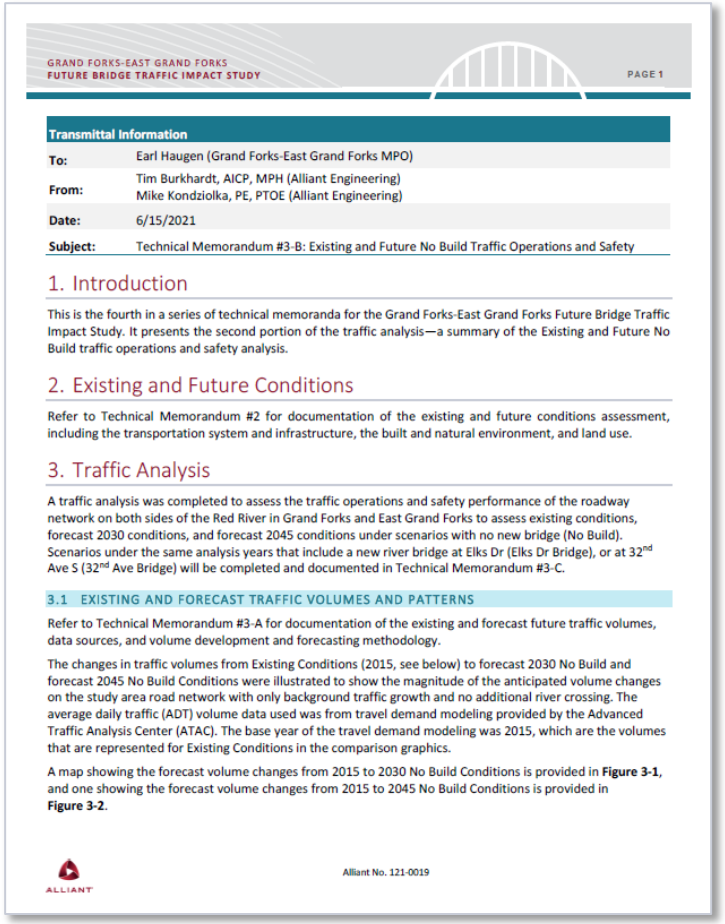
ALLIANT

Alliant No. 121-0019

Tech Memo #3-B – Existing and Future No Build Traffic Operations and Safety

Topics include:

- Forecast volume changes to 2030 and 2045
- 2016-2020 Safety Analysis
- Traffic Mobility and Operations Analysis
  - Scenario Years
    - Existing (2021) Conditions
    - 2030 No Build Conditions
    - 2045 No Build Conditions
  - Segment volume-to-capacity and LOS
  - Intersection LOS



GRAND FORKS-EAST GRAND FORKS
FUTURE BRIDGE TRAFFIC IMPACT STUDY
PAGE 1

Transmittal Information

To:	Earl Haugen (Grand Forks-East Grand Forks MPO)
From:	Tim Burkhardt, AICP, MPH (Alliant Engineering) Mike Kondziolka, PE, PTOE (Alliant Engineering)
Date:	6/15/2021
Subject:	Technical Memorandum #3-B: Existing and Future No Build Traffic Operations and Safety

1. Introduction

This is the fourth in a series of technical memoranda for the Grand Forks-East Grand Forks Future Bridge Traffic Impact Study. It presents the second portion of the traffic analysis—a summary of the Existing and Future No Build traffic operations and safety analysis.

2. Existing and Future Conditions

Refer to Technical Memorandum #2 for documentation of the existing and future conditions assessment, including the transportation system and infrastructure, the built and natural environment, and land use.

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) will be completed and documented in Technical Memorandum #3-C.

3.1 EXISTING AND FORECAST TRAFFIC VOLUMES AND PATTERNS

Refer to Technical Memorandum #3-A for documentation of the existing and forecast future traffic volumes, data sources, and volume development and forecasting methodology.

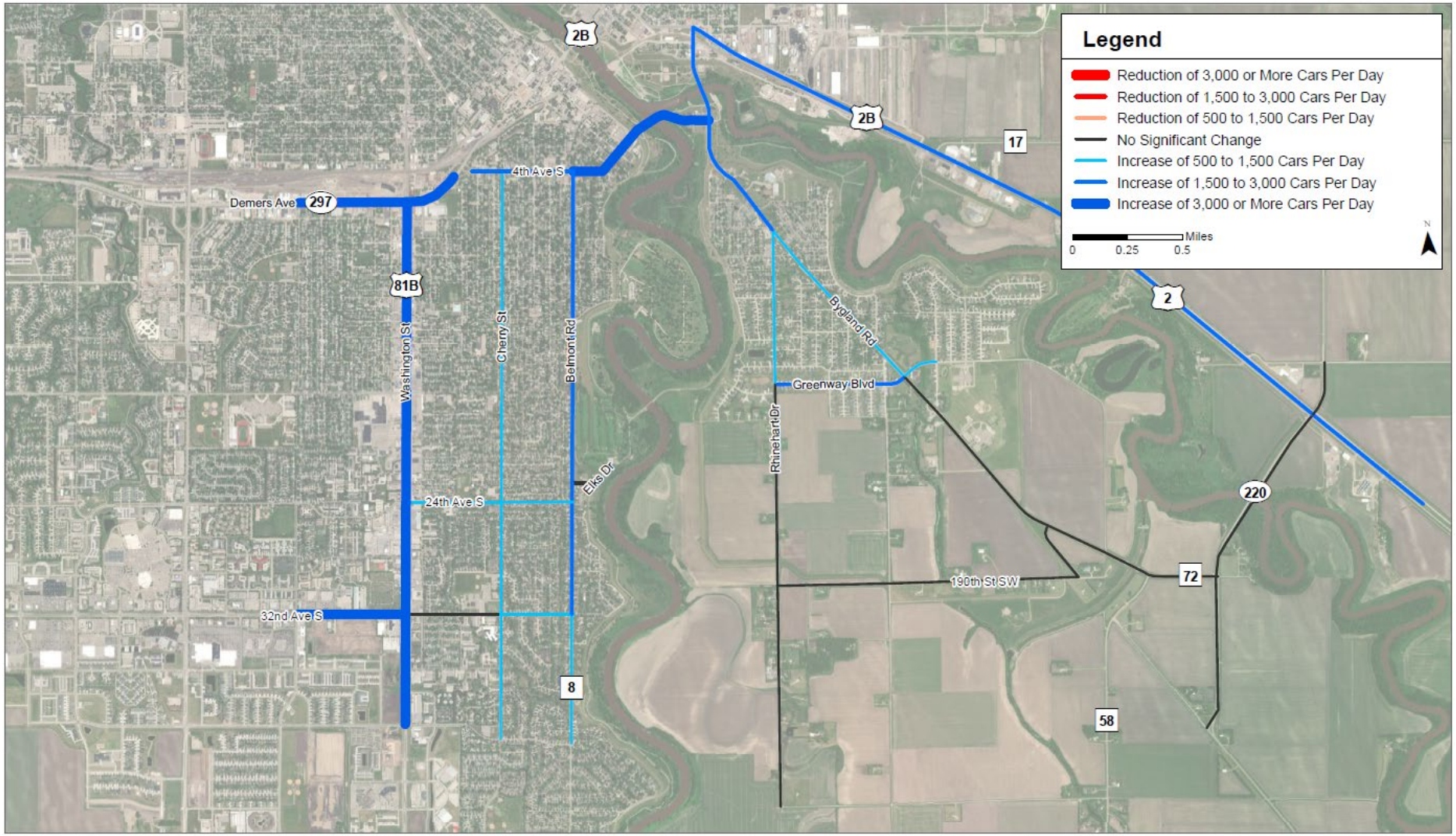
The changes in traffic volumes from Existing Conditions (2015, see below) to forecast 2030 No Build and forecast 2045 No Build Conditions were illustrated to show the magnitude of the anticipated volume changes on the study area road network with only background traffic growth and no additional river 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 3-1**, and one showing the forecast volume changes from 2015 to 2045 No Build Conditions is provided in **Figure 3-2**.

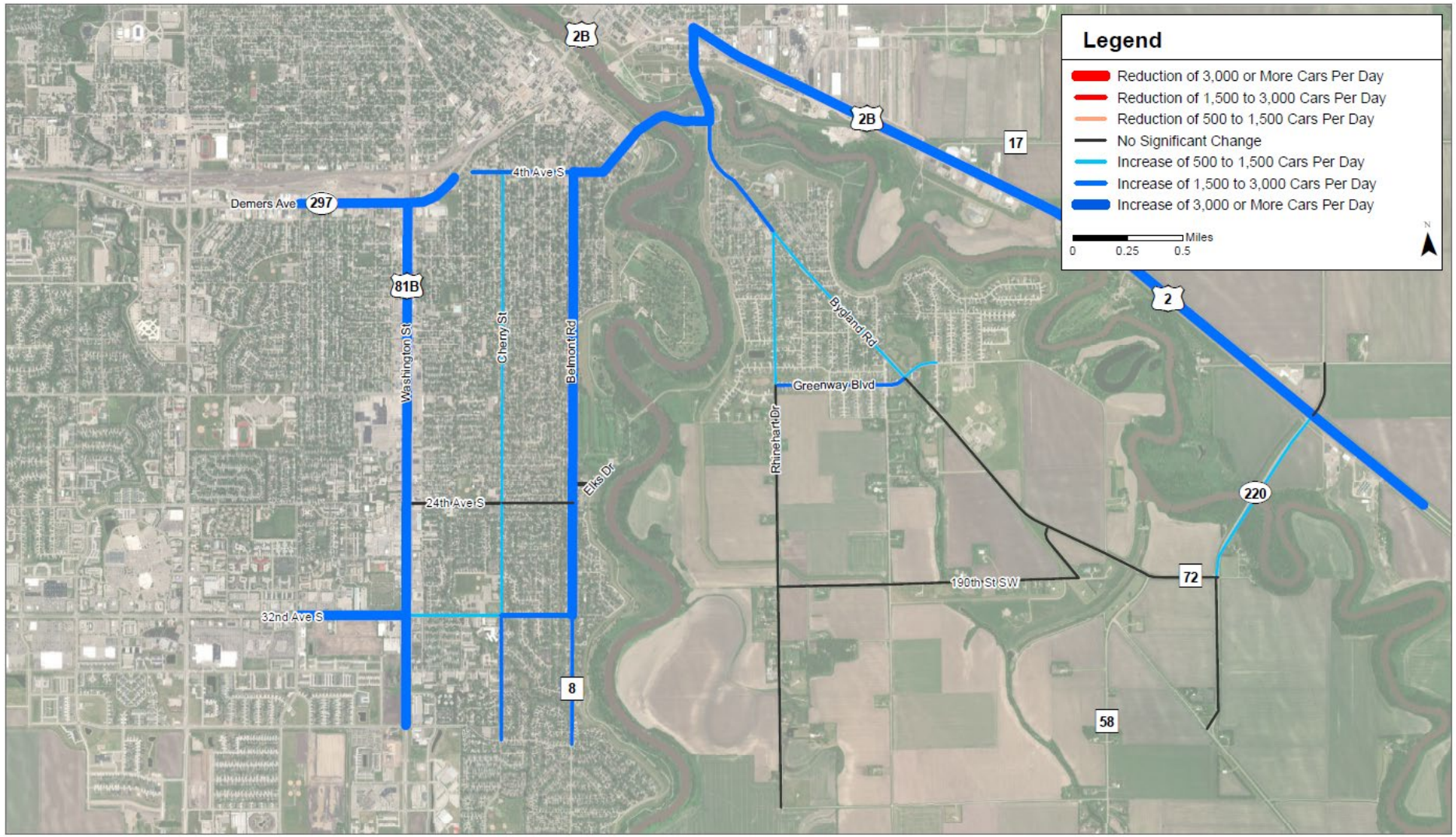
ALLIANT

Alliant No. 121-0019

2015 to 2030 Volume Changes



2015 to 2045 Volume Changes



Traffic Safety - Intersections

- The safety analysis identified critical crash concerns at the following intersections:
  - 32nd Avenue S & Washington Street S (Critical Crash Index)
  - 24th Avenue S & Washington Street S (Critical Crash Index)
  - DeMers Ave & Washington Street S (Critical Crash Index)
  - Bygland Road SE & Greenway Boulevard SE (Critical K/A Index)

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
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

Traffic Safety - Segments

- The following roadway segments have critical crash concerns:

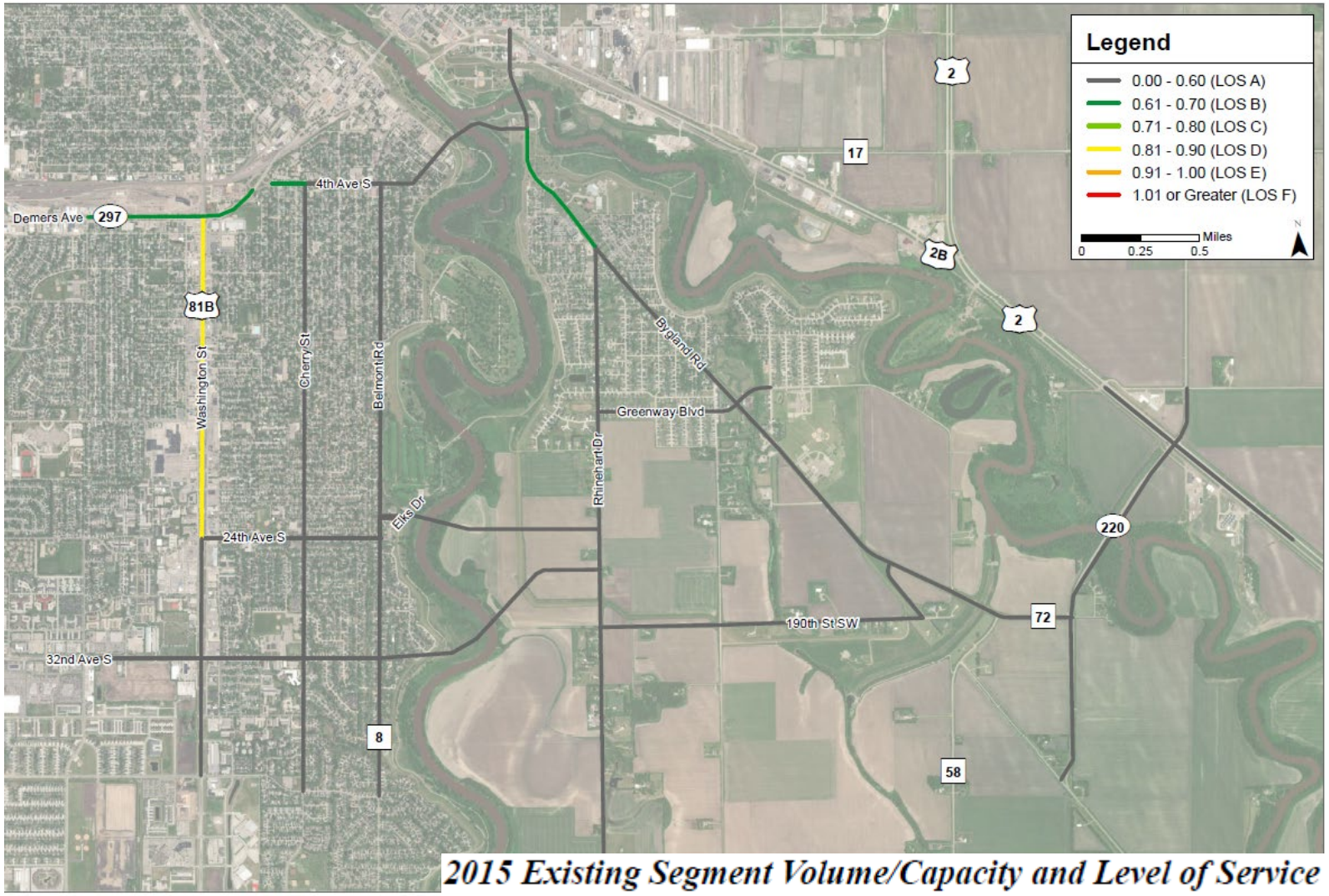
Critical Crash Index

- 24th Avenue S – Washington Street S to Cherry Street
- 4th Avenue S/Minnesota Avenue/1st Street SE over the Point Bridge
- Washington Street S – DeMers Avenue to 24th Avenue S
- Cherry Street – 4th Avenue S to 24th Avenue S

Critical Fatal/Severe (K/A) Crash Index

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

Traffic Operations & Mobility – Existing

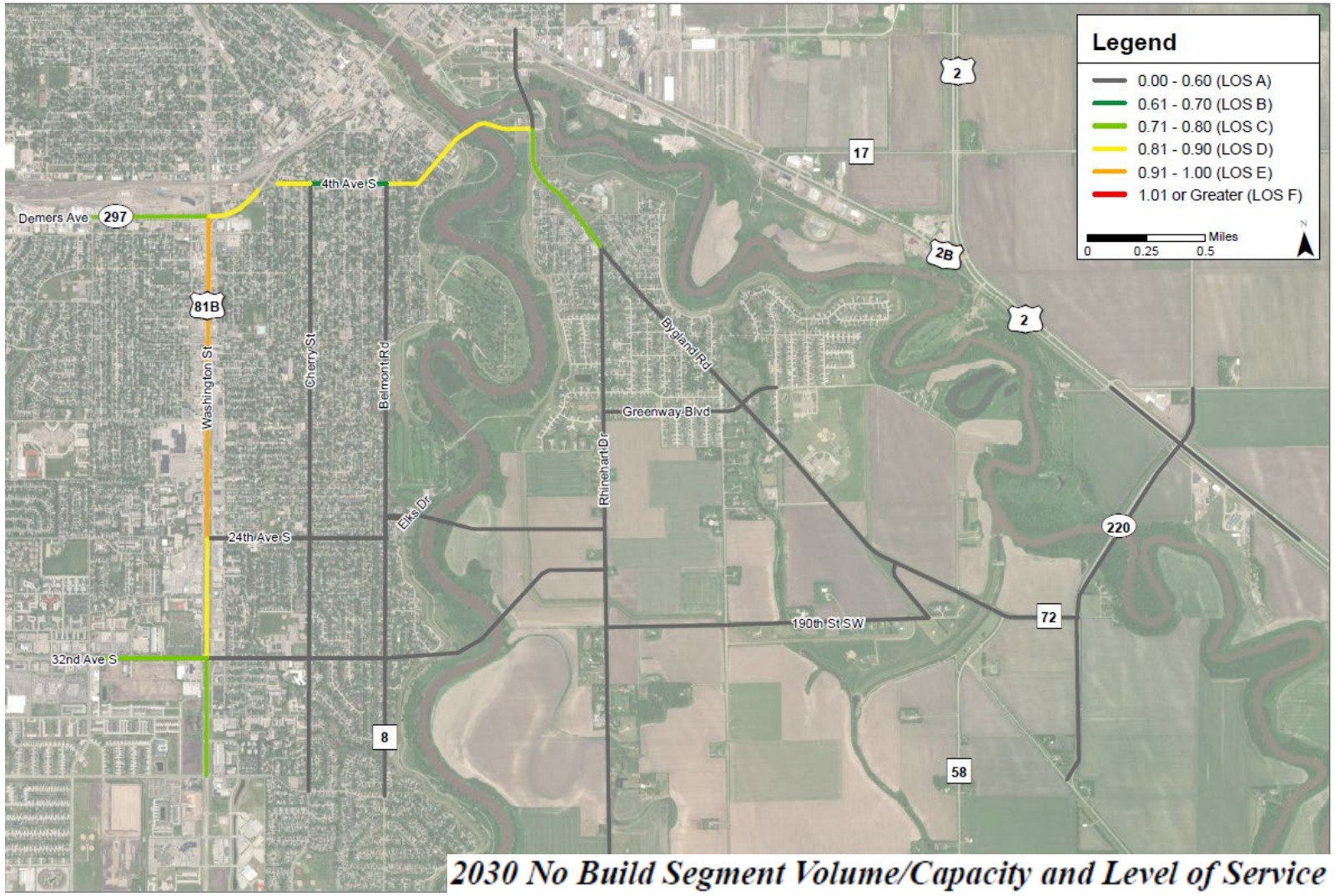


2015 Existing Segment Volume/Capacity and Level of Service

Intersection	Control Type	AM Peak Hour	PM Peak Hour
		LOS	LOS
Washington St S & 32nd Ave S	Signal	C	D
Cherry St & 32nd Ave S	AWSC	C	B
Belmont Road & 32nd Ave S	AWSC	B	B
Washington St S & 24th Ave S	Signal	C	C
Cherry St & 24th Ave S	AWSC	A	A
Belmont Rd & 24th Ave S	TWSC	B	C
Belmont Rd & Elks Drive	TWSC	B	B
Washington St S & DeMers Ave	Signal	D	D
Cherry St & 4th Ave S	Signal	A	A
Belmont Rd & 4th Ave S	AWSC	E	C
3rd Ave SE & 1st St SE	Signal	A	A
Bygland Rd SE & Rhinehart Dr SE	TWSC	E	C
Rhinehart Dr SE & Greenway Blvd SE	TWSC	A	A
Bygland Rd SE & Greenway Blvd SE	TWSC	C	B
Bygland Rd SE & 190th St SW	TWSC	A	A
Bygland Rd SE/Harley Dr & TH 220	TWSC	A	A
TH 220 & US 2	TWSC	B	B
Rhinehart Dr SE & 190th St SE	AWSC	A	A

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

Traffic Operations & Mobility – 2030 No Build

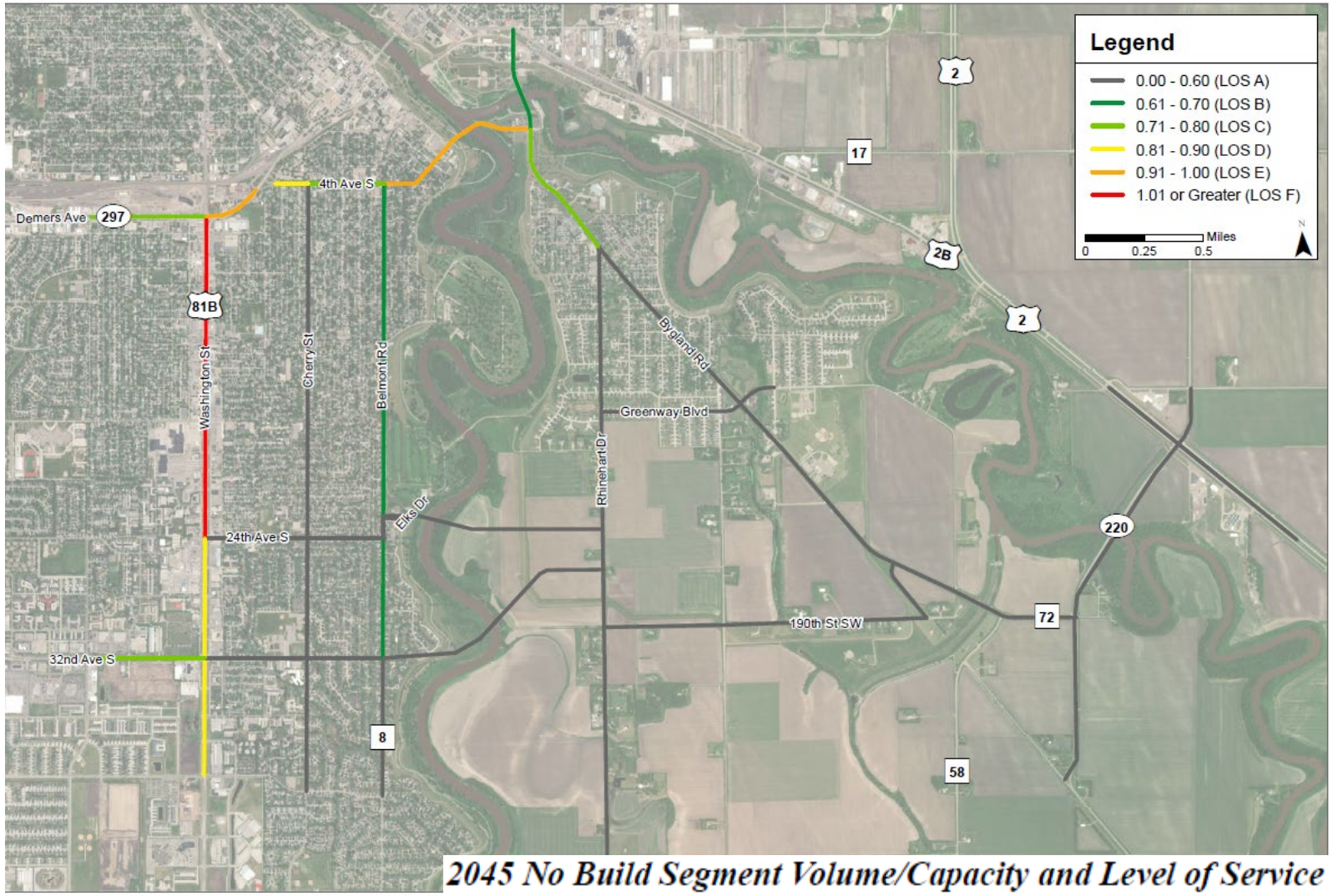


2030 No Build Segment Volume/Capacity and Level of Service

Intersection	Control Type	AM Peak Hour	PM Peak Hour
		LOS	LOS
S Washington St & 32nd Ave S	Signal	C	D
Cherry St & 32nd Ave S	AWSC	E	B
Belmont Rd & 32nd Ave S	AWSC	C	C
S Washington St & 24th Ave S	Signal	C	C
Cherry St & 24th Ave S	AWSC	A	A
Belmont Rd & 24th Ave S	TWSC	C	C
Belmont Rd & Elks Drive	TWSC	B	C
S Washington St & DeMers Ave	Signal	E	D
Cherry St & 4th Ave S	Signal	A	A
Belmont Rd & 4th Ave S	AWSC	F	F
3rd Ave SE & 1st St SE	Signal	B	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	F	C
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	B	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	A	A
Bygland Rd SE & Greenway Blvd SE	TWSC	D	B
Bygland Rd SE & 190th St SW	TWSC	A	A
Bygland Rd SE/Harley Dr & TH 220	TWSC	A	A
TH 220 & US 2	TWSC	B	B
Rhinehart Dr SE & 190th St SE	AWSC	A	A

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

Traffic Operations & Mobility – 2045 No Build



2045 No Build Segment Volume/Capacity and Level of Service

Intersection	Control Type	AM Peak Hour	PM Peak Hour
		LOS	LOS
S Washington St & 32nd Ave S	Signal	C	D
Cherry St & 32nd Ave S	AWSC	F	C
Belmont Rd & 32nd Ave S	AWSC	F	F
S Washington St & 24th Ave S	Signal	C	C
Cherry St & 24th Ave S	AWSC	B	B
Belmont Rd & 24th Ave S	TWSC	C	D
Belmont Rd & Elks Drive	TWSC	C	C
S Washington St & DeMers Ave	Signal	F	E
Cherry St & 4th Ave S	Signal	A	A
Belmont Rd & 4th Ave S	AWSC	F	F
3rd Ave SE & 1st St SE	Signal	B	A
Bygland Rd SE & Rhinehart Dr SE (Stop Control)	TWSC	F	D
Bygland Rd SE & Rhinehart Dr SE (Roundabout)	RAB	C	A
Rhinehart Dr SE & Greenway Blvd SE	TWSC	A	A
Bygland Rd SE & Greenway Blvd SE	Signal	A	A
Bygland Rd SE & 190th St SW	TWSC	A	A
Bygland Rd SE/Harley Dr & TH 220	TWSC	B	A
TH 220 & US 2	TWSC	C	C
Rhinehart Dr SE & 190th St SE	AWSC	A	A
Note: Delay and LOS for TWSC intersections reflect the worst approach			

Next Step

- Build Conditions Traffic Operations Analysis

Draft Purpose and Need

- Explains why the MPO is undertaking this project and describes main objectives
- “Need” = transportation problems to be addressed by the project
- “Purpose” = a broad statement of the intended transportation results
- Together, the purpose and need are a way to measure and understand to what extend the alternatives being considered meet the project needs

Draft Purpose and Need

- Draft purpose statement:

> *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 and by providing a **more direct connection** for trips between the two cities.*

Draft Purpose and Need

Primary needs

- Transportation problems which led to the initiation of the project

Secondary needs

- Transportation problems or opportunities for system improvements within the area that may be addressed concurrently

Questions/Discussion

www.forks2forksbridge.com/info

Tim Burkhardt

tburkhardt@alliant-inc.com

Transmittal Information	
To:	Earl Haugen (Grand Forks-East Grand Forks MPO)
From:	Tim Burkhardt, AICP, MPH (Alliant Engineering) Mike Kondziolka, PE, PTOE (Alliant Engineering)
Date:	6/18/2021
Subject:	Technical Memorandum #3-B: Existing and Future No Build Traffic Operations and Safety

1. Introduction

This is the fourth in a series of technical memoranda for the Grand Forks-East Grand Forks Future Bridge Traffic Impact Study. It presents the second portion of the traffic analysis—a summary of the Existing and Future No Build traffic operations and safety analysis.

2. Existing and Future Area Characteristics

Refer to Technical Memorandum #2 for documentation of the transportation system and infrastructure, the built and natural environment, and land uses for existing and planned future conditions.

3. Traffic Analysis

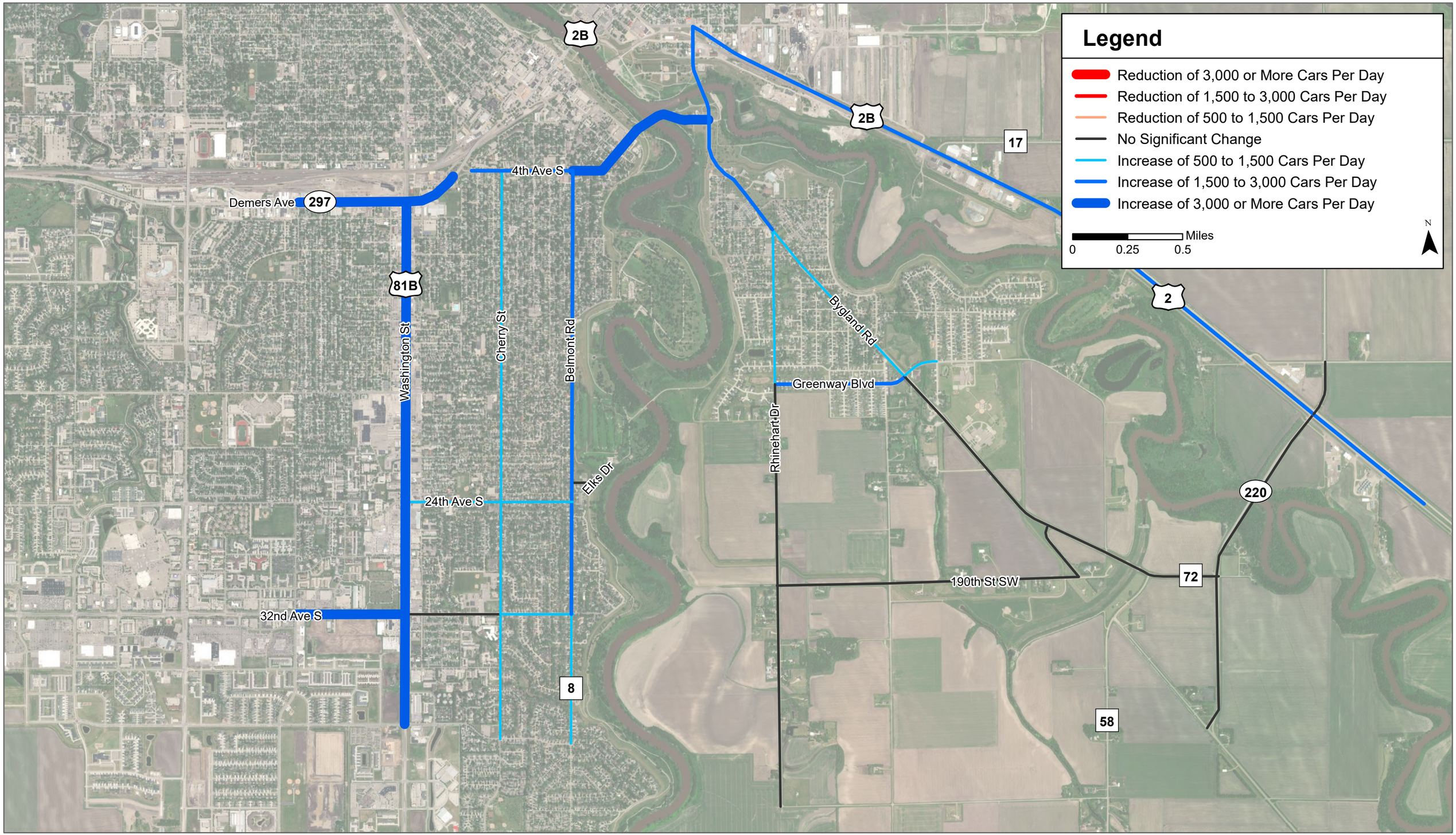
A traffic analysis was completed to assess the traffic operations and safety performance of the roadway network on both sides of the Red River in Grand Forks and East Grand Forks to assess existing conditions, forecast 2030 conditions, and forecast 2045 conditions under scenarios with no new bridge (No 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) will be completed and documented in Technical Memorandum #3-C.

3.1 EXISTING AND FORECAST TRAFFIC VOLUMES AND PATTERNS

Refer to Technical Memorandum #3-A for documentation of the existing and forecast future traffic volumes, data sources, and volume development and forecasting methodology.

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 3-1**, and one showing the forecast volume changes from 2015 to 2045 No Build Conditions is provided in **Figure 3-2**.



Future Bridge Traffic Impact Study

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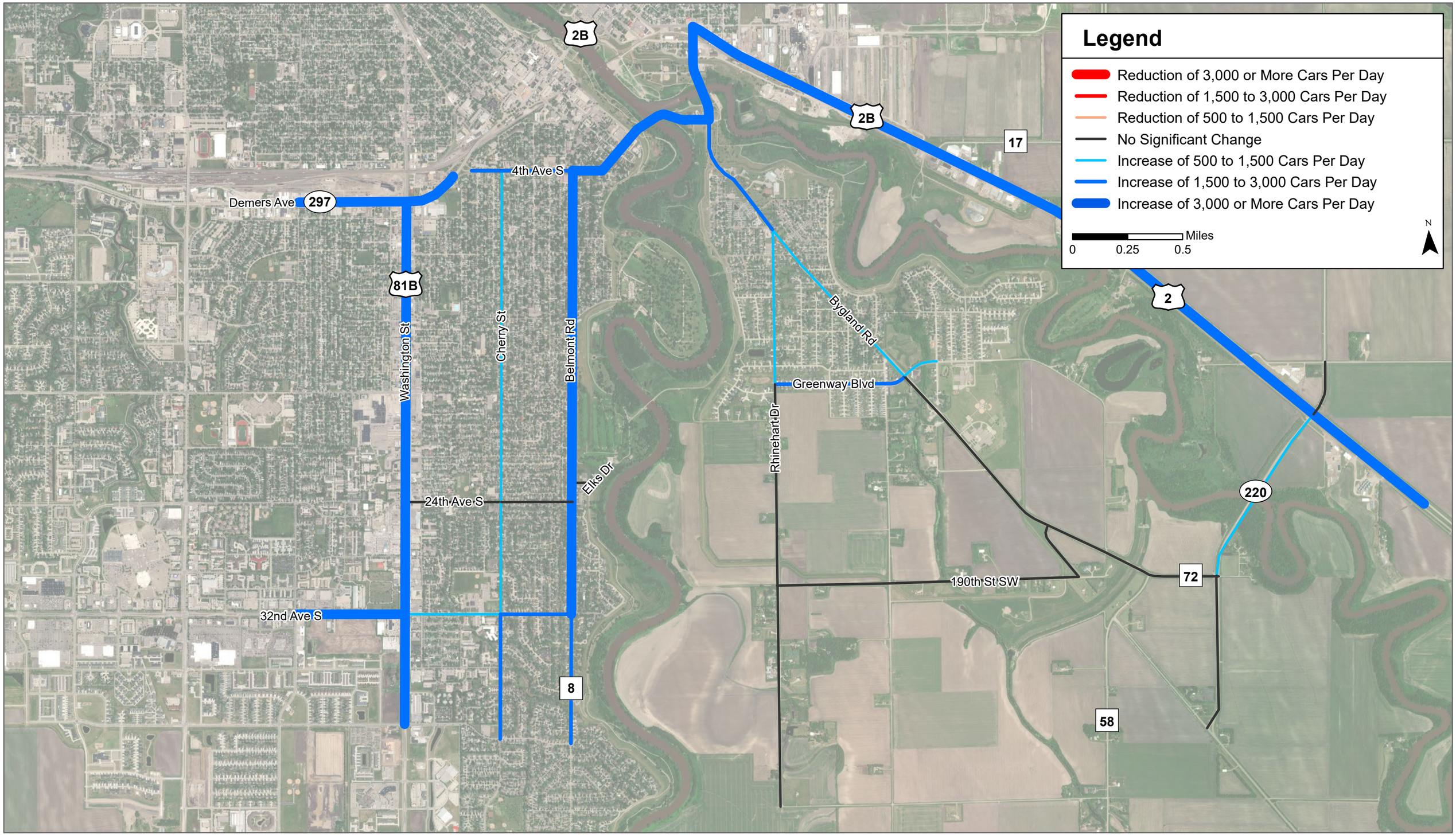
Figure 3-1
2015 to 2030 No Build Traffic Volume Change

Source: ESRI World Imagery Basemap



Future Bridge Traffic Impact Study

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Figure 3-2
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 3-1**. 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 3-1 – 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 3-1 – 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 last five intersections in **Table 3-1** 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.

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.

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.

Table 3-2 summarizes the study roadway segment crash analysis.

Table 3-2 – 2016-2020 Segment Crash Analysis Summary

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
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 3-2 – 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.

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. The existing and forecast volume sets and development methodology are documented in Technical Memorandum #3-A. A discussion of the capacity, including LOS, is included in the following sections.

3.3.1 Level of Service Methodology

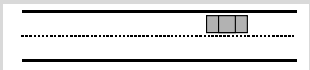
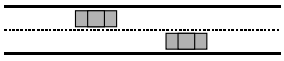
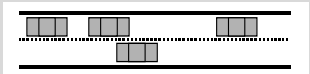
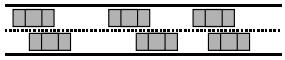
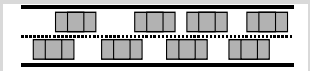
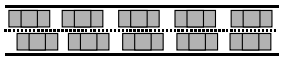
LOS is a concept used to estimate the quality of vehicular traffic flow through intersections and along roadway segments. In general, the capacity of a street is a measure of its ability to accommodate a certain volume of moving vehicles. Typically, street capacity refers to the maximum number of vehicles 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 3-3**.

Table 3-3. Level of Service Grade Definitions

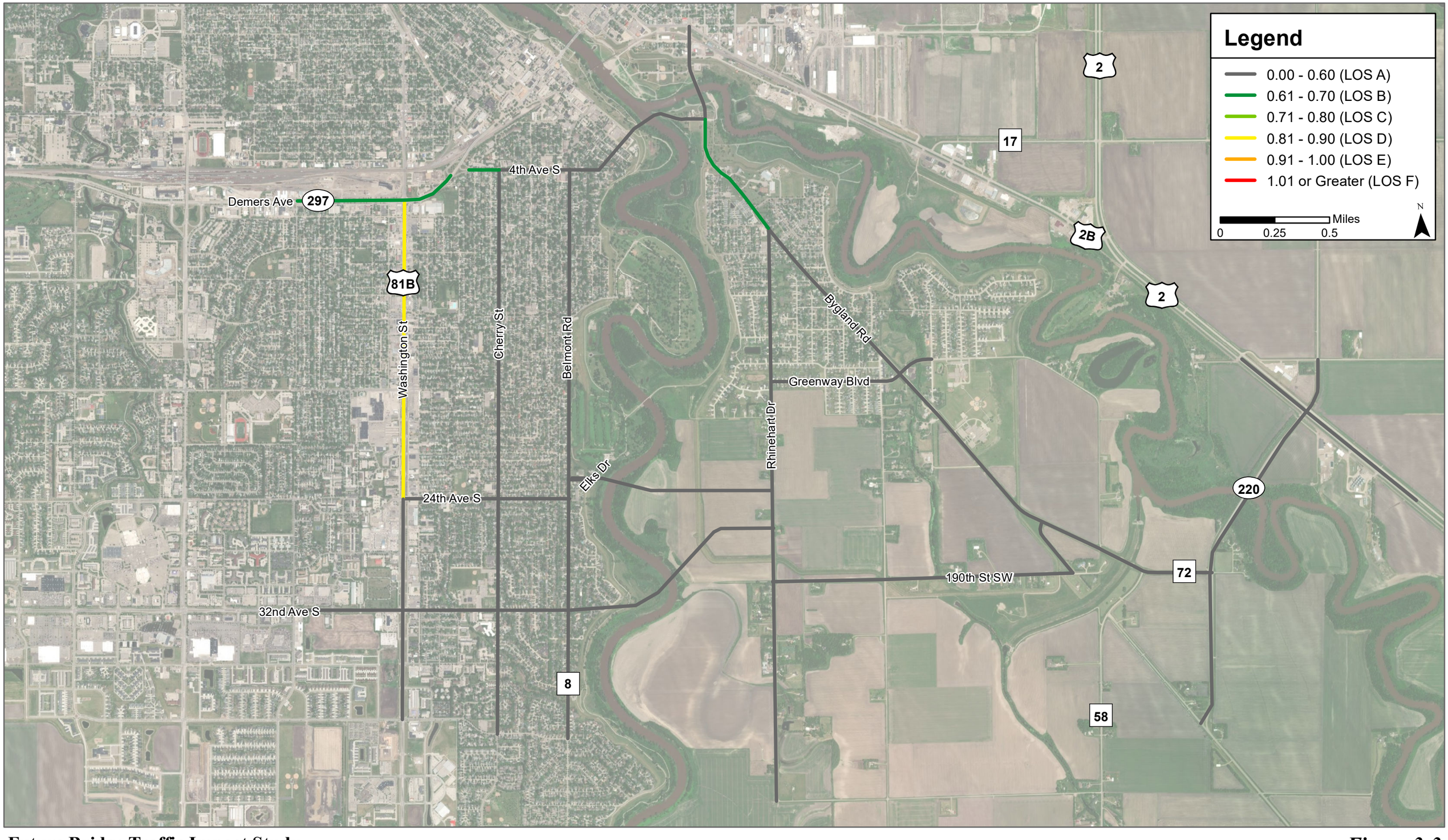
LOS	Description		Volume to Capacity Ratio	Signalized Intersection	Unsignalized Intersection
				Intersection Delay (Seconds / Vehicle)	Intersection Delay (Seconds / Vehicle)
A		**Free Flow.** Low volumes and little to no delays.	0 - 0.6	0 - 10	0 - 10
B		**Stable Flow.** Speeds restricted by travel conditions, 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 **Figures 3-3**, **3-4**, and **3-5**, respectively.



Future Bridge Traffic Impact Study

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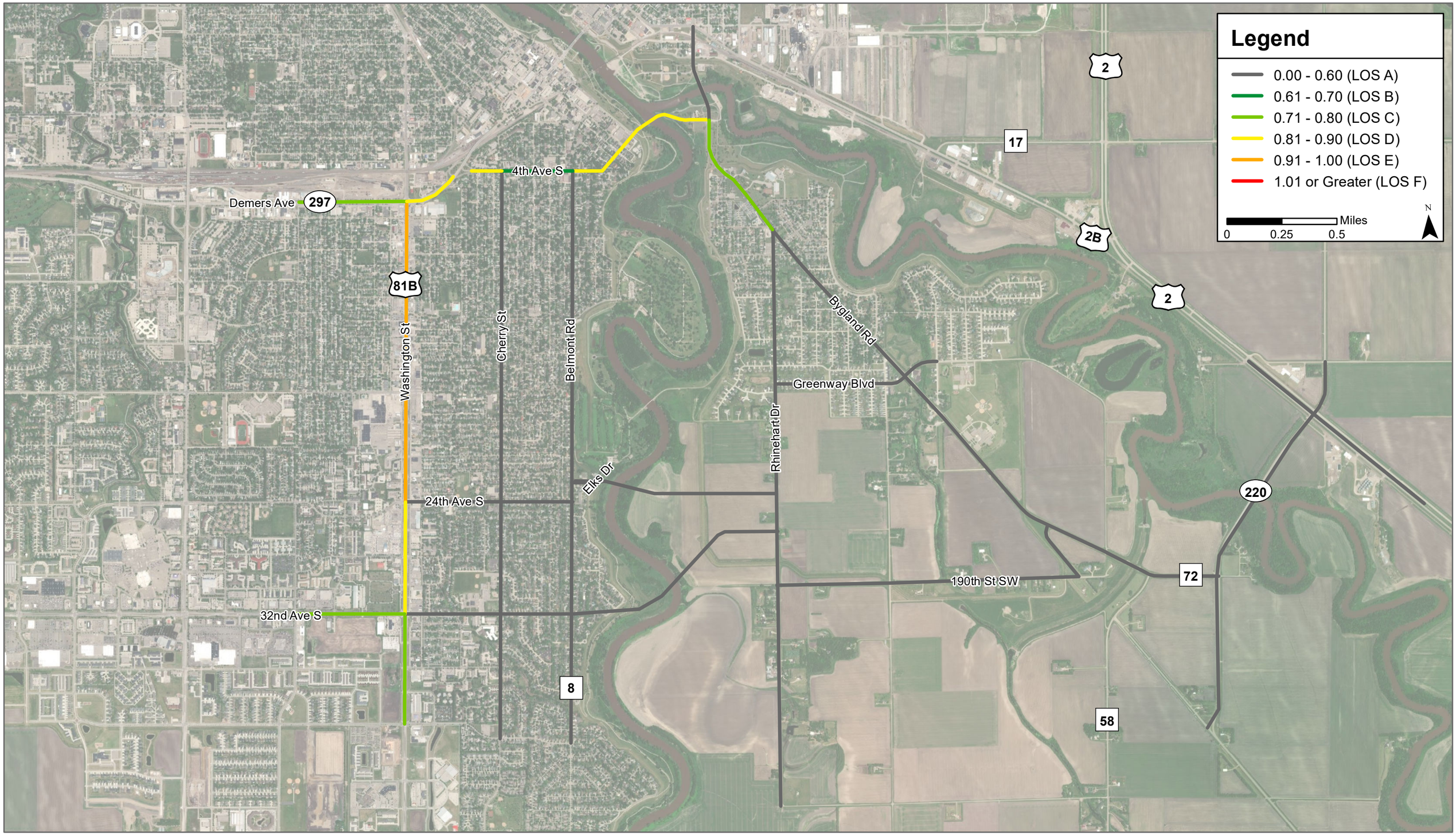
Figure 3-3
2015 Existing Segment Volume/Capacity and Level of Service

Source: ESRI World Imagery Basemap



Future Bridge Traffic Impact Study

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Figure 3-4
2030 No Build Segment Volume/Capacity and Level of Service

Source: ESRI World Imagery Basemap

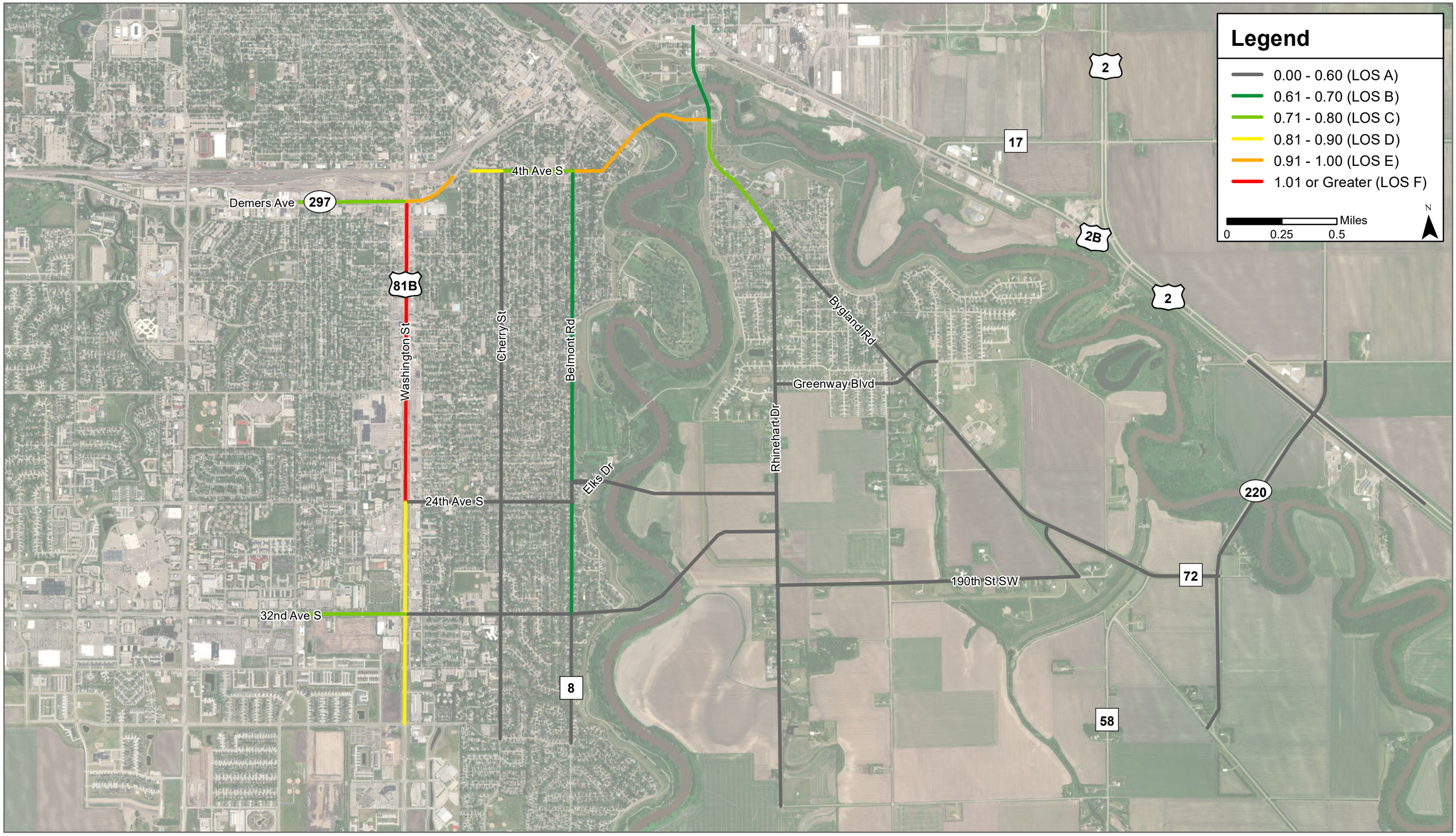

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Figure 3-5
2045 No Build Segment Volume/Capacity and Level of Service

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. The results of the intersection operations analysis will be used along with the segment analysis to identify locations that are anticipated to exceed capacity, and options for improving the intersections to an overall intersection LOS D or better will be provided in Technical Memorandum #3-C for all of the No Build and Build alternatives.

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 3-4**.

Table 3-4 – 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 3-5**.

Table 3-5 – 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 3-6**.

Table 3-6 – 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.