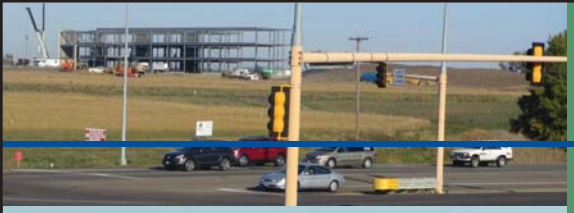
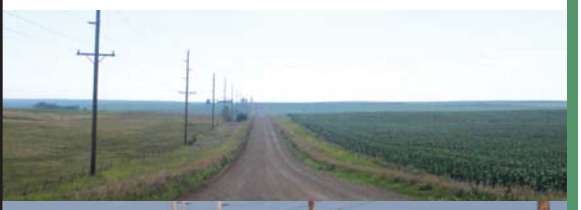


Where the City meets the Country



43RD AVENUE CORRIDOR STUDY

FINAL REPORT

May 2013

An Intermodal Transportation Plan

Study Partners:

Bismarck-Mandan Metropolitan Planning Organization

City of Bismarck

Burleigh County

WSB & Associates, Inc.

HOLLYBECK SURVEYING & ENGINEERING, LLC

43RD AVENUE CORRIDOR STUDY

BUTTE DRIVE TO 80TH STREET

FINAL REPORT

May, 2013

Prepared For:

Bismarck-Mandan Metropolitan Planning Organization

City of Bismarck

Burleigh County

Prepared By:

WSB & Associates, Inc.

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Bismarck City Commission

Mayor John Warford
Commissioner Josh Askvig
Commissioner Parrell Grossman
Commissioner Mike Seminary
Commissioner Brenda Smith

Burleigh County Commission

Chairman Jerry Woodcox
Vice Chairman Jim Peluso
Commissioner Mark Armstrong
Commissioner Brian Bitner
Commissioner Doug Schonert

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Chapter 1
Introduction

The 43rd Avenue Corridor Study was initiated by the Bismarck-Mandan Metropolitan Planning Organization (MPO), the City of Bismarck, and Burleigh County to identify, and evaluate a range of improvements encompassing several modes of transportation (i.e., walking, bicycling, transit, and driving) to accommodate future travel needs within the corridor, which extends from Butte Drive on the west to 80th Street on the east.

To guide the study, a Vision Statement was established to generally define the purpose of the transportation corridor within the community. Provided below is the Vision Statement that was developed by the 43rd Avenue Corridor Project Team (PT), which is comprised of staff from the MPO, the City of Bismarck, Burleigh County, and the North Dakota Department of Transportation (NDDOT).

VISION STATEMENT:

To promote the development of 43rd Avenue as a balanced, multiple mode transportation corridor that connects the city to the country by enhancing travel mobility and safety while supporting orderly and sustainable economic growth throughout the corridor.

The outcome of the study is the identification of an array of alternatives encompassing multiple modes of transportation (walking, bicycling, transit, and driving) that will address travel needs within the corridor through the year 2040. Details that were developed for each of the alternatives included sidewalk and trail placement and characteristics, roadway geometry including layout and grade, access management measures, environmental considerations, and estimated cost.

Driving the need for the project is the incredible growth that has occurred in Bismarck and Burleigh County in recent years. Between the year 2000 and 2012, the U.S. Census has estimated that Burleigh County added over 16,000 people, representing an increase of over 23 percent, and now has a population of over 86,000. Of this growth, more than half occurred in the city of Bismarck or immediately adjacent areas including the 43rd Avenue Corridor. The growth in the corridor is projected to continue with the MPO projecting that the general corridor area will add nearly 30,000 more residents and 23,000 jobs by 2040. This growth essentially drives the purpose and need for improving this

transportation corridor. This report documents the needs that will not be addressed unless the corridor is improved.

Provided below is the purpose and need developed for the study.

Project Purpose:
The Project Purpose is to provide mobility, access management, safety, geometric and other improvements for a multitude of travel users including motorists, pedestrians, bicyclists, and transit users needed to meet existing and future demands in the 43rd Avenue Corridor.

Project Needs include:

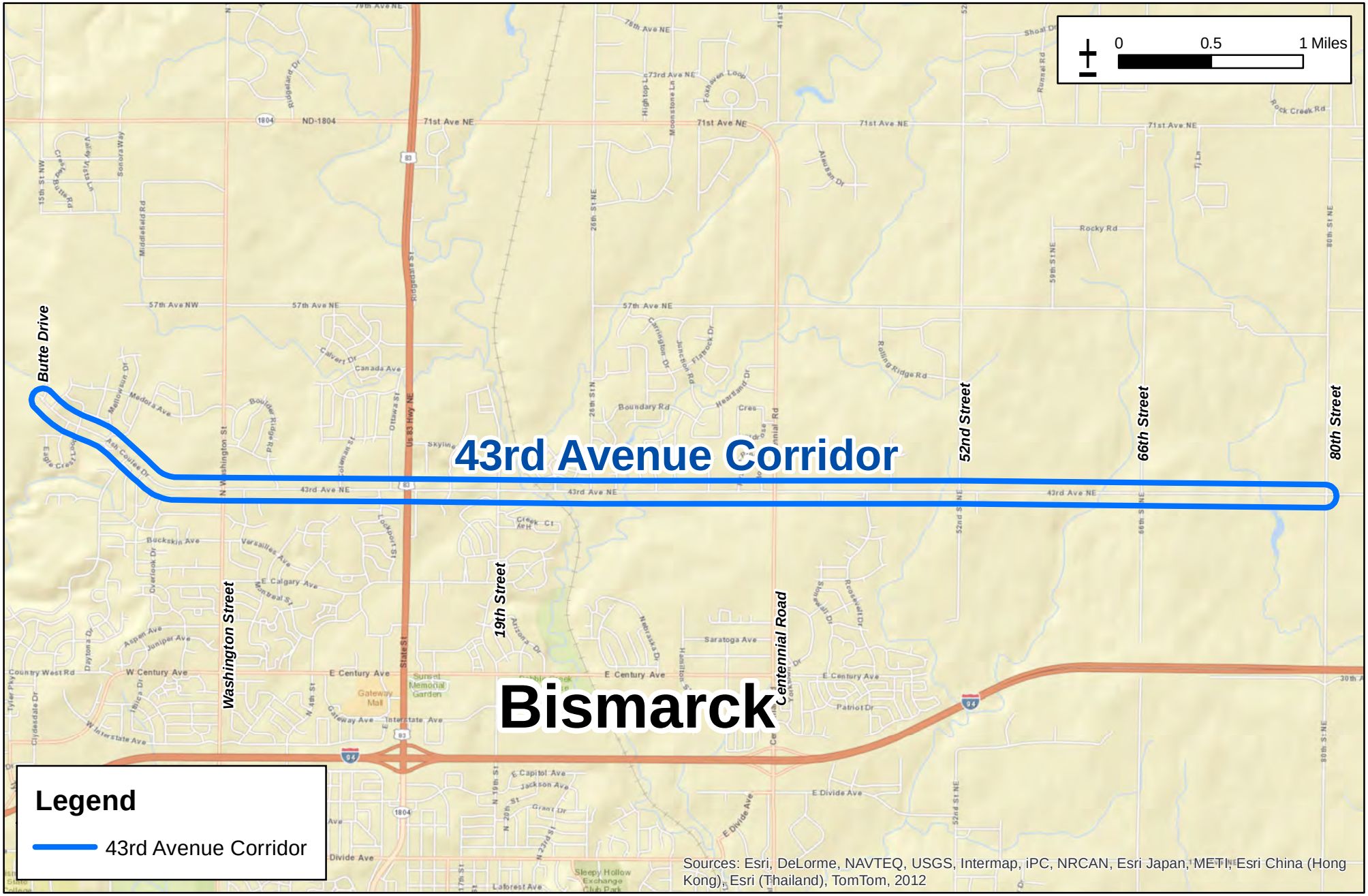
- The corridor lacks adequate roadway width and/or shoulders to provide a safe area for emergency stopping space (police pull-over's, broken down vehicles, etc.) and an area to safety accommodate transit vehicles and bus-stops.
- The steep roadway grade or profile limits sight distance at many locations within the corridor.
- The corridor lacks a continuous separated trail or path to accommodate safe and convenient pedestrian and bicycle travel, which is also desirable for transit service.
- Access along the corridor at many locations is not consistent with the City of Bismarck's Access Management Policies.
- The crash rate for the corridor is nearly three times higher than the North Dakota State Average recorded over the past ten years. Many segments of the corridor exceed the Burleigh County Average for roadways by nearly 40 percent.
- As the area continues to grow, forecasts indicate that traffic on 43rd Avenue will triple to nearly 17,000 vehicles per day by the year 2025 creating unacceptable travel conditions through the corridor.

1.1 Study Area

As mentioned, the 43rd Avenue Corridor study area extends from Butte Drive to 80th Street, which represents a distance of approximately seven miles. West of Washington Street, the roadway is named Ash Coulee Drive. Portions of the corridor lie within the City of Bismarck, Hay Creek Township, and Gibbs Township. Currently, the majority of the land is a mixture of residential and agricultural uses. To the west, the land is more developed while the east contains larger, rural parcels.

In recent years, growth within the corridor has accelerated with several developments either under construction or in the planning stages. Evidence of this growth is the recent decision to construct a new high school within the corridor to accommodate the areas growing population.

Figure 1-1 displays the location of the 43rd Avenue Corridor within the Bismarck – Mandan Metropolitan Planning Organization (MPO) area.



43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Figure 1-1

Project Location Map

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Other modes of transportation include a multi-use trail of approximately one mile that extends from west of Horizon Middle School at Golden Eagle Lane to Washington Street. East of Washington Street all the way to 80th Street, representing a distance of 6 miles, there are neither trails nor sidewalks for accommodating bicyclists and pedestrians. There is limited fixed route transit service with two routes that generally operate as one-way loops between Gateway Mall, located near I-94, and the 43rd Avenue Corridor. On 43rd Avenue these two routes only operate in one direction and do not intersect, limiting travel options for users.

While traffic levels are low and the need for trails and sidewalks and transit service along 43rd Avenue may not be pressing today (2013), projections indicate that growth within the area is going to result in an increased need for travel. To address this projected increase in travel, this study was initiated to establish a plan to identify a range of feasible transportation improvements within the corridor to accommodate motorists, bicyclists, pedestrians, and transit users.

1.2 Report Organization

Chapter 1, Introduction, introduced the project including the Vision Statement and a summary of the Purpose and Need for the improvement project.

Chapter 2, Study Process, provides information on the study process followed to develop the plan including an overview of the public involvement activities conducted over the course of the project.

Chapter 3, Existing Conditions, summarizes the existing conditions within the corridor related to land-use and transportation.

Chapter 4, Future Year Conditions, presents projected conditions for the years 2025 and 2040 and establishes the purpose and need for improving transportation within the 43rd Avenue Corridor.

Chapter 5, Development and Evaluation of Alternatives, identifies potential improvements to address the purpose and need and evaluates them to determine their effectiveness.

Chapter 6, Feasible Alternatives, presents information and characteristics of the potential improvements that were determined to effectively address the purpose and need as described in Chapter 5. Also contained within this chapter is a discussion of potential next steps for advancing improvements within the corridor.

Chapter 2
Study Process

This document reflects the vision and direction of local officials, relevant agencies, stakeholders, and the general public. At the beginning of the study, a Public Involvement Plan (PIP) was developed to describe the process of how and when stakeholders will be included in the project and how information will flow between all persons involved in the project, such as project professionals, government agencies, and the general public. This document, entitled the 43rd Avenue Corridor Study PIP, incorporates the process and ideals identified in the Bismarck – Mandan Public Participation Plan (PPP) developed in 2010, which stresses the importance of participation and involvement of a broad range of interest groups, organizations, governments, and citizens to result in more creative and effective decision-making.

2.1 Study Process

The study process followed in the 43rd Avenue Corridor Study consisted of several tasks necessary for the development of a plan that addressed the identified needs within the corridor. These tasks are listed below:

- Development of Corridor Vision, Goals and Objectives,
- Evaluation of Existing Conditions and Identification of Needs and Deficiencies,
- Evaluation of Future Conditions and Identification of Needs and Deficiencies,
- Development and Evaluation of Potential Improvement Alternatives, and
- Identification of Viable or Feasible Improvement Alternatives that Address the Needs and Deficiencies of the Corridor.

Guiding the study process were key staff from the Bismarck-Mandan MPO, the City of Bismarck, Burleigh County, and the North Dakota Department of Transportation (NDDOT), who together comprised the Project Team (PT). The PT met monthly to review and discuss the project tasks as well as various components of the study such as assumptions and technical analyses, design guidelines, and public outreach efforts. Although not identified as a task in the study process, public outreach is particularly important as public approval or acceptance of the identified recommendations is often critical to achieve project implementation.

To achieve public acceptance of the plan, a proactive public involvement process was undertaken to assure opportunities for the public to be involved in all phases of the process. Throughout the study period, numerous activities were used to maintain a dialogue with the public to allow for the exchange of information to make the plan representative of the community. As mentioned in Chapter 1, the public outreach efforts incorporate the principles within the Bismarck – Mandan Public Participation Plan (PPP).

Provided in the following sections are descriptions of the various public outreach efforts we employed throughout the study.

2.1.1 Project Newsletters

The 43rd Avenue Corridor project newsletter was a four-page information publication that served to inform and update the public on the study. Listed below are the dates of publication and a brief description of the newsletter focus. Each of the five newsletters is contained in **Appendix A – Public Outreach Materials.**

- Issue 1: March, 2012 – The focus of Newsletter No. 1 was to inform the public on the purpose of the study, the project partners, and of the public outreach efforts that would be employed throughout the study, including a project webpage, a Facebook page, and a Twitter account. Also, during the course of the study there were three Open Houses for the public to view and discuss information with project staff.


43rd Avenue Corridor

www.43rdAvenueCorridorStudy.com

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

NEWSLETTER 3 NOVEMBER 2012

KEY MILESTONES

- Data Collection - completed -
- Development of Vision Statement and Goals - completed -
- Existing and Future Conditions Analysis - completed -
- Open House 1 - Held September 20 at Sunrise Elementary School . See website and Facebook page for materials, presentation, and photos
- Development of Alternatives
- Alternatives Analysis
- Open House 2 December 13, 2012 at First Evangelical Free Church (4:30 to 6:30)
- Draft Report Preparation - Winter 2012/13 -
- Open House 3 - Winter 2013 -
- Final Report - Winter 2013 -

Transportation Conditions Displayed at Open House

On September 20, an Open House was held at Sunrise Elementary School on the eastern side of the corridor. Over 100 people attended this event where the goal of the meeting was to provide information on existing and projected 2040 transportation conditions within the 43rd Avenue Corridor. Future traffic projections indicate that trips on 43rd Avenue and the major intersecting north-south roadway will double or triple over existing levels.

At the outset of the meeting (4:30 p.m.) a 20 minute overview presentation was delivered to the attendees. In addition to providing an overview of the project, the presentation delivered a message about how important the public is for determining the future characteristics of the corridor. At the conclusion of the presentation the audience was encouraged to visit with the project personnel to discuss their ideas and concerns.

On hand at the meeting were seventeen information boards on display around the room as well as a 15-foot layout of the corridor that was laid out across tables in the middle of the room. Presented on this layout were three potential roadway designs along the corridor that would address the project's purpose and need related to improving travel mobility and safety. These designs, are presented below:

One Potential Design for segment between Butte Drive and Washington Street

One Potential Design for segment between Washington Street and 66th Street

One Potential Design for segment between 66th Street and 80th Street

at: 43rdAvenueCorridorStudy.com.

Bismarck-Mandan | Bismarck

- Issue 2: October, 2012 – The focus of Newsletter No. 2 was to present the study process including the establishment of a vision statement, and the goals and objectives of the study. Also, this newsletter provided information on existing and projected (Year 2040) transportation needs within the corridor including future traffic congestion levels along 43rd Avenue as well as the major cross-streets.

- Issue 3: November, 2012 – The focus of this newsletter was on the information shown at the first Open House, which included potential improvement measures that would address the projected congestion levels along the corridor. These potential measures included alternative lane geometry within the corridor (i.e., 2-lane, 3-lane, 4-lane divided, 5-lane, etc.) as well as necessary traffic control and intersection geometry to accommodate the increase in traffic. This newsletter was also mailed out to over 1,300 households or property owners in the corridor to inform them of the second Open House.

- Issue 4: February, 2013 – The focus of this newsletter was to advertise the third Open House for the Study and to provide information on topics of inquire we have received over the course of the study, including the choice of forecast years 2025 and 2040, population and employment growth projections, timing of improvements, accommodations for non-motorists, and potential property right-of-way requirements for the long-term or 2040 corridor design.

- Issue 5: March, 2013 – The focus of this newsletter was information on the identified feasible transportation improvements and the next steps for project advancement.

2.1.2 Project Website

The 43rd Avenue Corridor project website (43rdavenuecorridorstudy.com) contained information on the project, including project documents and design layouts, open house information including display boards and event summaries, newsletters, and videos. Also, the website allowed for people to post comments or questions, as well as to sign-up to receive the project newsletter electronically. Over the course of the one-year study, the website had over 5,000 visits from over 1,500 different visitors. Using Google Analytics to track website usage, it was found that the average visitor spent over six minutes on the site and visited an average of 3.3 pages or website tabs.

The primary website pages or tabs included:

- Project Background
- Schedule
- Public Involvement/Media Releases
- Open House Information
- Newsletters
- Public Comment
- Reports / Documents
- Project Maps / Layouts
- Videos / Images

2.1.3 Project Twitter Account

The Twitter account (@43avestudy) was used to tweet out information about upcoming events such as Open Houses.

2.1.4 Project Facebook Page

The Facebook page for the project was very effective at both providing information on the project, similar to the website, but also for the exchange of information with the public. In particular, the Facebook page was very effective in generating a dialogue with the public for the identification of areas of concern (geographic locations) and categories of concern (traffic control, bicycling, safety, etc.). Over the course of the one-year study, over 100 people regularly checked the site for project information.

2.1.5 Open Houses

Three Public Open houses were held during the one-year study. In general, each of the Open Houses was advertised in the Bismarck Tribune (2" x 12" ad), the project website and Facebook pages, and through direct mailings of either postcards or newsletters to over 1,300 corridor households or property owners.

At the beginning of the Open House a 20 minute presentation was given followed by an informal break-out session where people could meet informally with project staff to talk about the project. At the final Open House a question and answer session followed the presentation.

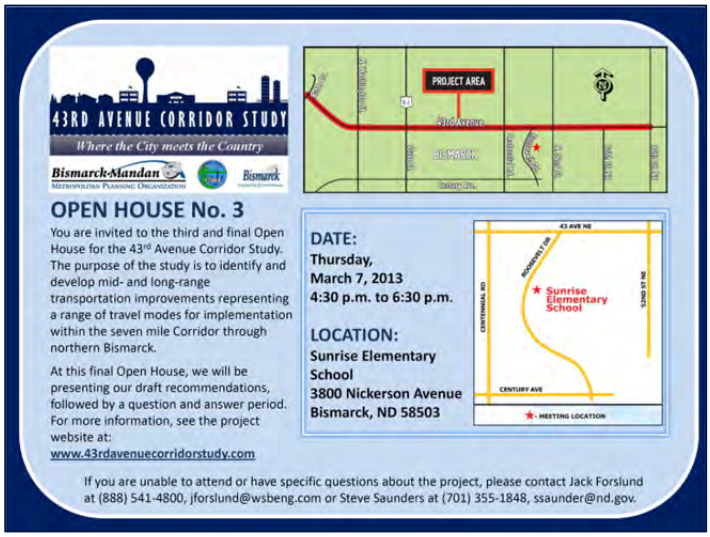
Listed below are the dates of the open house as well as a brief description of each. **Appendix A –** contains summaries for each of the open houses.

Public Open House No. 1 – September 20, 2012 (4:30 – 6:30 p.m.) at Sunrise Elementary School: At this Open House, there were nearly 20 graphic display set up around the room with information on a range of project topics, such as project purpose, existing conditions, projected population and employment growth within corridor and how it will affect travel, future congestion levels, and potential corridor designs and how they address the projected transportation needs. Over 100 people attended the first open house.

Public Open House No. 2 – December 13, 2012 (4:30 to 6:30 p.m.) at First Evangelical Free Church: As the first open house was held on the eastern portion of the corridor, it was decided to hold the second one on the western portion. Similar to the first open house, this one consisted of the display of numerous informational boards as well as a half-hour presentation at the beginning of the meeting. In addition to the informational boards and layouts shown at first open house, this event featured an access assessment of the existing roadway to identify potential areas where access consolidation measures should be considered. Also, a fly-

over video of the corridor was on display that showed the topographical challenges of the corridor, which impact travel by limiting sight-distance in many locations for motorists entering or leaving the roadway. In addition to motorist considerations, this open house contained information on potential measures to for accommodating the needs of pedestrians, transit users, and bicyclists.

Public Open House No. 3 – March 7, 2013 (4:30 – 6:30 p.m.) at Sunrise Elementary School. The third and final Open House was held to present the findings or improvement recommendations to address future travel needs within the 43rd Avenue Corridor. Provided at the meeting for review by the participants were fourteen large layout plots showing an alternative that would address the needs of motorists, pedestrians, transit users, and bicyclists. At this event, a presentation started the meeting followed by a question and answer period.



2.1.6 Development of Corridor Goals

The following is a list of previous study efforts related to the 43rd Avenue corridor area that were reviewed to assist in the development of a vision statement and goals for the project. The reviewed studies include:

- 2010 - 2035 Long Range Transportation Plan (LRTP)
- Northwest Subarea Study
- US Highway 83 Corridor Study
- 71st Avenue - Centennial Road Corridor Study
- Bismarck-Mandan Transit Development Plan
- Regional Land Use Study
- Regional North-South Beltway Corridor Study
- Northern Bridge Corridor Study
- North Dakota 2009 - 2011 Crash Summary

The vision statement and goals are used for guidance in the evaluation and identification of feasible transportation improvements representing multiple modes of travel. The vision statement identified for the study defines the general direction of the transportation corridor and frames the development for the study goals. As identified in Chapter 1, the Vision Statement for the project is: "To promote the development of 43rd Avenue as a balanced, multiple mode transportation corridor that connects the city to the country by enhancing travel mobility and safety while supporting orderly and sustainable economic growth throughout the corridor. "

Goals are very general and are used to influence the identification and implementation of feasible transportation strategies and improvements. Presented below are the six goals that were developed to guide the study and assist in evaluating the transportation improvement alternatives.

Goal A – Alternative Modes of Transportation
Key Objective: Develop a transportation system that promotes the use of alternative modes of transportation including bicycling, walking, and transit.

Goal B – Travel Safety for All Users
Key Objective: Promote travel safety within the 43rd Avenue corridor area for all users by incorporating good design strategies to improve safety for motorists, bicyclists, pedestrians, and transit users. This also applies to school access locations along the corridor.

Goal C – Mobility
Key Objective: Promote a high level of mobility throughout the 43rd Avenue corridor area by developing needed capacity improvements to the roadway system that also incorporate established access spacing guidelines.

Goal D – Economic Benefits
Key Objective: Support transportation improvement projects that promote economic prosperity in the corridor by encouraging orderly growth and improved access to employment, housing, shopping, and recreational destinations.

Goal E – Environmental Considerations
Key Objective: Support transportation improvements that avoid or minimize potential impacts on the natural and man-made environment.

Goal F – Project Cost
Key Objective: Development of cost-conscious improvements (right-sizing) that foster jurisdictional cooperation in pursuing funding.

While each of the goals is important, it was desired to establish their relative importance. To ascertain this, an exercise to "weight" the goals was conducted with area decision-makers consisting of representatives from the City of Bismarck (3 members), the Bismarck-Mandan MPO (2 members), Burleigh County (2 members), NDDOT (1 member), and Hay Creek (1 member). These representatives completed a questionnaire or survey that quantified the relative importance of each goal or objective to one another. Representing the goals and objectives are criteria or measures-of-effectiveness (MOEs) that will assist in the evaluation process. For each MOE, the survey participants were asked to circle the number that indicates their relative importance to one another with 10 representing the highest level of importance.

Table 2-1 presents the weighting factor survey that was completed by the participants and **Figure 2-1** presents the results. As can be seen the most important goal as determined by the group was Travel Safety for all Users (9.4) and second highest was Mobility and Accessibility (7.6). Project Cost, which typically rates fairly high, scored third highest with 6.4 out of 10 possible points. In the development and subsequent evaluation of improvement alternatives, these criteria will carry the greatest weight in identifying the preferred alternatives.

Table 2-1. Goal Weighting Survey

Goal / Criteria	Relative Weight ← Less Important					More Important →				
A. Alternate Modes of Transportation	1	2	3	4	5	6	7	8	9	10
B. Travel Safety for All Users	1	2	3	4	5	6	7	8	9	10
C. Mobility	1	2	3	4	5	6	7	8	9	10
D. Economic Benefits	1	2	3	4	5	6	7	8	9	10
E. Environmental Considerations	1	2	3	4	5	6	7	8	9	10
F. Project Cost	1	2	3	4	5	6	7	8	9	10

Source: WSB & Associates

Figure 2-1. Weighting Survey Results

Scoring Process

Rating System for identifying how well an Alternative addresses each of the Goals:

Value - Effectiveness

1 – Very Poor
2 – Poor
3 – Fair
4 – Fair/Good
5 – Good
6 – Very Good

The process used in the evaluation of transportation alternatives involved the development of a series of matrices for each of the user types; motorists, pedestrians and transit users, and bicyclists. For each of these matrices, the various alternative measures is assigned a value from one to six based on how well they satisfy or address the primary objective for the goal. A value of 6 meant the alternative was very good, while a value of 1 meant it was very poor at addressing the goal.

Because it is difficult to obtain quantitative measurements for many of the goals, the decision was to use professional engineering and planning judgment in determining whether an alternative should receive a score of 1, 6, or somewhere in between the two.

Presented in this section are hypothetical examples of the matrices that will be developed to address the alternative transportation improvements for each of the travel user categories.

For motorists, there are two matrices. One is for roadway sections (number of lanes, shoulder, drainage type, etc.) which is broken out for individual geographic segments of the corridor (defined later in the report), and one is for intersections, which is broken out for the primary north-south travel routes across the corridor (i.e., Washington Street, US 83, Centennial Road, 66th Street), plus a hypothetical cross-street that would represent many of the secondary north-south roadways within the corridor.

The scores below represent the values based on how well it was determined to address each of the six goals. In the case of this hypothetical example matrix, two of the alternatives were eliminated from consideration as they each contained fatal flaws. In the case of Alternative 2, it would not provide the capacity required for the projected traffic volumes. For the alternative on the right column, it was eliminated as it did not adhere to city guidelines or standards. An example would be that type of roadway section represented in this alternative may contain drainage, which would not be considered in many of the more urban segments of the corridor where the type of drainage would be curb and gutter.

TRAVEL USER TYPE: Motorists — ***Example Matrix***	UNWEIGHTED SCORES Segment 1: Roadway Section Alternatives			
GOAL / OBJECTIVE	Alternative 1	Alternative 2	Alternative 3	..cont'd.
A. Promote use of Alternate Modes of Transportation	2	Fatal Flaw - Does not address Capacity Requirements	6	Fatal Flaw - Does not adhere to City Guidelines
B. Improve Travel Safety	4		3	
C. Improve Travel Mobility	6		3	
D. Promote Economic Benefits	4		4	
E. Promote Environmental Stewardship	1		3	
F. Promote right-sizing (project scale and cost)	6		4	
RAW (unweighted) SCORE	23	NA	23	NA

A Fatal Flaw is a characteristic of an alternative that removes it from further consideration or analysis. Potential Fatal Flaws could be that either an alternative doesn't address any of the identified Needs for the Action (I.e., "Does not address roadway Capacity Requirements") or that it possesses a characteristics that would prohibit it from being implemented (I.e., "Does not adhere to City Guidelines")

After the raw scores are calculated, they are then adjusted based on the weighting factors generated from the survey of area decision-makers. From this matrix, alternatives are identified that address the needs for the project that best reflect the values or priorities of the community. In this hypothetical example, you can see the impact of the weighing factors when applied to the raw scores. Without the weighting factor Alternatives 1 and 3 both received scores of 23. When applying the weighting factor as shown in the matrix below, Alternative 1 receives a higher score. The idea is that the weighting factors offer a way to provide local input on the relative importance of the goals.

TRAVEL USER TYPE: *Example Matrix*	WEIGHTED SCORES			
Motorists	Segment 1: Roadway Section Alternatives			
GOAL / OBJECTIVE	Alternative 1	Alternative 2	Alternative 3	..cont'd.
A. Promote use of Alternate Modes of Transportation	12	Fatal Flaw - Does not address Capacity Requirements	37	Fatal Flaw - Does not adhere to City Guidelines
B. Improve Travel Safety	38		28	
C. Improve Travel Mobility	46		23	
D. Promote Economic Benefits	25		25	
E. Promote Environmental Stewardship	6		19	
F. Promote right-sizing (project scale and cost)	40		26	
WEIGHTED SCORE	167	NA	158	NA

A matrix such as the hypothetical example above will be prepared for each of eleven identified geographic corridor segments to assist in identifying a set of feasible alternatives for roadway sections.

In addition to roadway section designs, matrices are also developed to assist in identifying feasible improvements for intersections, pedestrians and transit users, and bicyclists. The goals and associated weights for each of these matrices are the same as those shown in the above matrices.

Major Intersections

TRAVEL USER TYPE:	WEIGHTED SCORES				
Motorists	Intersection 1: Washington Street -- Alternatives				
GOAL / OBJECTIVE	Alternative 1	Alternative 2	Alternative 3	Alternative 4	. . . Cont'd

Minor Intersections

TRAVEL USER TYPE:	WEIGHTED SCORES				
Motorists	Sidestreet Intersection with under 5,000 vehicles per day -- Alternatives				
GOAL / OBJECTIVE	Alternative 1	Alternative 2	Alternative 3	Alternative 4	. . . Cont'd

Pedestrian and Transit User Accommodations

TRAVEL USER TYPE:	WEIGHTED SCORES				
Pedestrians and Transit Users	Improvement Alternatives				
GOAL / OBJECTIVE	Alternative 1	Alternative 2	Alternative 3	Alternative 4	. . . Cont'd

Bicyclist Accommodations

TRAVEL USER TYPE:	WEIGHTED SCORES				
Travel User Type: Bicyclists	Improvement Alternatives				
GOAL / OBJECTIVE	Alternative 1	Alternative 2	Alternative 3	Alternative 4	. . . Cont'd

Chapter 3
Existing Conditions

This chapter summarizes the existing conditions within the 43rd Avenue corridor area including population and employment, land-use, and transportation facilities including transit, pedestrian/bicycle facilities, and the roadway system. Included within the summary of the roadway system will be an evaluation of the travel mobility, access, and safety.

3.1 Land-use and Development

The 43rd Avenue Corridor is located in one of the fastest growing sections of the Bismarck-Mandan Metropolitan area. Over the past ten years the area has experienced significant growth going from a largely rural area to a residential area that is expanding northward. **Figure 3-1** shows the historical growth within the corridor area from 1997 to 2013.

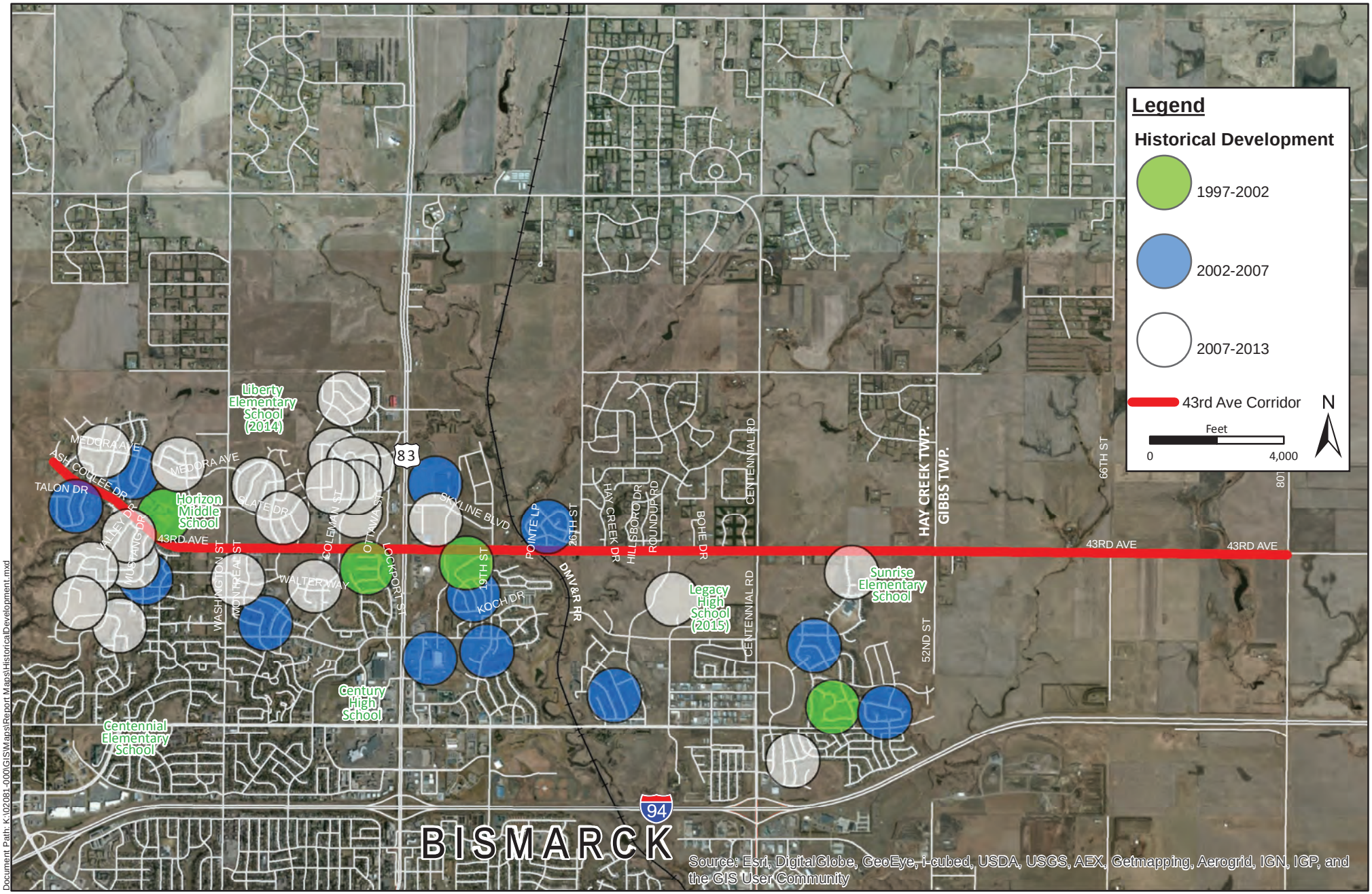
Areas within the city of Bismarck are categorized according to eight general land-use types, including Residential, Open Space, Commercial, Mixed-use, Office, Institutional, Industrial, and Undeveloped. Currently approximately half of the corridor is within the City of Bismarck with the remainder located in Hay Creek Township and Gibbs Township. Provided in the following section are general descriptions of these land-use types, followed by **Figure 3-2**, which shows the current or existing land-use within the corridor.

Residential

The category "Residential" land-use includes a range of home types from low-density detached homes to higher density apartment complexes. Currently the majority of the developed land within the 43rd Avenue Corridor is single-family detached housing residential with some areas of higher density or multifamily apartment complexes, primarily near the 43rd Avenue intersections with Washington Street and with US 83.

Open Space

Open space incorporates a wide range of uses including conservation areas and corridors, streams, rivers, and wetlands, as well as traditional park or recreational facilities such as ball fields, golf courses, trails and bikeways. The 43rd Avenue Corridor is well represented with each of these types of Open Space.



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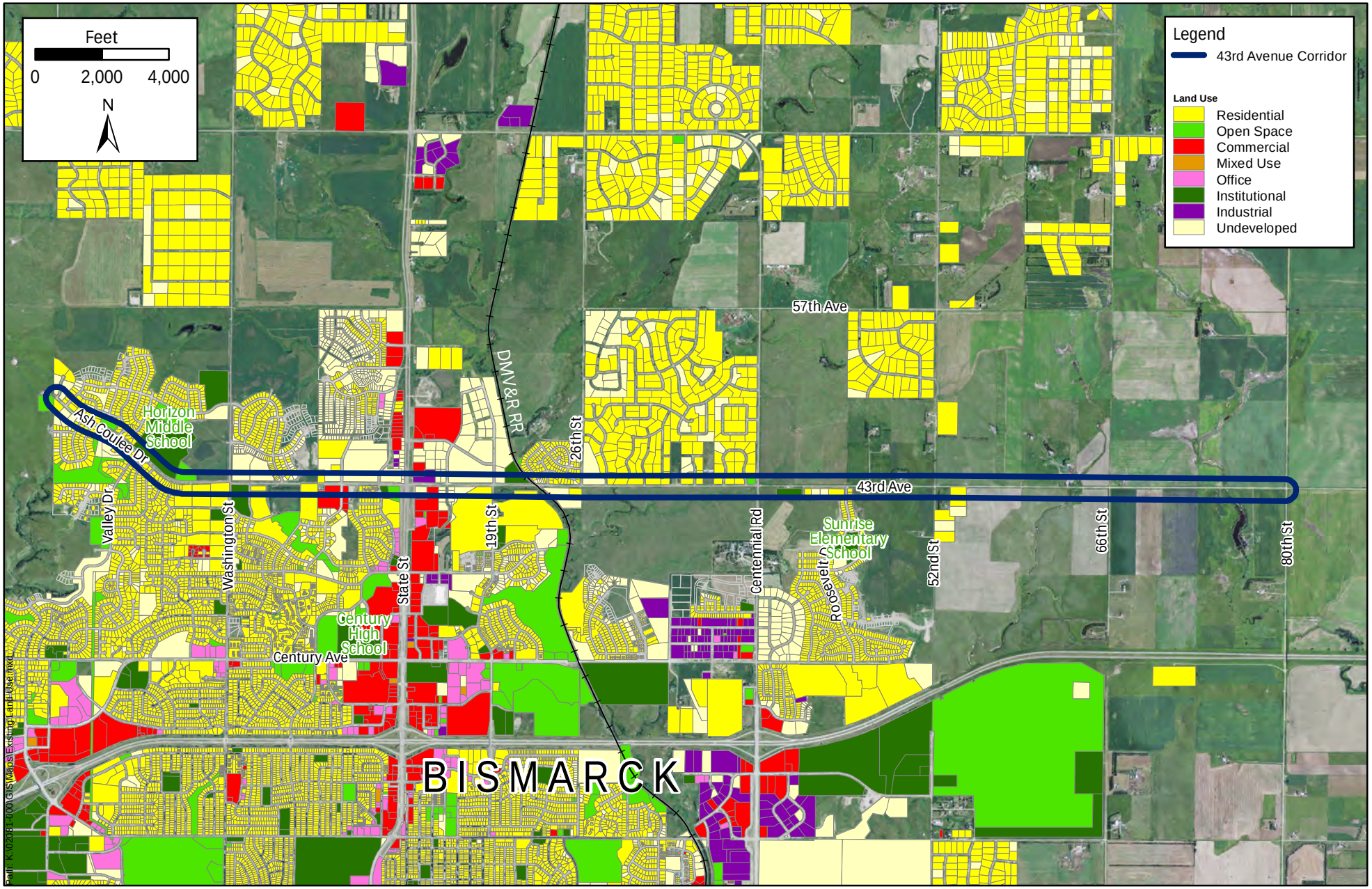
43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 3-1

Historical Growth Along Corridor: 1997-2013

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK



Aerial Date: 2009

SOURCE: City of Bismarck and Bismarck - Mandan MPO

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Figure 3-2

Existing Land Use Map

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Commercial

Commercial land-use use includes retail and service activities, sometimes in combination with offices. Within the 43rd Avenue Corridor most of the commercial activity is located near the intersection of US 83, which is the primary retail corridor in Bismarck. As the population in northern Bismarck and adjacent areas has grown, commercial development has followed the growth. In 2005 a Wal-Mart Supercenter opened on US 83 one-quarter mile north of 43rd Avenue. This has been followed by the opening of other commercial businesses in the area including banks, hotels, restaurants, and other retail stores.

Mixed-Use

Mixed-Use generally refers to a range of vertically-integrated uses (such as residential above ground-floor commercial or office use, commercial and office use, and office with light industrial use) and/or horizontally integrated mixed uses, such as a variety of uses within a block. Within the 43rd Avenue Corridor there currently is not much development that can be characterized as mixed-use. However, there has been interest in developing mixed-use projects in the area. One such development is a proposed office and residential building for the northeast quadrant of US 83 and 43rd Avenue.

Office

Office includes buildings utilized primarily for office purposes, including medical and government offices. Within the corridor there are not very many existing office buildings, outside of the area near Highway 83, which is zoned for office and commercial use. Over the past few years, this area has seen the development of new office buildings.

Institutional

This use includes public and private schools, places of worship, hospital, recreation centers, police stations, and fire stations. Within the Corridor, there are several institutional uses including churches, recreational centers, and two existing public schools with a third soon to be under construction. The existing schools include Horizon Middle School located on the western end of the corridor at 500 Ash Coulee Drive and Sunrise Elementary School located on the western half of the corridor at south of 43rd Avenue off of Roosevelt Drive. Soon, the new Legacy High School will be constructed approximately one-half mile west of Sunrise Elementary off of Nebraska Drive near the center of the corridor study area. Also, the new Burleigh County Highway Department Garage and Shop is being constructed on the northeast quadrant of the intersection of 43rd Avenue and 80th Street on the eastern end of the corridor.

Industrial

This use includes manufacturing, product assembly, wholesaling and warehousing/shipping activities. Within the Corridor there are no industrial uses directly on 43rd Avenue. There is a storage facility located on the northeast quadrant of the intersection with US 83.

3.2 Environmental Considerations

While the 43rd Avenue Corridor Study is not a National Environmental Policy Act (NEPA) document, and therefore does not require an extensive environmental review process, it is valuable to conduct a screening to identify potential considerations, particularly if Federal funding for an improvement is solicited in the future. Regardless, it is important to identify potential environmental considerations to obtain an understanding of the corridor, which will assist in the development and evaluation of

improvement alternatives. The corridor was reviewed for the following natural or man-made environmental features:

- Floodplains,
- Wetlands,
- Threatened and Endangered Species,
- Historical / Cultural Resources,
- Existing Right-of-way,
- Topography
- Utilities, and
- Environmental Justice (EJ) areas

Provided below is an overview of these features as well as a findings on whether they are present within the corridor.

Floodplains

A floodplain is an area of land adjacent to a stream or river that stretches from the banks of its channel to the base of the enclosing valley walls and experiences flooding during periods of high discharge. It includes the floodway, which consists of the stream channel and adjacent areas that actively carry flood flows downstream, and the flood fringe, which are areas inundated by the flood, but which do not experience a strong current. In other words, a floodplain is an area near a river or a stream which floods when the water level reaches flood stage. In North Dakota, floodplain management is authorized by the North Dakota Floodplain Management Act of 1981, as amended in 1999 and 2003.

At the Federal Level, Executive Order 11988 requires the federal agencies to avoid to the extent possible long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. EO 11988 applies to Federally-funded projects and directs agencies to consider alternatives to siting in a floodplain. EO 11988 also requires that federal agencies proposing to site an action in a 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If no practicable alternatives exist to constructing a facility in the floodplain, the action must be designed to minimize potential harm to or within the floodplain.

Within the corridor area, there is a relatively narrow band of floodplains generally following Hay Creek extending from west of 19th Street on the west to east of Point Loop on the east. It is likely that any expansion of the roadway through this area would impact some floodplain areas.

Wetlands

A wetland is a land area that is saturated with water, either permanently or seasonally. Primarily, the factor that distinguishes wetlands from other land forms or water bodies is the characteristic vegetation that is adapted to its unique soil conditions: Wetlands consist primarily of hydric soil, which supports aquatic plants. Wetlands are a protected biological resource and are subject to several laws that regulate activities within wetland areas. In North Dakota, wetlands are regulated primarily through the Section 401 water quality certification under the Clean Water Act (CWA). Section 404 of the Clean Water Act, at the federal level, is implemented by the U.S. Army Corps of Engineers and requires applicants to document avoidance and minimization of impacts prior to approving a permit to mitigate impacts.

Within the 43rd Avenue Corridor there are some wetlands generally adjacent to Hay Creek between 19th and 26th Streets that may be impacted with if the roadway/corridor is widened. There are also some wetland areas located between 66th and 80th Streets. However, the initial review indicates that these wetland areas (between 66th and 80th Streets) are located further away from the roadway and therefore less likely to be impacted by expansion of the roadway.

Threatened and Endangered Species

Threatened and endangered species are protected by the Threatened and Endangered Species Act of 1973. A search of the U.S. Fish and Wildlife database revealed that there are four species listed as threatened or endangered in Burleigh County as verified by the North Dakota Ecological Services Field Office. These include:

- Interior Least Tern (Sternula antillarum) – Endangered: These birds are slightly larger than piping plovers, but occupy generally the same habitat, sparsely vegetated sandbars along the Missouri River.

- Piping Plover (Charadrius melodus) – Threatened: These are small birds that use sand and gravel shorelines lacking vegetation along lakes and rivers including the Missouri River and prairie wetlands. The nesting and fledging periods for the piping plover are from late April to August. Piping plovers forage for invertebrates on exposed beach substrates.

- Whooping crane (Grus Americana) – Endangered: These are the tallest birds in North America standing 5 feet tall with a 7-foot wingspan. The historical breeding range of this bird included North Dakota. Presently, there are about 145 whooping cranes in the wild, and the migrating birds may be observed in North Dakota during the spring and fall. Whooping cranes use shallow wetlands but may also be found in upland areas, especially during migration.

- Pallid Sturgeon (Scaphirhynchus albus) - Endangered: These are one of the largest fish found in the Missouri River, with a known habitat in the Missouri River from Montana to St. Louis. No natural Pallid Sturgeon reproduction has been documented in North Dakota in more than a decade.

All of the above listed species live in habitats of streams, rivers, lakes, and wetlands. Additional analysis would need to be conducted to determine whether they are located within the corridor.

In addition to threatened or endangered species, there is also evidence that this area is the habitat for Spragues Pipit (Anthus sprageuii), which is a candidate species meaning that it has been proposed for listing as a threatened or endangered species. Provided below is information on the Spragues Pipit (Anthus sprageuii):

- Spragues Pipit (Anthus sprageuii) - Candidate: These are short distance migrant birds that move between their breeding grounds in the northern prairies of the United States and Canada to the wintering grounds in the southern United States and Mexico. The Sprague's Pipit is sensitive to fragmentation and conversion of grassland habitat. They prefer relatively large prairie patches a minimum of approximately 72 acres, with larger patches of at least 360 acres preferred. The first Sprague Pipit was documented in Fort Union, ND in 1843.

Historical / Cultural Resources

If a property is on the National Register of Historic Places is protected through Section 106 of the National Historic Preservation Act (NHPA). In order for a property to be eligible for NRHP listing, it must have a high degree of physical integrity (i.e. well preserved) and meet at least one of four significance criteria. For construction projects using federal funds, impacts to these properties must be considered for mitigation. Upon additional project development activities in the future, there should be coordination with the State Historic Preservation Officer (SHPO), particularly if federal funding is involved.

Right-of-way

Right-of-way (ROW), while being different from the other environmental considerations, is an important consideration with respect to property impacts. Currently within the corridor, the publically owned right-of-way ranges from 66 feet to 150 feet. Long-term, it is envisioned that a reconstructed 43rd Avenue would be located within a (ROW) of 120 feet in the more developed areas and 150 feet through more rural areas. Within the ROW would be all the roadway, boulevards, trails/sidewalks, clear zones, lighting, and landscaping. In reviewing the existing publicly owned ROW, it was calculated that nearly 94 percent (6.65 miles) of the corridor having at least 100 feet of ROW.

In areas where additional ROW or property easements are needed, the roadway owner (City of Bismarck or Burleigh County) would work with the property owner to achieve a mutually agreeable solution. It is important to bear in mind that while a 120 or 150-foot corridor is desired, it may not always be feasible and when this is the case there can often be design modifications to allow the roadway and associated attributes such as shoulders, boulevard, trails, etc., to fit within a narrower corridor.

Topography

Topography through the corridor is very hilly with areas where the roadway profile exceeds 7 percent. Also, in some areas, such as east of US 83 there is a steep side-slope beyond the roadway. While the hilly topography doesn't necessarily represent an environmental issue, it does present challenges upon planning and designing a new multi-modal transportation corridor, particularly for stopping sight-distance. Currently the roadway profile impacts sight-distance at several locations within the corridor.

With any substantial reconstruction of the roadway the roadway profile should be adjusted to provide sufficient sight distance for a driver to either stop or take evasive action to avoid having to abruptly stop. In the development of a final corridor profile, it is expected that the final design will avoid, minimize, or impact for any adverse impacts.

Utilities

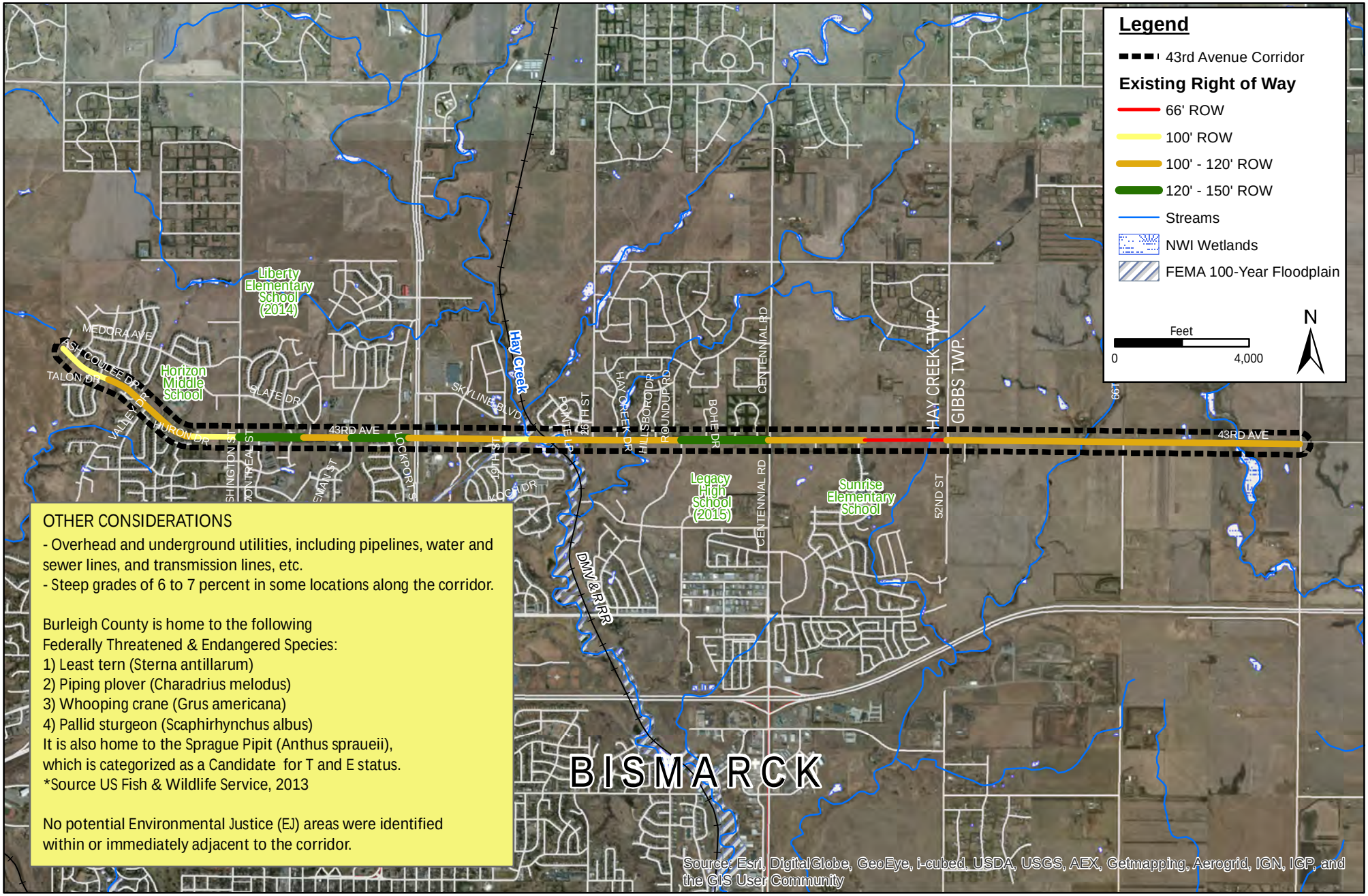
At this level of project development utility considerations are not of primary concern as decisions involving utilities are typically made during the final design stage of a project. However, it is noted that there are utilities within the corridor, including underground pipelines, electrical substations and overhead transmission lines that cross and/or parallel of the corridor, often within the allotted ROW desired for the corridor.

3.2.1 Environmental Justice (EJ) areas

An area that has been determined to have a substantially lower income or higher minority population than the project area as a whole is protected by Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations (February 11, 1994). This

Order protects these areas, referred to as Environmental Justice (EJ) areas, from shouldering disproportionately high impacts for construction projects involving federal funding. Although no federal funding is currently allotted for the reconstruction of 43rd Avenue, a preliminary review was conducted to determine if there are potential EJ areas within the corridor. In a cursory review, no EJ areas were identified immediately adjacent to the corridor.

Figure 3-3 identifies the environmental considerations within the corridor.



43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 3-3

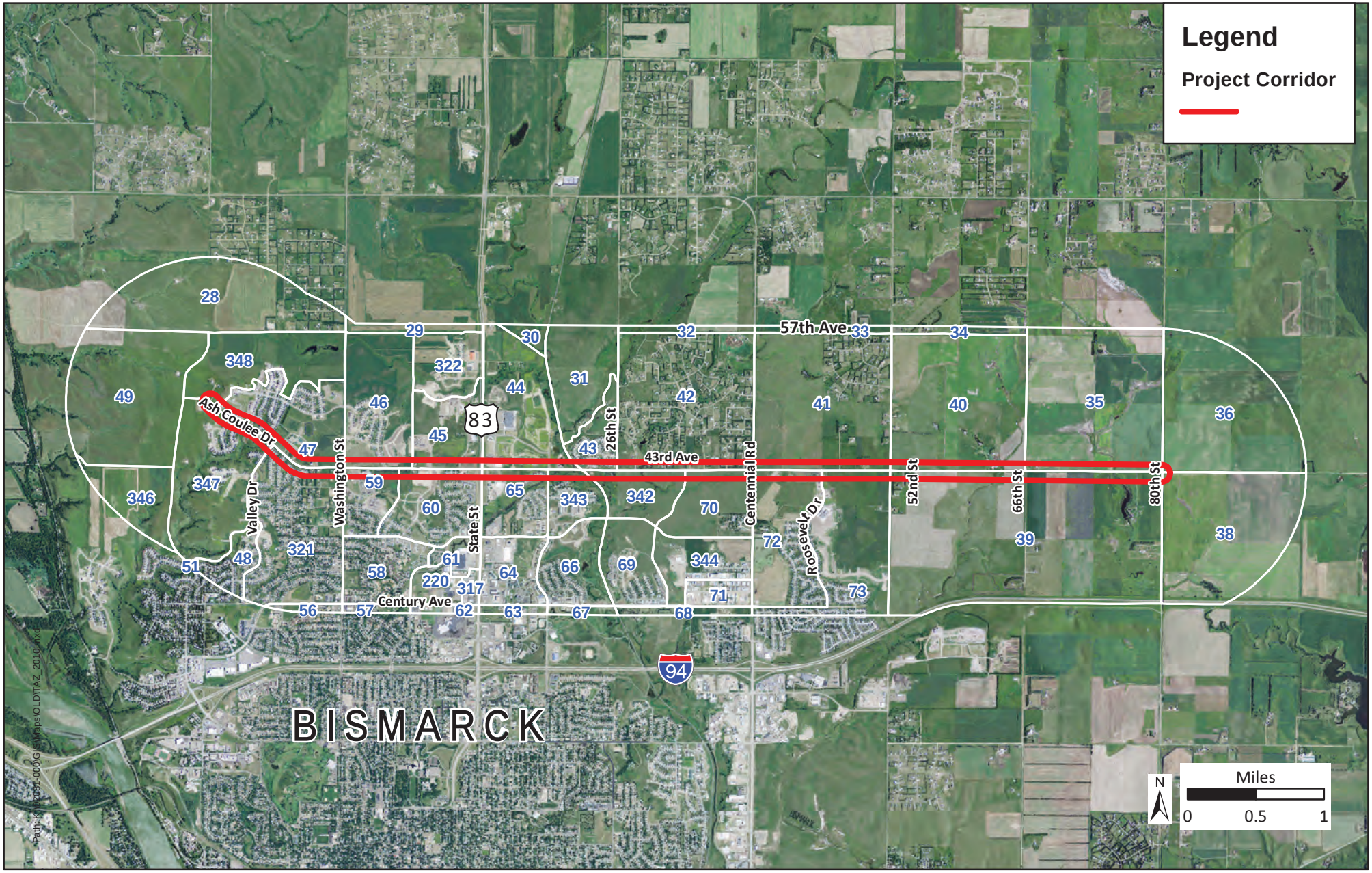
Environmental Considerations

3.3 Population and Employment

Every ten years the U.S. Census Bureau goes through a process of counting the population of everyone in the United States, where they also collect a variety of other data that helps to define the characteristics of an area. In the last census, 2010, data collected for the census tracts comprising the 43rd Avenue Corridor provides a snapshot of the residents of the area. In addition to census tracts, the area is also sub-divided as a geographic unit called a Traffic Analysis Zone (TAZ). A TAZ is generally a subset within a census tract. The intent of the TAZ is to organize data so that it can be used to assist in the application of travel demand models, which are used to project future traffic in area given the travel characteristics of the population and the options for travel, which include personal motorized vehicles, transit, and walking and bicycling. Within the entire Bismarck – Mandan MPO Model area, there are over 300 TAZs for representing the population, employment, and land use characteristics. Chapter 4 – Future Year Conditions will provide more information on TAZs and how they are used to project transportation needs. The purpose of introducing the TAZ in this chapter is to provide information on the population and employment characteristics of area, which will be used as a benchmark in comparing the projected future growth of the area.

Of the over 300 TAZs making up the 430 square-mile MPO model areas, approximately 35 are primarily located within a one mile radius of the corridor and represent approximately 18 square-miles. This area can generally be defined as the 43rd Avenue travel shed, which is a term used to define an area served by a transportation corridor. While this area only represents about 4 percent of the MPO area, it is home to nearly 17,000 people (15.6% of MPO total) and contains approximately 6,000 jobs (9.4% of MPO total). As this area represents the fastest growing area of the Bismarck-Mandan MPO area, it is projected that the percentage of the area total for both population and employment will increase, and with it the number of person-trips within the corridor.

In addition to these TAZs there are those that are located well beyond this one-mile radius that are also important in terms of their impact on travel through or within the corridor, but are a secondary concern with respect to identifying the transportation needs of those living or working within the corridor. Shown in **Figure 3-4** are the TAZs generally within the 43rd Avenue Corridor Area. **Table 3-1** displays the population and the employment information for the TAZs identified as comprising the primary travel shed of the corridor and **Figure 3-5** displays the population and employment distribution for 2010.



Aerial Date: 2009

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Figure 3-4

Corridor Area TAZs

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Table 3-1. 2010 Population and Employment by TAZ

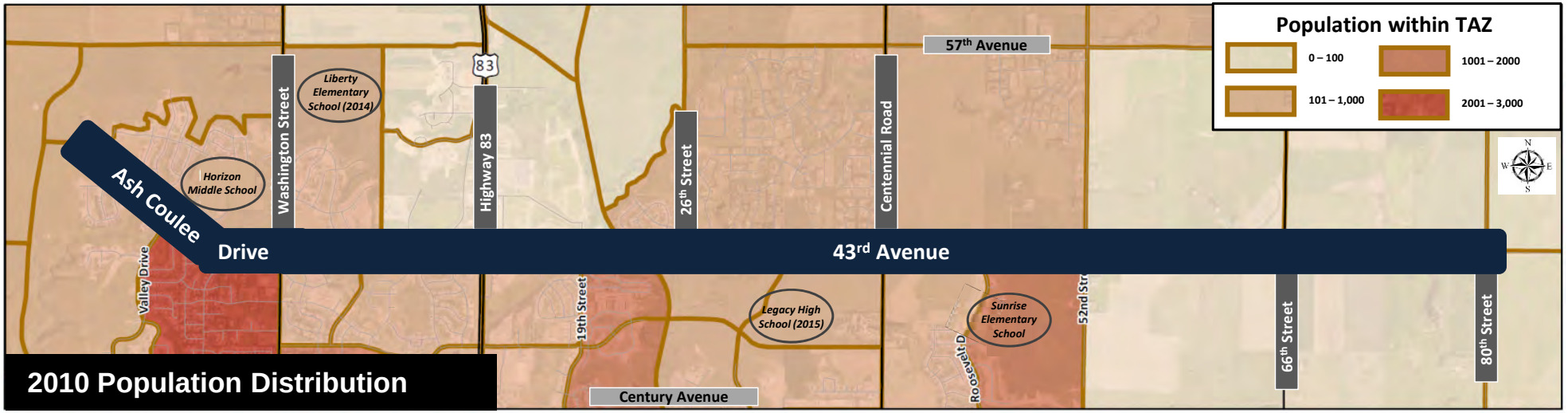
TAZ Number	Area (Sq. Mi.)	POPULATION	Pop Density (per/sq mi)	EMPLOYMENT (JOBS)			
				TOTAL	Retail	Service	Other
31	0.7	**50**	69	**6**	0	2	4
35	2.0	**97**	48	**2**	0	0	2
39*	2.0	**24**	12	**0**	0	0	0
40	1.0	**6**	6	**0**	0	0	0
41	1.0	**196**	195	**5**	0	0	5
42	1.0	**517**	516	**28**	0	6	22
43	0.2	**392**	2,610	**11**	0	2	9
44	0.5	**14**	27	**358**	350	8	0
45	0.3	**25**	89	**31**	2	0	29
46	0.5	**322**	655	**157**	3	69	85
47	0.4	**601**	1,422	**75**	0	0	75
48	0.2	**718**	3,923	**12**	2	10	0
49	1.2	**391**	330	**50**	0	50	0
58	0.3	**1,530**	5,631	**129**	10	117	2
59	0.2	**695**	3,975	**106**	0	102	4
60	0.3	**882**	2,550	**200**	0	178	22
61	0.1	**123**	1,551	**277**	267	10	0
64	0.2	**627**	2,786	**1,560**	547	685	328
65	0.2	**398**	1,656	**719**	96	470	153
66	0.3	**1,002**	3,834	**26**	12	9	5
69	0.3	**457**	1,796	**114**	5	109	0
70	0.3	**183**	642	**0**	0	0	0
71	0.1	**0**	0	**766**	8	118	640
72	0.5	**783**	1,632	**6**	0	3	3
73**	0.9	**1,757**	1,961	**136**	104	4	28
220	0.1	**8**	82	**487**	48	181	258
317	0.0	**0**	0	**371**	231	137	3
321	0.7	**2,043**	2,926	**192**	16	107	69
322	0.2	**27**	117	**9**	9	0	0
342	0.2	**457**	2,236	**0**	0	0	0
343	0.2	**1,002**	6,215	**0**	0	0	0
344	0.3	**183**	730	**132**	13	12	107
346	0.7	**391**	558	**0**	0	0	0
347	0.6	**391**	639	**0**	0	0	0
348	0.4	**391**	883	**3**	0	0	3
TOTAL	**18.0**	**16,683**		**5,968**	**1,723**	**2,389**	**1,856**
MPO AREA TOTAL		**106,779**		**64,124**	**11,473**	**26,730**	**25,921**
CORRIDOR % OF MPO		**15.6%**		**9.3%**	**15.0%**	**8.9%**	**7.2%**

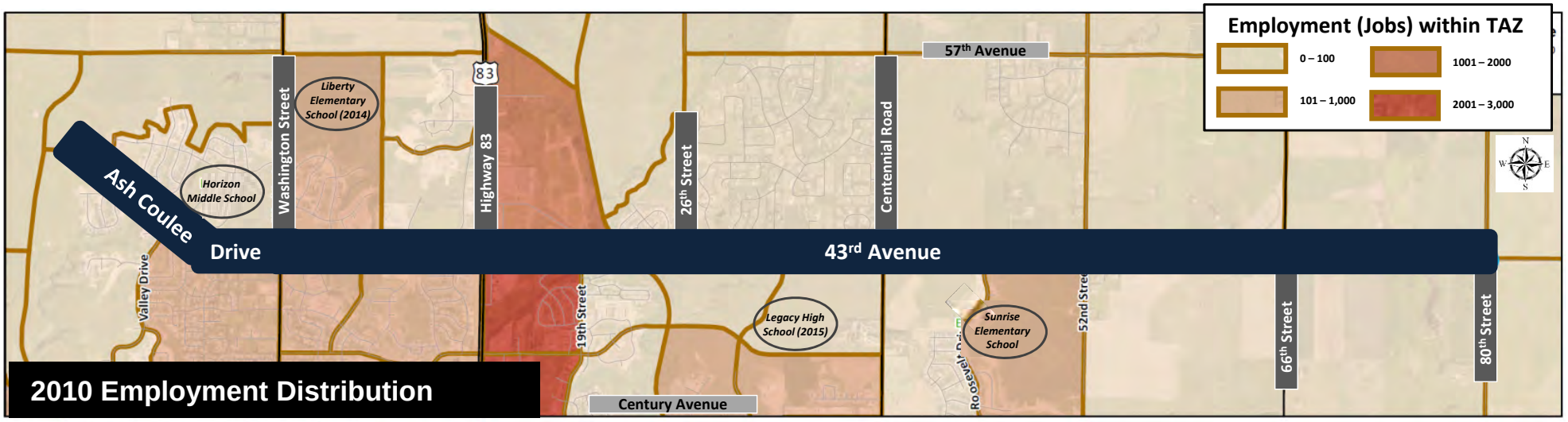
*2010 TAZ No. 39 was split into 2040 TAZ Nos. 39, 359, and 360.

**2010 TAZ No. 73 was split into 2040 TAZ Nos. 73 and 361

SOURCE: Bismarck - Mandan MPO and WSB & Associates, Inc.

K:\02081-000\Admin\Docs\REPORT\Draft\[LOSand Pop Tables for 43rd Study - 03-16-13.xlsx]Table 3-1 2010 TAZ Data





43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Figure 3-5

Existing Population and Employment Distribution

3.4 Transportation System Overview

The transportation system serving the 43rd Avenue Corridor includes transit, non-motorized transportation or bicycling and walking, and motorized vehicles via the roadway system.

3.4.1 Transit

The 43rd Avenue Corridor is served by Bis-Man Transit through their Capital Area Transit (CAT) fixed route system and their paratransit service. Bis-Man Paratransit provides door-to-door services to senior citizens 60 years of age or older and to individuals with any type of certifiable disability. The service area includes the cities of Bismarck and Mandan and areas within 2 miles of the city limits, which includes the majority of the corridor. Ridership on the CAT fixed route system has been steadily increasing with 2012 seeing a record setting year of ridership with over 140,000 rides provided.

In general, fixed route transit service operates within more developed areas of communities. As a considerable portion of the 43rd Avenue Corridor is largely undeveloped, the provision of CAT service is limited to the more built up areas of 43rd Avenue east and west of Highway 83. Currently this area is served by CAT Route C-2 (east of Highway 83) and Route D-2 (west of Highway 83). Each route essentially operates in one direction of travel extending from Gateway Mall (which serves as a major transfer point) to 43rd Avenue. Provided below are brief descriptions of each of these routes.

CAT Route C-2:
Route C-2 starts at Gateway Mall, travels eastbound on Century Avenue to Centennial Road where it travels north to 43rd Avenue and then goes west until 19th Street. At 19th Street, Route C-2 operates in both directions between 43rd Avenue and Super Wal-Mart north of 43rd Avenue on Skyline Boulevard. At Wal-Mart, which is a major boarding and alighting point, it then travels southbound on 19th Street and eventually returns to Gateway Mall.

CAT Route D-2:
Route D-2 starts and ends at Gateway Mall. It reaches 43rd Avenue via traveling northbound on Washington Street and then travels eastbound on 43rd Avenue to Lockport Street where it turns south where it eventually arrives back at Gateway Mall.

Future Operations:
In 2012 a transit study was completed entitled Mobility 2017, which establishes a roadway map for transit service within the region. With respect to routes C-2 and D-2 there are some recommended modifications to their structure to improve efficiency. Basically, the two routes would be aligned more as north-south routes with service on 43rd Avenue between Lockport and Washington Streets being identified as an optional fixed route alignment. However, in looking ahead beyond the timeframe of Mobility 2017, it is very likely that 43rd Avenue will continue to develop and perhaps it will become more conducive to fixed route service.

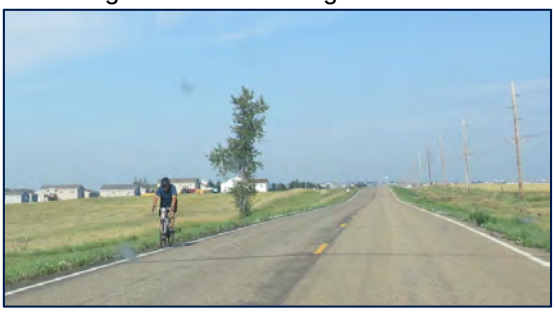
In the 43rd Avenue Corridor Study, the objective with respect to transit is to consider how service might be accommodated in advance of this development. This may entail potential considerations with respect

to roadway design features to better accommodate busses, the provision of backage roads to allow for better density along the corridor to while reducing or minimizing access points on 43rd Avenue, and the development of a sidewalk/trail network to make it easier for walkers to access bus stops. These and other potential improvements will be further described in later sections of this report.

3.4.2 Non-motorized Transportation

Non-motorized transportation in the context of this report includes travel by bicycle and walking. Sidewalks in Bismarck are typically 4.5-6 feet wide and constructed out of concrete (although, additional width may be provided and other materials may be used as well). They are intended and designed primarily for pedestrians, although bicyclists are not prohibited from using them in most cases. Sidewalks allow two-way travel and may be provided along one or both sides of a roadway. Sidewalks are not currently in use within the 43rd Avenue corridor, though they are provided on many of the intersecting residential roadways.

Multi-use or shared paths in Bismarck are typically 10 – 12 feet wide, constructed out of asphalt and are intended and designed for use by both bicyclists and pedestrians. Within the corridor there is approximately one mile of multi-use trail extending from Golden Eagle lane to Washington Street. At Valley Drive, it connects to the Valley Drive Greenway Trail, which extends south into Bismarck. At Washington Street, the trail intersects with Washington Street Trail paralleling the west side of the roadway. Generally bicycling accommodations are lacking within the corridor as in addition to the lack of multi-use trails through the corridor, there is also a lack of paved shoulders that can provide for bicycle travel.



There is activity on developing a trail network within the corridor. Recently the Bismarck Parks and Recreation Department announced plans to construct the Edgewater Trail, which will be over two miles in length and generally be located near the new Legacy High School located south of 43rd Avenue and west of Centennial Road. This trail will provide a travel connection for pedestrians and bicyclists between Century Avenue, 43rd Avenue, and Centennial Road.

3.4.3 Roadway System

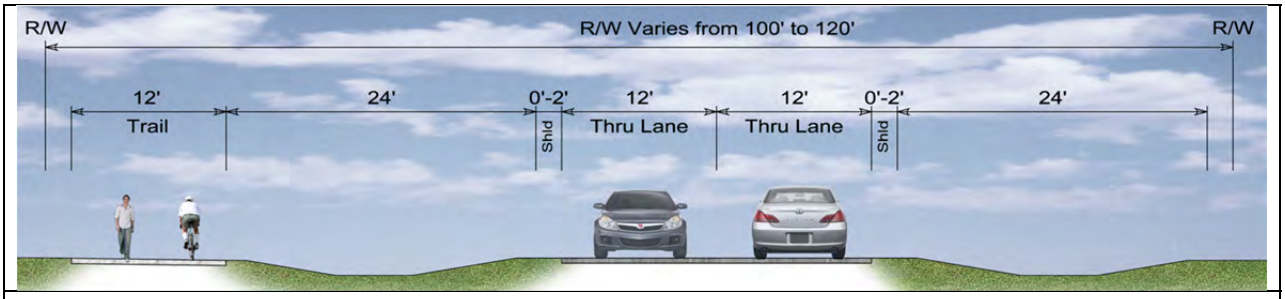
The east-west 43rd Avenue corridor is intersected by major north-south roadways and some residential developments that use curvilinear street patterns to limit pass-through traffic and increase developable land. Provided below are general descriptions of 43rd Avenue and other important roadways within the study area. More detailed descriptions of the roadway system are contained in subsequent sections of this chapter.

43rd Avenue Corridor (43rd Avenue and Ash Coulee Drive)

43rd Avenue (Ash Coulee Drive) is a two-lane rural section roadway that averages less than 5,000 daily trips through-out the six-mile study area. The posted speed limit on the roadway ranges from 25-mph west of Washington Street to 55-mph east of Centennial Road. In between these points, representing a distance of 1.5 miles, the posted speed limit is 45-mph. Motorists on 43rd Avenue have the right-of-way most intersections, with the exceptions being Washington Street (traffic signal), US 83 (traffic signal),

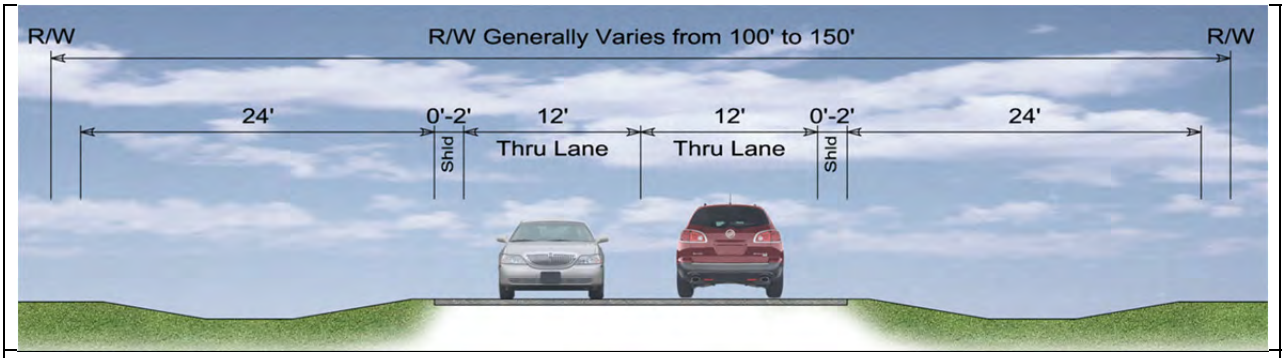
and Centennial Road (2-way stop with traffic on 43rd Avenue required to stop). **Figures 3.6** and **3.7** show the existing typical sections of Ash Coulee and 43rd Avenue, respectively.

Figure 3-6. Ash Coulee Drive - Existing Typical Section



Ash Coulee Drive: 2-lane with Trail and Ditch Drainage

Figure 3-7. 43rd Avenue - Existing Typical Section



43rd Avenue: 2-lane with Ditch Drainage – no Trail or Sidewalk

The major roadways that intersect 43rd Avenue include:

- United States Highway (US) 83 (State Street), which is a major north-south highway that intersects 43rd Avenue approximately 1.50 miles north of its interchange with I-94. Of the roadways intersecting 43rd Avenue, it carries the heaviest traffic volumes. Daily traffic volumes on US 83 range from 11,600 north of 43rd Avenue to 17,700 south of 43rd Avenue.

- Centennial Road is a major north-south roadway that intersects 43rd Avenue approximately 1.50 miles north of its interchange with I-94. Daily traffic volumes on Centennial Road range from 5,600 north of 43rd Avenue to 6,700 south of 43rd Avenue.

- Washington Street is a north-south roadway that intersects 43rd Avenue approximately 1.50 miles north of its grade separated crossing (underpass) of I-94. Daily traffic volumes on Washington Street range from 3,000 north of 43rd Avenue to 6,700 south of 43rd Avenue.

In addition to the roadways briefly described above, another important roadway in the project vicinity is Interstate (I) 94, which runs parallel to 43rd Avenue approximately 1.50 miles to the south. While I-94

does not intersect 43rd Avenue and is outside of the study area, its role as part of the area's transportation network is very important. Since all crossings and junctions with I-94 are grade separated, these intersecting roadways often also intersect 43rd Avenue and play an important role in moving people and goods throughout the area. Daily traffic volumes on I-94 range from 8,000 vehicles east of Centennial Road to 30,000 at the Missouri River.

3.4.4 Functional Classification

The various functional classifications define a roadway's general role in performing the two primary functions:

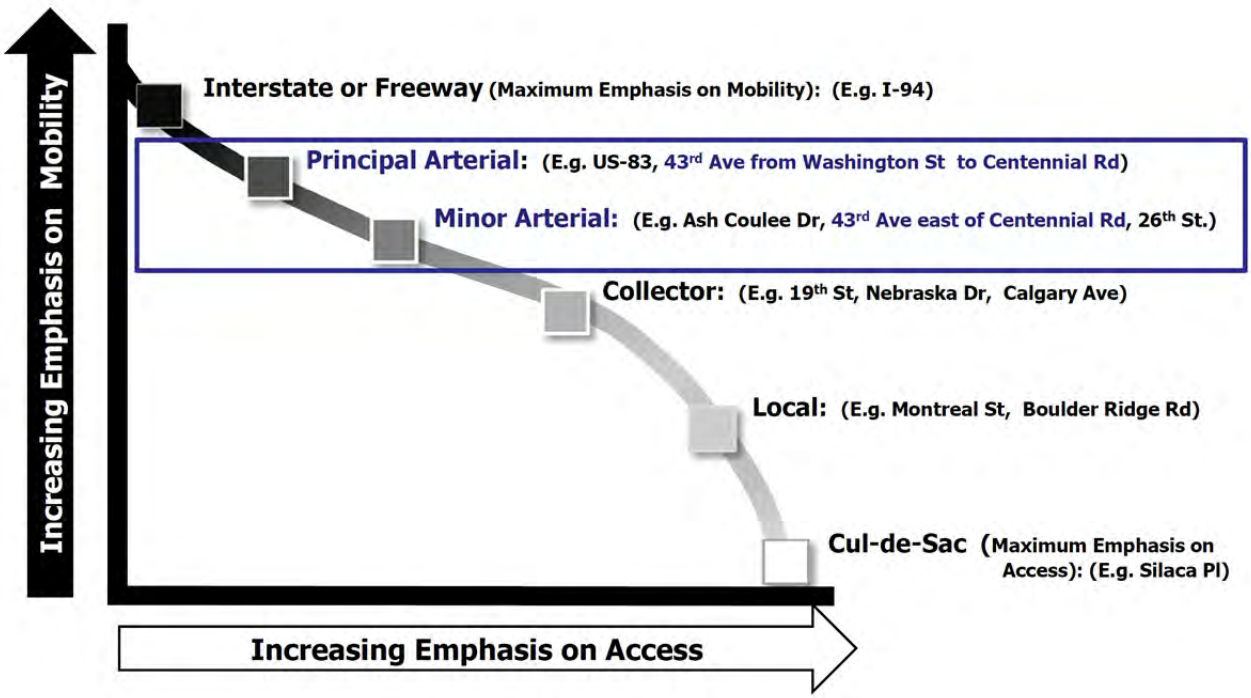
- Providing access to adjacent properties
- Providing travel mobility from one part of the corridor and/or region to another.

Each of the roadways within the area, as well as all roads in the State, may be described by their function. The differentiation between functional classifications is based on through-traffic movement and access to adjacent land.

The functional classification system is broken down into five primary categories – interstate highways, principal arterials, minor arterials, major and minor collectors, and local roads.

Figure 3-8 displays the relative level of mobility and access performed by the various facility types in the study area. More specific definitions of each of the classifications, including roadway examples for each, are provided below.

Figure 3-8. Functional Emphasis on Mobility and Access by Facility Type



Interstate

Example: I-94

- Created by the Federal government to better connect the United States
- Serve long, through-type trips
- High-speed with only grade-separated access provided

Principal Arterials

Examples: US-83, Washington Street, Centennial Road, 43rd Avenue (Washington St. to Centennial Rd.)

- Connect major activity centers
- Typically higher-speed with limited access
- Serve large travelsheds (regions)

Minor Arterials

Examples: Ash Coulee Drive east to Washington Street, 26th Street north of 43rd Avenue, 43rd Avenue between Centennial Road and 52nd Street

- Connect key activity centers
- Serve longer to medium-length trips
- Typically high-speed with limits on access

Collectors

Major Collectors (Examples: Washington Street and Centennial Road north of 57th Avenue)
Minor Collectors (Examples: Valley Drive, 19th Street)

- Connect local activity centers and/or connect to higher-order routes
- Places equal emphasis on access and mobility

Local Roads

Examples: 52nd Street, Coleman Street

- Connect local neighborhoods, farms, small developments, and higher-order streets/routes
- Have closely spaced access with direct access property access
- Serve limited travelsheds (very few through trips)

Summary:
Within the 43rd Avenue Corridor, the existing functional classification from west to east is as follows:

- Butte Drive to Washington Street, Minor Arterial (1.1 miles)
- Washington Street to Centennial Road, Principal Arterial (3.0 miles)
- Centennial Road to 52nd Street, Minor Arterial (1.0 mile).
- 52nd Street to 80th Street, Local (2.0 miles).

The area of the corridor that is within the designated MPO Urbanized Area (from Butte Drive to 52nd Street) is maintained by City of Bismarck and is eligible for federal funding as an Arterial roadway. East of 52nd Street, 43rd Avenue is maintained by Burleigh County.

Figure 3-9 displays the functional classification of the roadways within the 43rd Avenue Corridor study area.

Feet
0 2,500 5,000
N

Legend
- Project Corridor

Roadway Functional Classification
- Interstate
- Principal Arterial
- Minor Arterial
- Collector
- Local

HAY CREEK TWP.
GIBBS TWP.
BISMARCK

57th Ave
43rd Ave
Century Ave

83
94

State St
26th St
Valley Dr
Washington St
19th St
Centennial Rd
Roosevelt Dr
52nd St
66th St
80th St

Liberty Elementary School (2014)
Horizon Middle School
Ash Coulee Dr
Legacy High School (2015)
Sunrise Elementary School
Century High School
Centennial Elementary School

Path: K:\02081-000\GIS\Maps\Functional Class.mxd

Aerial Date: 2010

43RD AVENUE CORRIDOR STUDY
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Figure 3-9

Functional Classification

3.4.5 Access Assessment

Access management is the proper planning and design of access to the public roadway system that helps ensure better traffic mobility with fewer crashes. Fewer direct access points, greater separation of driveways, and better driveway design and location are the basic elements of access management. When these techniques are implemented, there is less occasion for through traffic to brake and change lanes in order to avoid turning traffic. As a result, the flow of traffic will be smoother and average travel times lower resulting in fewer potential accidents.

By managing roadway access, government agencies can increase public safety, extend the life of major roadways, reduce traffic congestion, support alternative transportation modes, and improve the appearance and quality of the built environment. Without access management, the function and character of major roadway corridors such as 43rd Avenue can deteriorate rapidly.

Studies have shown that there is a direct correlation between access frequency and crash rates. According to the Federal Highway Administration (FHWA), before and after analyses show those routes with well managed access can experience 50% fewer accidents than comparable facilities with no access controls. Presented in **Table 3-2** is information from different sources showing that as access density increases, so do crash rates. The roadway types in the table are primarily urban or suburban. While 43rd Avenue Corridor is largely rural characterized with a rural or ditch drainage section and relatively low traffic volumes, it is likely that the reconstructed roadway fit within this category particularly as the corridor continues to develop. Considering this, this table provides valuable information regarding the importance of access management.

Table 3-2. Correlation Table showing Relationship between Access and Crash Rates

Variable	Crash Rate per Million Vehicle Miles Traveled (MVMT) by Roadway Type and Information Source							
	NCHRP 420 Literature Synthesis	NCHRP 420 Safety Analysis	Minnesota Study				Indiana Study	Square Root Rule[1]
		Urban-Suburban Roads	Urban-Suburban Roads				Urban-Suburban Roads	ALL ROADS AVERAGE
Access Points per Mile	All Roads		2-Lane No LT	4-lane No LT	4-lane With LT	AVERAGE		
10	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
20	1.3	1.4	1.3	1.4	1.4	1.4	1.2	**1.4**
30	1.7	1.8	1.9	1.7	1.6	1.7	1.5	**1.7**
40	2.1	2.1	2.5	2.0	1.8	2.1	1.8	**2.0**
50	2.8	2.3	2.7	2.5	2.3	2.5	2.1	**2.2**
60	4.1	2.5	2.9	2.8	2.9	2.9	2.5	**2.7**
70	N/A	2.9	3.1	3.1	3.2	3.1	3.0	**2.7**

NOTE: LT = Left-turn

[1] Square Root Rule is a statistical calculation used to provide a weighted average for all roads.

SOURCE: Access Management Manual, Transportation Research Board, 2003, Page 16.

K:\02081-000\Traffic\Access\[Access Tables.xlsx]Table 3-2 Access - Crash Rates

In addition to travel safety, other impacts associated with failure to manage access may include:

- Poor travel mobility,
- Increase in cut-through traffic through residential areas due to overburdened arterials,
- Unsightly commercial strip development, and
- Degradation of the landscape.

Poorly managed access can also adversely affects corridor businesses. Closely spaced and poorly designed driveways make it more difficult for customers to enter and exit businesses safely. As conditions worsen, it is likely that many customers would stop frequenting these businesses in favor of businesses that can provide safer, more convenient access.

After access problems have been created, they are difficult to solve. Recognizing the importance of access management, in 2005 the City of Bismarck developed an Access Management Policy that identifies guidelines for access based on the roadways functional classification and on the type of access to be provided. Considering that the majority of the 43rd Avenue Corridor is undeveloped, it is important to employ access management, as once problems are created, they are difficult to solve. **Table 3-3** displays the access spacing obtained from the Access Management Policy for different roadway function types and land-uses.

Table 3-3. Access Management Guidelines for 43rd Avenue

Access Spacing Based on Bismarck Access Management Policy [1]				
		Minimum Access Spacing by Zoning and/or Land-use		
Roadway Functional Classification	Private Driveways [2]	Low Density Residential [3]	Commercial or High Density Residential [4]	Rural Residential [5]
Principal Arterial	No New Driveways Allowed	1/8 mi. (660 ft.)	1/4 mi. (1,320)	NA
Minor Arterial	No New Driveways Allowed	300 ft.	1/8 mi. (660 ft.)	NA
Collector		60 ft.	150 ft.	100 ft.

[1] The Bismarck Access Management Policy (2005) established a systematic procedure to manage intersection access, The key factors in determining access are the Functional Classification of the roadway and the zoning and/or land-use of the adjacent area served. Refer to City of Bismarck Access Management Policy for more information.

[2] Existing driveways are exempt from this policy. However, the City's intent is to consolidate and/or relocate access to serve the property.

[3] Low Density Residential land-use refers to residential areas where the housing units are either single-family or twin homes (duplexes).

[4] Commercial or High Density Residential land-use refers to higher trip generation areas including retail, office, industrial, and higher density residential (apartments, manufactured home parks, etc.).

[5] Rural Residential land-use refers to rural single-family homes in large lots (i.e., 5-acre lots).

SOURCE: Derived from City of Bismarck Access Management Policy (2005)

K:\02081-000\Traffic\Access\[AccessTables.xlsx]Table 3-3 Access Policy Table

A general assessment of access along the Corridor was conducted to determine how well existing access along the corridor conforms to the City of Bismarck Access Management Policy. **Table 3-4** shows this comparison in terms of access density per mile. Highlighted in this table are corridor segments where either the access exceeds (by at least double) the number if access was spaced per Policy. These are locations where opportunities for access consolidation should be considered. Also highlighted is the segment extending from 66th Street to 80th Street where the number of access points is much less than allowed per Policy. This segment provides an ideal location to implement the guidelines prior to development of the corridor. It should be noted that Table 3-4 does not contain information on access frequency or spacing. This information is shown on **Figure 3-10**, which indicates there are several locations within the corridor where access points are within a few hundred feet of one another, which may lead to safety issues.

Feet
0 2,500 5,000
N

Legend

Access

	Number of Access Locations
Private Access	(32)
Public 3-Leg Intersection to North	(14)
Public 3-Leg Intersection to South	(10)
Public 4-Way Intersection	(11)

Roadway Functional Classification

- Interstate
- Principal Arterial
- Minor Arterial
- Collector
- Local

83
Washington St
State St
Horizon Middle School
Ash Coulee Dr
Valley Dr
43rd Ave
19th St
26th St
Centennial Rd
57th Ave
52nd St
66th St
80th St
Sunrise Elementary School
Roosevelt Dr
Century High School
Century Ave
Centennial Elementary School
94
BISMARCK

Aerial Date: 2010

Path: K:\02081-000\GIS\Maps\Access.mxd

43RD AVENUE CORRIDOR STUDY
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Figure 3-10

Access Inventory Map

Table 3-4. Existing 43rd Avenue Access Assessment

Existing Access Locations and Density					Access Management Policy		DIFFERENCE
Corridor Segment		Length (miles)	Number of Existing Access Locations [1]	Resulting Access Density (per Mile)	Access Locations allowed per Policy [2]	Resulting Access Density (per Mile)	Existing Density - Policy Density) [3]
From	To						
Butte Drive	Washington Street	1.10	18	16.4	19.0	17.3	-0.9
Washington Street	US 83 (State Street)	1.00	11	11.0	5.0	5.0	6.0
US 83 (State Street)	19th Street	0.50	5	10.0	3.0	6.0	4.0
19th Street	26th Street	0.50	4	8.0	3.0	6.0	2.0
26th Street	Centennial Road	1.00	10	10.0	5.0	5.0	5.0
Centennial Road	Roosevelt Drive	0.50	4	8.0	3.0	6.0	2.0
Roosevelt Drive	66th Street	1.50	9	6.0	3.0	2.0	4.0
66th Street	80th Street	1.00	6	6.0	17.0	17.0	-11.0
	TOTAL	**7.10**	**67**	**9.4**	**58**	**8.2**	1.3

Existing number of access points is less than half the number per Access Policy - Good location for proactive access planning.

Existing access points is at least double the number per Access Policy - Consolidate access locations where feasible.

[1] **Common access points at segment endpoints are included only in segment to the west to avoid double counting acces**

[2] For purposes of the assessment, the land-use for the corridor was generalized.

[3] The a negative number indicates the overall density of the existing access points is within the access policy density. However, it more important on how well access conforms to the spacing intervals identified in the Policy (i.e., 300 ft., 660 ft., 1,320 ft.).

SOURCE: WSB & Associates, Inc. Derived from City of Bismarck Access Management Policy (2005)

K:\02081-000\Traffic\Access\[Access Tables.xlsx]Table 3-4 Existing Access

Sight-Distance

The industry accepted standards for sight distance in roadway design were developed by the American Association of State Highway and Transportation Officials (AASHTO) and are published in their publication entitled, A Policy on Geometric Design of Highways and Streets. As defined by AASHTO, sight-distance is measured from the driver's eyes, or 3.5 feet above the pavement surface, to an object 2 feet high on the road. The typical sight-distance measurements that are considered are for stopping, decision-making, and passing, which are further defined below:

- Stopping sight-distance is the distance required by the driver of a vehicle, traveling at a given speed, to bring his vehicle to a stop after an object on the road becomes visible.
- Decision sight-distance is the distance necessary for a driver to detect an unexpected condition and initiate evasive action by maneuvering their vehicle at the same or reduced speed. It is desirable to design to accommodate decision sight-distance as it often involves less risk and is generally preferable to stopping.
- Passing sight-distance is the distance necessary for a vehicle to overtake slower moving vehicles. Within the corridor, passing is allowed along certain segments based on sight-distance. These areas are identified through lane striping (dashed yellow centerline).

Presented in **Table 3-5** are the minimum sight-distances per AASHTO for these three driver maneuvers. The conditions represented in this table assume a dry pavement and a level roadway. In cases where the roadway profile is not level, as is the case in many locations within the 43rd Avenue Corridor, the stopping sight distances shown in this table would be modified (I.e., stopping sight-distance would be increased on downgrades).

Table 3-5. Sight-Distances by Driver Maneuver

Design Speed (mph)	Sight Distance (ft.) on Level Roadways [1]		
	Stopping [2]	Evasive Action Decision [3]	Passing
30	200	450	500
35	250	525	550
40	305	600	600
45	360	675	700
50	425	750	800
55	495	865	900
60	570	990	1000

[1] It is recognized that 43rd Avenue is not completely level. Depending on the direction of travel by grade, the distances presented below would either be increased or decreased.

[2] Break reaction distance is assumed to be 2.5 seconds, with a deceleration rate of 11.2 feet/second.

[3] Evasive action involves a change in speed, path, and direction.

SOURCE: AASHTO A Policy on Geometric Design of Highways and Streets (*Green Book*), 2011.

3.4.6 Safety Assessment

Travel safety is always a key consideration. Crashes impose a cost to both drivers involved in the incident and the public as a whole. In North Dakota, the DOT collects crash data for roads across the state to better understand the characteristics and design types of various roads. Roadway or motorist travel safety is typically measured in terms of number of vehicular crashes, types of crashes, crash rates, and severity of crashes. Provided below are brief descriptions of crash types, rates, and severity types and rates.

Crash Types

Vehicle crashes are typically assigned a type. Provided below are the five crash types that were used in the analysis of the 43rd Avenue Corridor.

- Right Angle: Two vehicles approaching from non-opposing angular directions collide, typically resulting as one vehicle failed to either stop or yield right of way from a Stop or Yield sign, ran a red light, or was not cleared from the intersection upon the onset of the conflicting movement's green signal.

- Rear-end: Two vehicles in a position of one behind the other collide, regardless of what movement(s) either vehicle was in the process of making with the exception of one or both vehicles backing. This type includes a collision in which the leading vehicle spun out and became turned 180 degrees around such that the resulting same direction collision had it strike front end to front end with the following vehicle.

- Left Turn/U-turn: Two vehicles approaching from opposite directions collide as a result of at least one vehicle attempting to make a left or U turn in front of the opposing vehicle.

- Sideswipe: Two vehicles moving alongside each other and collide, with at least one of the vehicles being struck on the side. This type would include a collision resulting from one of the vehicles making an improper turn such as a left from the right lane or vice-versa or turning right from the appropriate outside lane and striking a vehicle passing on the right shoulder.

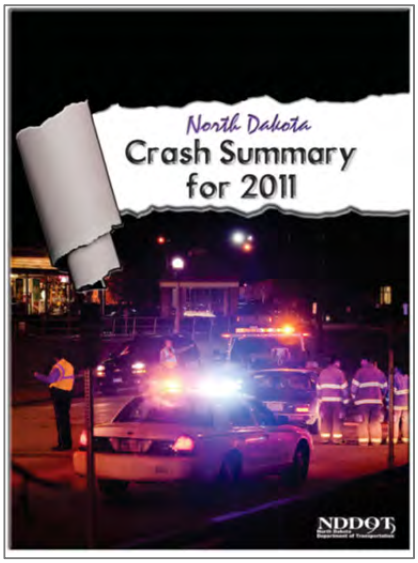
- Non-collision: This type implies any crash initially involving a single vehicle and object not considered a fixed or permanent condition of the highway like ruts, bumps, sink- or potholes or other miscellaneous stationary or airborne road debris such as garbage, tree limbs, fallen-off parts of other vehicles, broken and scattered signs/posts, etc.

- Other: This category encompasses all other categories of single and multi-vehicle crashes that are not defined above. These include, but are not limited to, all other non-collision events such as immersion, cargo loss, separation of units, fire/explosion, and run-off road incidents (whereby damage is caused to the vehicle, but nothing else was physically struck during or following the act of leaving the highway).

3.4.6.1 Crash Rates

Crash rates are expressed in total number of crashes per million vehicle miles traveled (mvmt). This allows comparisons to be made between roadway sections and roadway types of similar design.

The severity rate is another measure comparing the safety level of various roadway types. This method involves classifying each crash occurring at a site into one of three severity categories: fatal, personal injury and property damage only. Fatal crashes result in at least one death. Crashes that result in injuries but no deaths are classified as personal injury crashes. Crashes that result in neither death nor injuries but do involve damage to property are classified as property damage only (PDO) crashes. The severity rate calculation gives added weight to the fatal and injury crashes that have occurred along roadway segments.

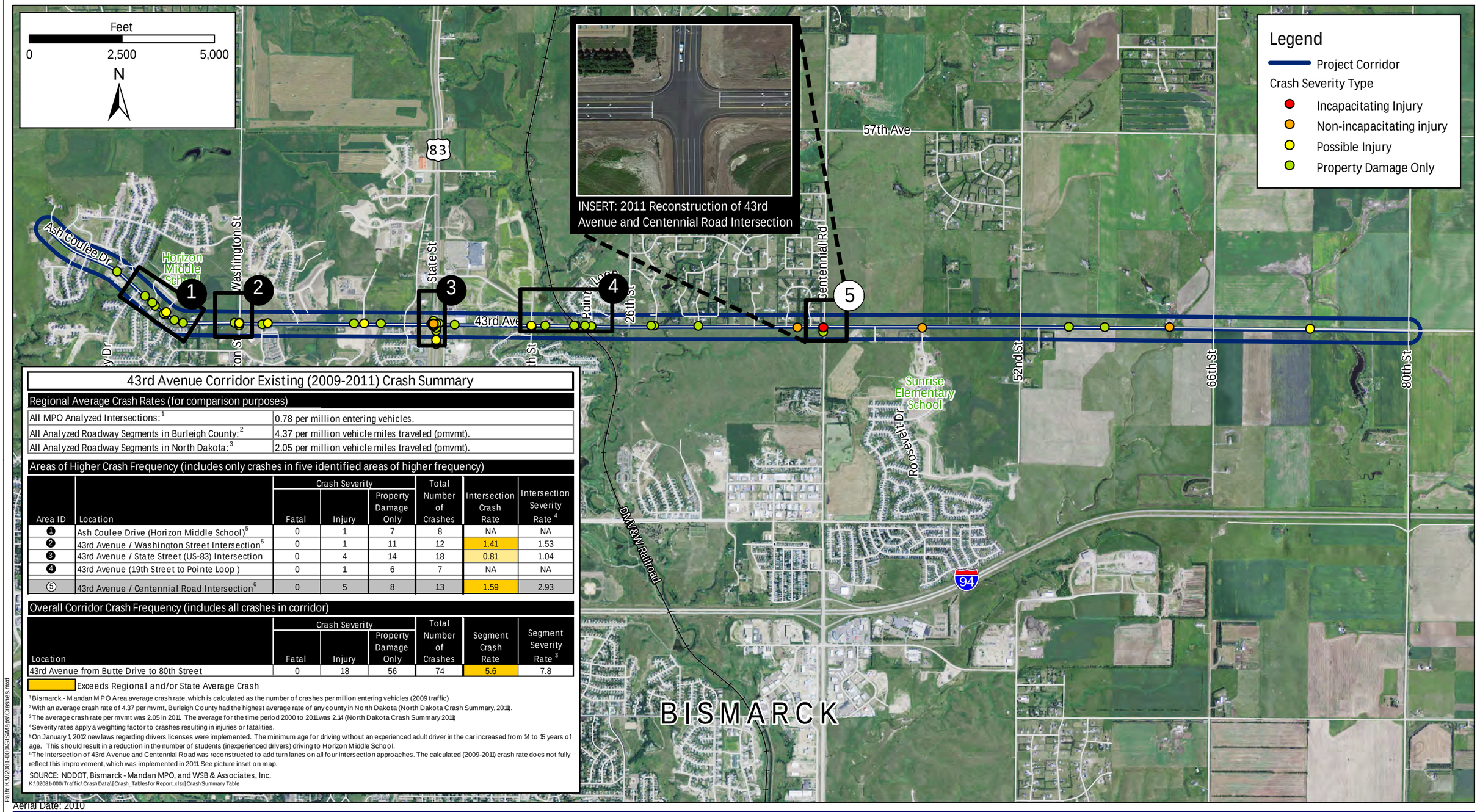


The crash data used to identify crash locations along the 43rd Avenue corridor was obtained from NDDOT and represents a three-year period of (2009 to 2011). Summarizing the findings for the entire corridor; there were a total of 74 crashes, with 11 of these representing single-vehicle crashes that appear to be primarily weather-related. Over the three year period there were no fatalities and there were no crashes involving motorists with either pedestrians or bicyclists.

It is worth pointing out that the corresponding crash rate for the 74 crashes during this time period is 5.6 per mvmt. This is nearly three times the crash rate or 2.05 per mvmt for all analyzed roadways in North Dakota as reported in the North Dakota Crash Summary, 2011).

High Crash Frequency Locations

Of the 74 total crashes recorded for the 7.1 mile corridor for the period 2009 – 2011, five locations accounted for 58 or nearly 80 percent of all crashes. The crash characteristics of these five geographic areas are shown and displayed on **Figure 3-11.**



43rd Avenue Corridor Existing (2009-2011) Crash Summary

Regional Average Crash Rates (for comparison purposes)

All MPO Analyzed Intersections:[1]	0.78 per million entering vehicles.
All Analyzed Roadway Segments in Burleigh County:[2]	4.37 per million vehicle miles traveled (pmvmt).
All Analyzed Roadway Segments in North Dakota:[3]	2.05 per million vehicle miles traveled (pmvmt).

Areas of Higher Crash Frequency (includes only crashes in five identified areas of higher frequency)

Area ID	Location	Crash Severity			Total Number of Crashes	Intersection Crash Rate	Intersection Severity Rate[4]
		Fatal	Injury	Property Damage Only			
1	Ash Coulee Drive (Horizon Middle School)[5]	0	1	7	8	NA	NA
2	43rd Avenue / Washington Street Intersection[5]	0	1	11	12	1.41	1.53
3	43rd Avenue / State Street (US-83) Intersection	0	4	14	18	0.81	1.04
4	43rd Avenue (19th Street to Pointe Loop)	0	1	6	7	NA	NA
5	43rd Avenue / Centennial Road Intersection[6]	0	5	8	13	1.59	2.93

Overall Corridor Crash Frequency (includes all crashes in corridor)

Location	Crash Severity			Total Number of Crashes	Segment Crash Rate	Segment Severity Rate[3]
	Fatal	Injury	Property Damage Only			
43rd Avenue from Butte Drive to 80th Street	0	18	56	74	5.6	7.8

Exceeds Regional and/or State Average Crash

[1] Bismarck - Mandan MPO Area average crash rate, which is calculated as the number of crashes per million entering vehicles (2009 traffic)
[2] With an average crash rate of 4.37 per mvmt, Burleigh County had the highest average rate of any county in North Dakota (North Dakota Crash Summary, 2011).
[3] The average crash rate per mvmt was 2.05 in 2011. The average for the time period 2000 to 2011 was 2.14 (North Dakota Crash Summary 2011)
[4] Severity rates apply a weighting factor to crashes resulting in injuries or fatalities.
[5] On January 1, 2012 new laws regarding drivers licenses were implemented. The minimum age for driving without an experienced adult driver in the car increased from 14 to 15 years of age. This should result in a reduction in the number of students (inexperienced drivers) driving to Horizon Middle School.
[6] The intersection of 43rd Avenue and Centennial Road was reconstructed to add turn lanes on all four intersection approaches. The calculated (2009-2011) crash rate does not fully reflect this improvement, which was implemented in 2011. See picture inset on map.

SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.
K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]Crash Summary Table

Path: K:\02081-000\GIS\Maps\Crashes.mxd

Aerial Date: 2010

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 3-11

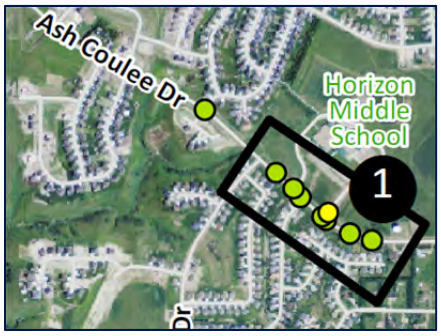
Crash Characteristics and Inventory Map

Provided below is a summary of findings for each of these five high frequency crash locations.

Area 1: A one-quarter mile segment of Ash Coulee Drive near Horizon Middle School
8 Total Crashes:

- Two crashes at the west entrance to the school – one southbound rear end (14 year old driver at fault) – one southbound left turn failing to yield to westbound through vehicle (15 year old driver at fault)
- Three crashes at the east entrance to the school – two were westbound right turns sliding into southbound vehicles due to icy conditions. One was a southbound rear end. (ages not contributing)
- One eastbound rear end near Mustang Drive (ages unknown, not weather related)
- Two non-intersection crashes east of the school entrances were related to westbound vehicles sliding off the north side of the road in icy conditions and hitting fixed objects (signs)

Summary:



Half of the crashes occurring at this location can be attributed to icy conditions. This may also be an indication of steep grades that become problematic during icy conditions. Both of the crashes at the west entrance to the school involved drivers aged either 14 or 15 years-old.

Since this data period (2009 – 2011), the State of North Dakota increased the minimum age for driving to 15-years old. Also, the Bismarck Public School Board will soon be building a new elementary (planned 2014 opening) and high school (planned 2015 opening) within the general corridor area. Upon opening of the new schools, Horizon Middle School will change their grade structure to house grades 6 through 8, rather than 7 through 9 as is currently the case. This change should result in eliminating most if not all driver license eligible students (15 years-old or older) from the school.

Area 2: The intersection of 43rd Avenue and Washington Street
12 Total Crashes:

- Two crashes speed related
- Five crashes attributed to drivers age 15 or younger
- Two crashes attributed to drivers age 16-19
- Eight right-angle crashes – all eastbound or westbound drivers failing to yield at the stop sign to northbound/southbound vehicles which do not have a stop sign
- One rear-end crash; northbound on Washington Street
- One left-turn crash; westbound driver failed to yield to northbound left
- One crash attributable to icy conditions

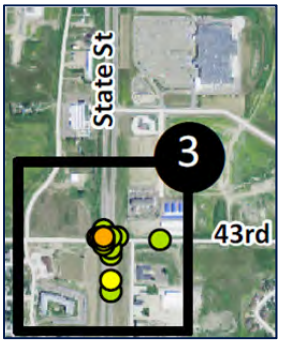
Summary:

The majority of the crashes at this location can be attributed either to age, or failure to yield to the through-stop intersection control. During the period for which this crash data was collected, the intersection of 43rd Avenue/Ash Coulee Drive with Washington Street was regulated by stop-signs on the

for the east-west traffic with the north-south traffic on Washington Street uncontrolled. Nine of the twelve crashes involve eastbound or westbound drivers who either fail to stop to northbound or southbound vehicles, or who stop and then exercise poor judgment in choosing a gap in northbound and southbound traffic. Several drivers indicated that they thought it was a 4-way stop. In addition, age may be a factor in these crashes. Five of the crashes were attributed to drivers age 15 or younger, and an additional two were attributed to drivers age 16-19. In early 2013, a traffic signal was installed at this location, which should improve safety at this intersection.

Area 3: The intersection of 43rd Avenue and US 83

18 Total Crashes:



- Two crashes attributable to weather
- Six right-angle crashes
- Eight rear end crashes
- Two crashes attributable to 15 year-old drivers

Summary:

The crashes at this location are fairly typical of high-speed signalized intersections, both in terms of type and quantity. Most of the crashes are right-angle or rear-end crashes.

Area 4: A one-third of a mile segment of 43rd Avenue from 19th Street to Pointe Loop

7 Total Crashes

- Two crashes at 19th Street intersection (1 rear-end, 1 right-angle)
- One crash at Pointe Loop intersection (eastbound rear-end)
- Four crashes between 19th Street & Pointe Loop
- One crash attributable to a 15-year-old driver
- One rear-end crash occurred while a school bus came to a stop before crossing the RR tracks (bus was not involved in the crash)
- One rear-end crash occurred while one vehicle slowed for broken asphalt

Summary:

The crashes in this area appear to be the result of many factors, including inexperienced drivers, poor pavement quality, the railroad crossing, and vehicles waiting to execute turn movements from through lanes (turn-lanes do not exist in this location). The intersection crashes are rear-end or right-angle crashes, which are typical for the type of intersection.

Area 5: The intersection of 43rd Avenue and Centennial Road

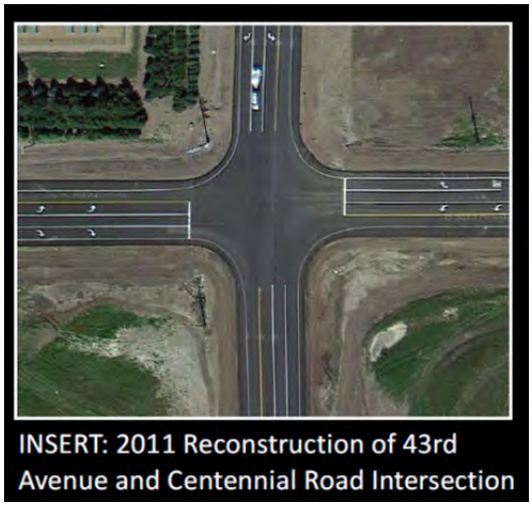
13 Total Crashes:

- Ten crashes involve one or more northbound vehicles
- Eight crashes involve two or more northbound vehicles
- Four crashes attributable to drivers age 16-18
- Three right-angle or left-turn crashes. All were the result of the westbound vehicles failing to yield because they did not see the stop sign, or used poor judgment to select a gap in northbound and southbound traffic.

NOTE: The intersection of 43rd and Centennial Road was reconstructed in 2011 to add turn lanes to all approaches, this will likely lead to a reduction in the number of crashes at this location.

Summary:

The crashes at this location are concentrated heavily on the northbound approach, and are largely attributable to the intersection geometry. The intersection geometry throughout the 2009-2011 period had single lane approaches in all directions and did not include dedicated turn lanes. This geometry contributed to the prevalence of same-direction crashes. Eight of the crashes involved two northbound vehicles: five northbound rear end and three sideswipe crashes. The rear-end crashes are likely a result of vehicles on Centennial Road slowing or stopping to prepare for executing a left or right turn. The sideswipe crashes are an indication that vehicles are not correctly queuing on the northbound approach and are attempting to pass slowing or stopped vehicles when there are no passing lanes for that purpose.



INSERT: 2011 Reconstruction of 43rd Avenue and Centennial Road Intersection

With the reconstruction of the intersection, it is expected that the number of crashes will decrease.

3.4.7 Corridor Segment Characteristics

Provided in this section of the report are descriptions of the corridor by specific roadway segments. The roadway segments were generally determined based on adjacent land-use, length, and logical breaks such as at major intersections. For each roadway segment, specific information will be provided on access locations, traffic control and signage, and crash or safety data. Also, locations where sight distance may be an issue are identified.

The eight segments and sub-segments include:

1. Butte Drive to Washington Street (1.1 miles)
    a. Butte Drive to Valley Drive (0.55 miles)
    b. Valley Drive to Washington Street (0.55)
2. Washington Street to US 83 (1.0 mile)
    a. Washington Street to Coleman Street (0.60 miles)
    b. Coleman Street to US 83 (0.40 miles)
3. US 83 to 19th Street (0.5 miles)
4. 19th Street to 26th Street (0.5 miles)
5. 26th Street to Centennial Road (1.0 mile)
6. Centennial Road to Roosevelt Drive (0.5 miles)
7. Roosevelt Drive to 66th Street (1.5 miles)
    a. Roosevelt Drive to 52nd Street (0.50 miles)
    b. 52nd Street to 66th Street (1.0 mile)
8. 66th Street to 80th Street (1.0 mile)

Segment 1 – Ash Coulee Drive from Butte Drive to Washington Street (1.1 miles)

Segment 1 of the corridor is a section of the 43rd Avenue Corridor designated Ash Coulee Drive that extends from Butte Drive to the Washington Street intersection, a distance of approximately 1.1 miles. The western most 300 feet of Ash Coulee Drive currently has a gravel surface. Within this section, Ash Coulee Drive has a speed limit of 25 mph and there is one signalized intersection, located at Washington Street. The 2010 traffic volumes, which represent the most current comprehensive of numbers for the entire corridor, ranged from 1,400 to 3,000 vehicles per day. The land adjacent to Ash Coulee Drive consists primarily of low density residential, a middle school, and some undeveloped areas.

The existing right-of-way for this segment ranges from 100 to 120 feet.

Access:

For access management assessment purposes, it is assumed that the land-use is classified as low-density residential. Within the segment, there are 18 access points to the roadway of which 11 are public and 7 are private, which equates to approximately 16 access points per mile. Immediately east of Butte Drive it appears as there could be some sight-distance concerns upon extension of the roadway to the west. This would be addressed through reconstruction of the roadway as the design should provide acceptable stopping sight-distances per AASHTO Guidelines.

Safety:

The crash rate on this segment was 7.86 per mvmt, which is 40 percent higher than the corridor as a whole. However, the recent signalization of the intersection at Washington Street as well as the increase of the driving age along with the change in grade structure at Horizon Middle School should help in reducing the future crash rate. **Table 3-6** presents a crash summary for this segment.

Table 3-6. Segment 1 Crash Summary

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
21	12	4	1	0	3	1	**7.86**	0	2	19	16
na	57%	19%	5%	0%	14%	5%		0%	10%	90%	

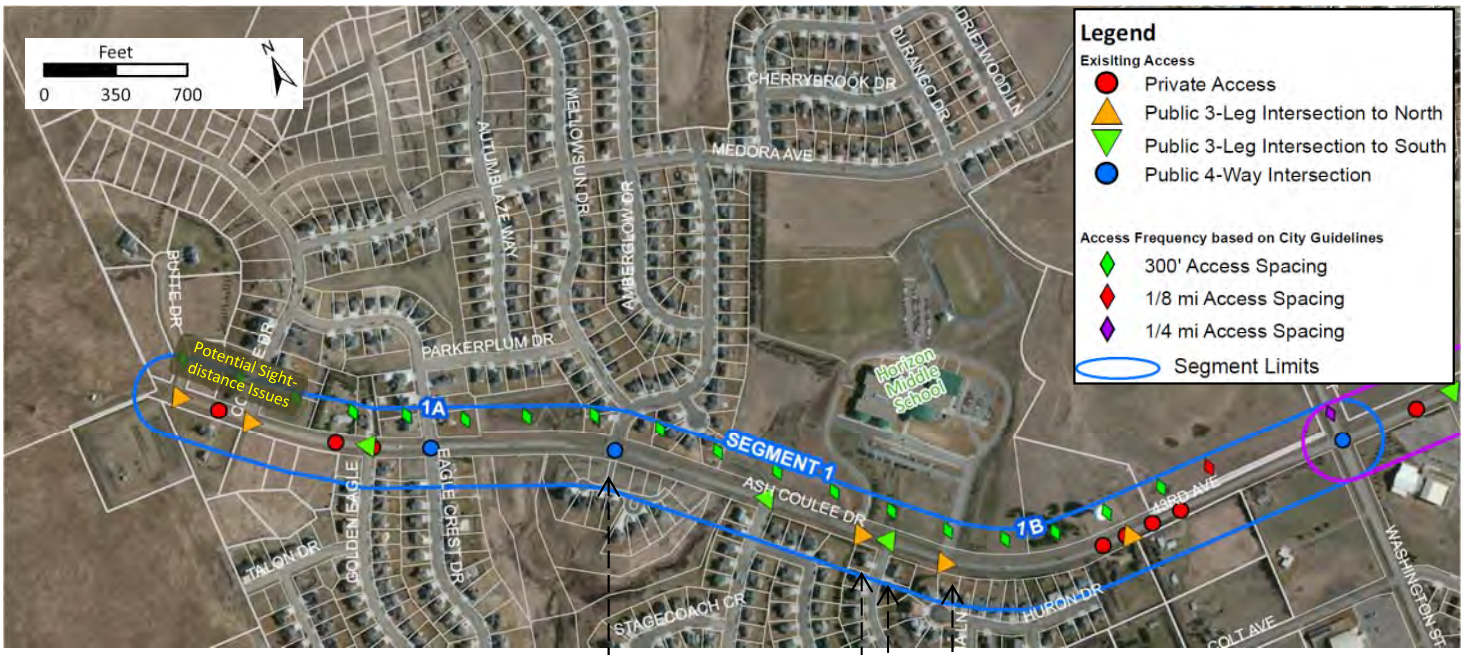
SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

Figure 3-12 contains two maps, one showing existing access locations and one displaying crash locations. In reviewing the information, it appears that there could be a correlation between access and crashes at four of these locations. No crashes occurred in the area east of Butte Drive where there may be stopping sight-distance issues. However, given that the speed limit is only 25-mph, the minimum stopping sight-distance only needs to be 155 feet, per AASHTO design standards.

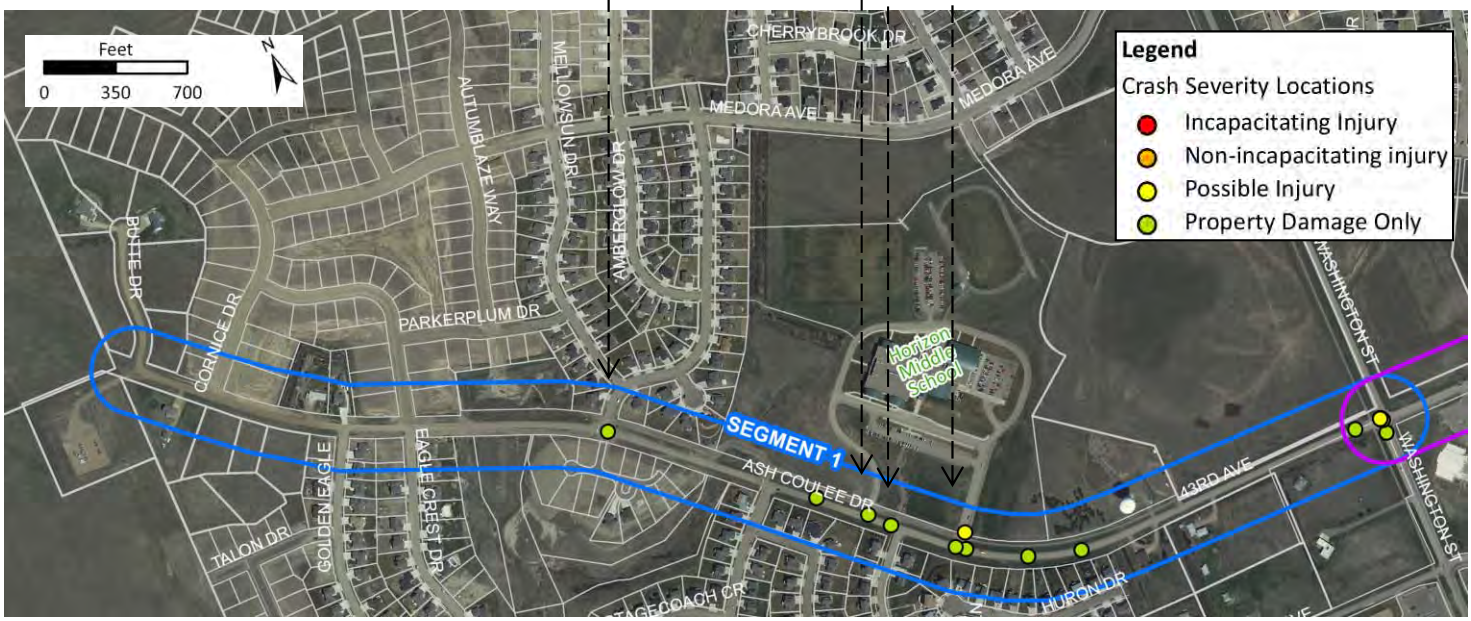
Ash Coulee Drive: Butte Drive to Washington Street (1.1 miles)

Existing Access Spacing Compared to Spacing per Policy Guidelines



Common Access and Crash Location s

Crash Locations:



Observation / Assessment:

Four common access and crash location.

43RD AVENUE CORRIDOR STUDY

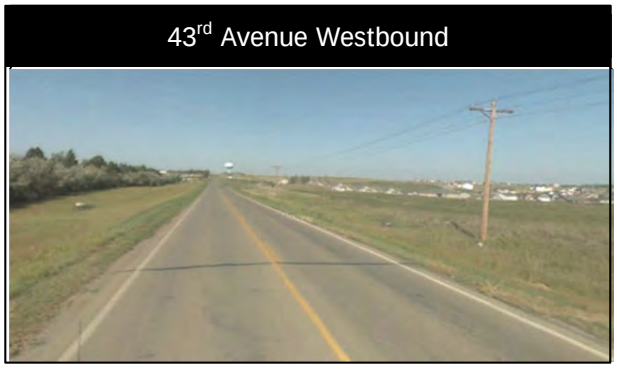
Where the City meets the Country

Figure 3 -12

Segment 1 - Assessment of Access and Crash Locations

Segment 2 – 43rd Avenue from Washington Street to US-83 (1.0 mile)

Segment 2 of the corridor is a section of 43rd Avenue that extends from Washington Street to US-83, a distance of approximately 1.0 mile. The existing speed limit is 45-mph and 2010 traffic volumes ranged from 2,800 to 4,400 vehicles per day. The land adjacent to 43rd Avenue consists primarily of low and medium density residential and undeveloped areas.



The existing right-of-way for this segment ranges from 120 to 150 feet.

Access:

For access management assessment purposes, it is assumed that the land-use is classified as low-density residential. Within the segment, there are 12 access points to the roadway of which 6 are public and 6 are private. The average access density equates to 12 access points per mile. It should be noted that the identified access points for roadway segments 2 through 8 will contain one more access point than reported in Table 3-4. In that table access points at the corridor endpoints (intersections) were only counted for the segment to the west to avoid double-counting.

Safety:

The crash rate on this segment was 8.8 per mvmt, which is nearly 60 percent higher than the corridor as a whole. The signalization of the intersection at Washington Street should help reduce the future crash rate. **Table 3-7** presents a crash summary for this segment.

Table 3-7. Segment 2: Washington Street to US 83 (State Street)

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
35	14	11	2	2	3	3	**8.80**	0	7	28	12
na	40%	31%	6%	6%	9%	9%		0%	20%	80%	

SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

Figure 3-13 contains two maps, one showing existing access locations and one displaying crash locations. In reviewing the information, it appears that there could be a correlation between access and crashes at three of these locations.

43rd Avenue: Washington Street to US 83 (1.0 mile)

Existing Access Spacing Compared to Spacing per Policy Guidelines

Common Access and Crash Location s

Crash Locations:

Observation / Assessment:

Three common access and crash location.

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 3 -13

Segment 2 - Assessment of Access and Crash Locations

Segment 3 – 43rd Avenue from US-83 (State Street) to 19th Street (0.50 mile)

Segment 3 of the corridor is a section of 43rd Avenue that extends from US-83 to 19th Street, a distance of approximately 0.50 mile. The existing speed limit is 45-mph and the 2010 traffic volume was 2,400 vehicles per day. Within this segment, 43rd Avenue has a speed limit of 45 mph with a traffic signal at US-83. The land adjacent to 43rd Avenue consists primarily of undeveloped land, commercial, storage, and medium density residential.

The existing right-of-way for this segment ranges from 100 to 120 feet.

Access:

For access management assessment purposes, it is assumed that the land-use is classified as commercial. Within the segment, there are 6 access points of which 4 are public and 2 are private. The average access density equates to 12 access points per mile.

Safety:

This segment had a crash rate of 15.9 per mvmt, which is nearly four times the Burleigh County average and 8 times the average for all roadways in North Dakota. **Table 3-8** shows the crash characteristics of this segment for the 2009 -2011 time frame.

Table 3-8. Segment 3: US 83 to 19th Street

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
21	7	8	1	2	0	3	**15.9**	0	5	16	12
na	33%	38%	5%	10%	0%	14%		0%	24%	76%	

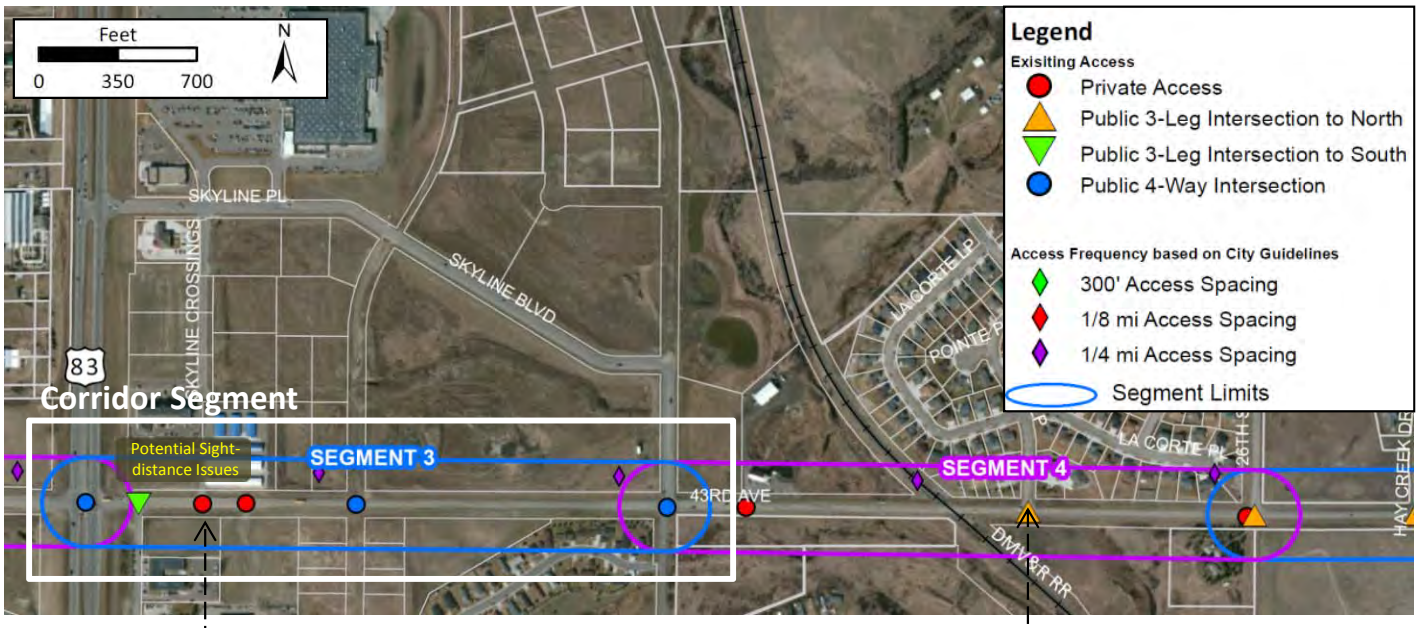
NOTE: Sight-distance Discussion

Just east of US-83 there is a crest of a hill where the profile coming from the east is approximately 7 percent. In addition to "stopping" sight-distance, another important design consideration is "decision" sight-distance, which is the distance necessary for a driver to detect an unexpected condition and initiate evasive action by maneuvering their vehicle at the same or reduced speed. Currently, the options for taking evasive action are limited due to inadequate shoulders or the presence of another travel lane to maneuver. However, upon reconstruction assuming the presence of a shoulder or another travel lane, the sight-distance should be 675 feet to allow time to change speed/path/direction to avoid a crash.

Figure 3-14 presents the access and crash locations within this segment. In reviewing the information, it appears that there could be a correlation between access and crashes at two of these locations.

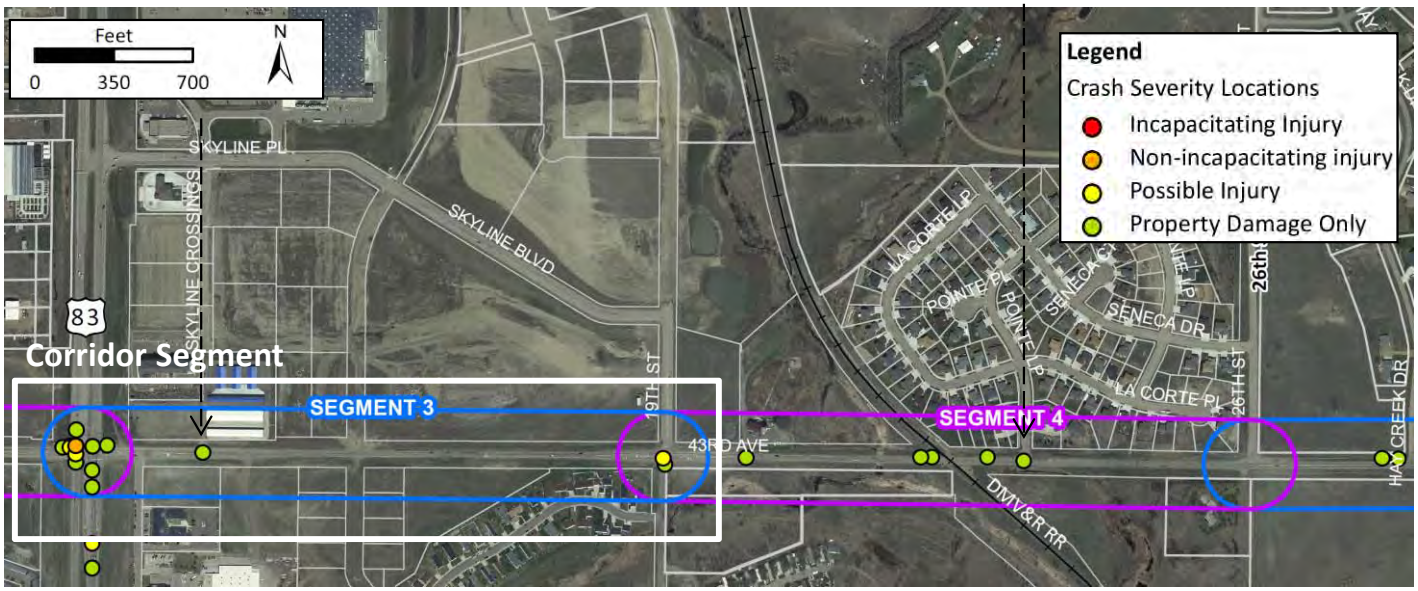
43rd Avenue: US 83 to 19th Street (0.5 miles)

Existing Access Spacing Compared to Spacing per Policy Guidelines



Common Access and Crash Location s

Crash Locations:



Observation / Assessment:

Two common access and crash location.

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Figure 3 -14

Segment 3 - Assessment of Access and Crash Locations

Segment 4 – 43rd Avenue from 19th Street to 26th Street (0.5 mile)

Segment 4 of the corridor is a section of 43rd Avenue that extends from 19th Street to 26th Street, a distance of approximately 0.50 mile. The posted speed limit is 45 mph and the 2010 traffic volume was 3,400 vehicles per day.

The land adjacent to 43rd Avenue consists primarily of undeveloped land and medium density residential (manufactured housing) south of 43rd Avenue and low density residential north of 43rd Avenue. Located along this segment are a box culvert structure for Hay Creek and an at-grade railroad crossing (Dakota, Missouri Valley & Western Railroad), which averages less than 5 trains per day. There are also overhead transmission lines that cross the corridor in the vicinity of 26th Street.

The existing right-of-way for this segment ranges from 100 to 120 feet.

Access:

For access management assessment purposes, it is assumed that the land-use is classified as low-density residential. Within the segment, there are 5 access points to the roadway of which 3 are public and 2 are private. The average access density equates to 10 access points per mile.

Safety:

The crash rate on this segment of 3.8 per mvmt is lower than the corridor as a whole. **Table 3-9** shows the crash characteristics of this segment for the 2009 -2011 time frame.

Table 3-9. Segment 4: 19th Street to 26th Street

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
7	1	4	0	1	0	1	**3.8**	0	1	6	10
na	14%	57%	0%	14%	0%	14%		0%	14%	86%	

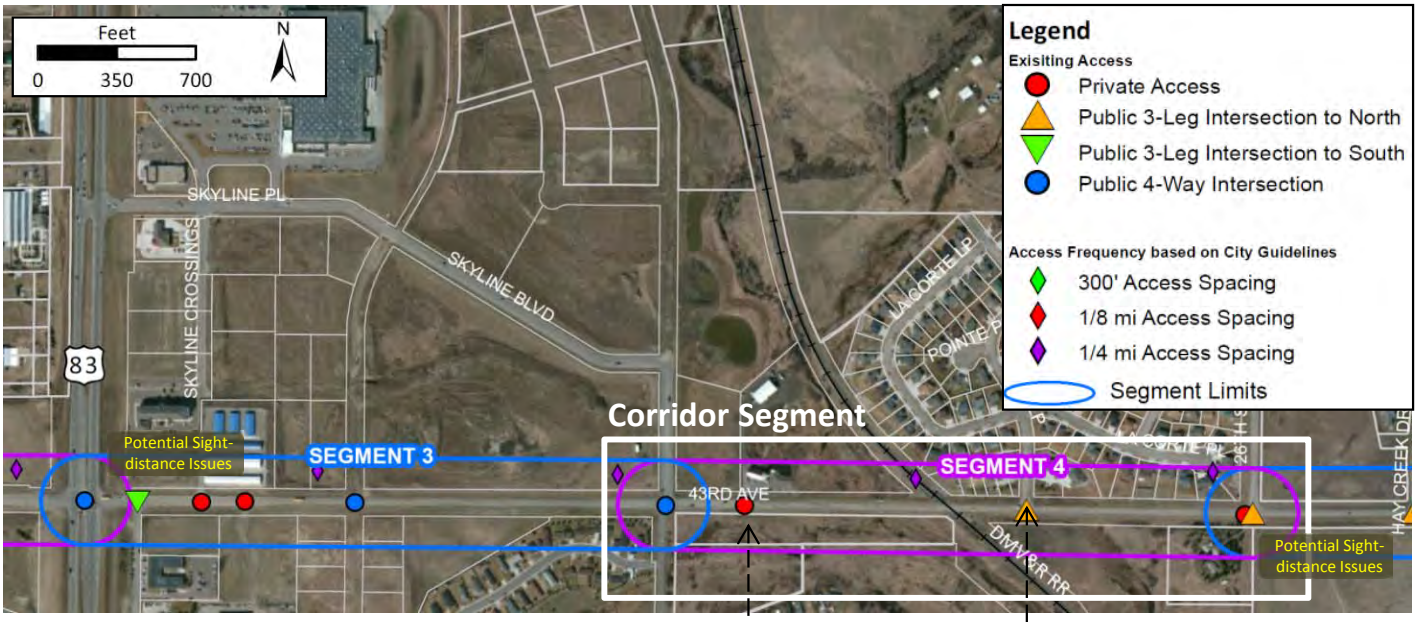
SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

Figure 3-15 presents the access and crash locations within this segment. In reviewing the information, it appears that there could be a correlation between access and crashes at two of these locations.

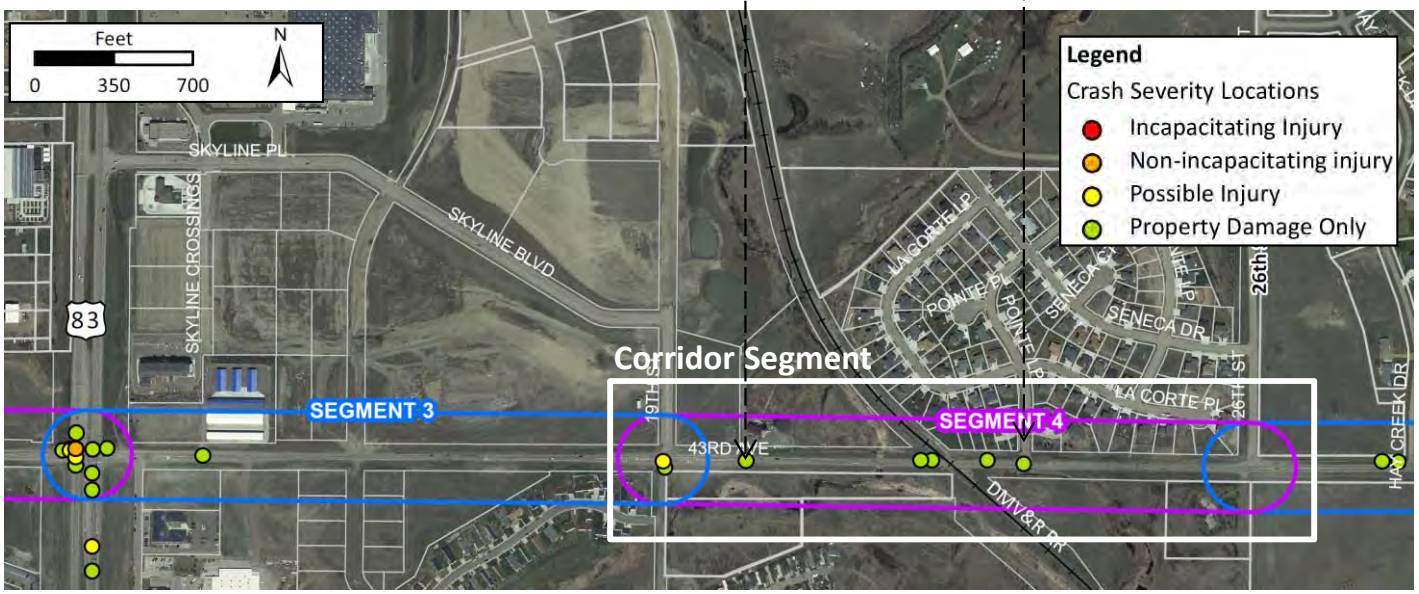
43rd Avenue: 19th Street to 26th Street (0.5 miles)

Existing Access Spacing Compared to Spacing per Policy Guidelines



Common Access and Crash Location s

Crash Locations:



Observation / Assessment:

Two common access and crash location.

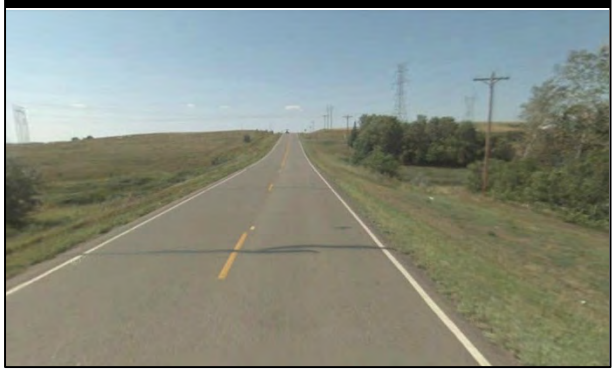
Segment 5 – 43rd Avenue from 26th Street to Centennial Road (1.0 mile)

Segment 5 of the corridor is a section of 43rd Avenue that extends from 26th Street to Centennial Road, a distance of approximately 1.0 mile. The existing speed limit is 45-mph and the 2010 traffic volume was 2,300 vehicles per day.

The land adjacent to 43rd Avenue consists primarily of low density residential along the northern side of 43rd Avenue and undeveloped land along the south side.

43rd Avenue Eastbound

43rd Avenue Westbound



The existing right-of-way for this segment ranges from 100 to 150 feet

Access:

For access management assessment purposes, it is assumed that the land-use is classified as low-density residential. Within the segment, there are 12 access points to the roadway of which 8 are public and 4 are private. The average access density equates to 12 access points per mile. Between 26th Street and Hay Creek Drive, there is a crest of a hill that may limit sight distance.

Safety:

This segment had an incredibly high crash rate of 51.8 per mvmt, which is over 10 times higher than the Burleigh County average. The reason the rate is so high is two-fold, one is that there were a lot of crashes, and secondly, the traffic volumes on this roadway segment are very low, averaging less than 300 vehicles per day during the time period from when the crash data was collected. **Table 3-10** shows the crash characteristics of this segment for the 2009 -2011 time frame.

Table 3-10. Segment 5: 26th Street to Centennial Road

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
17	3	5	1	5	2	1	**51.8**	0	6	11	12
na	18%	29%	6%	29%	12%	6%		0%	35%	65%	

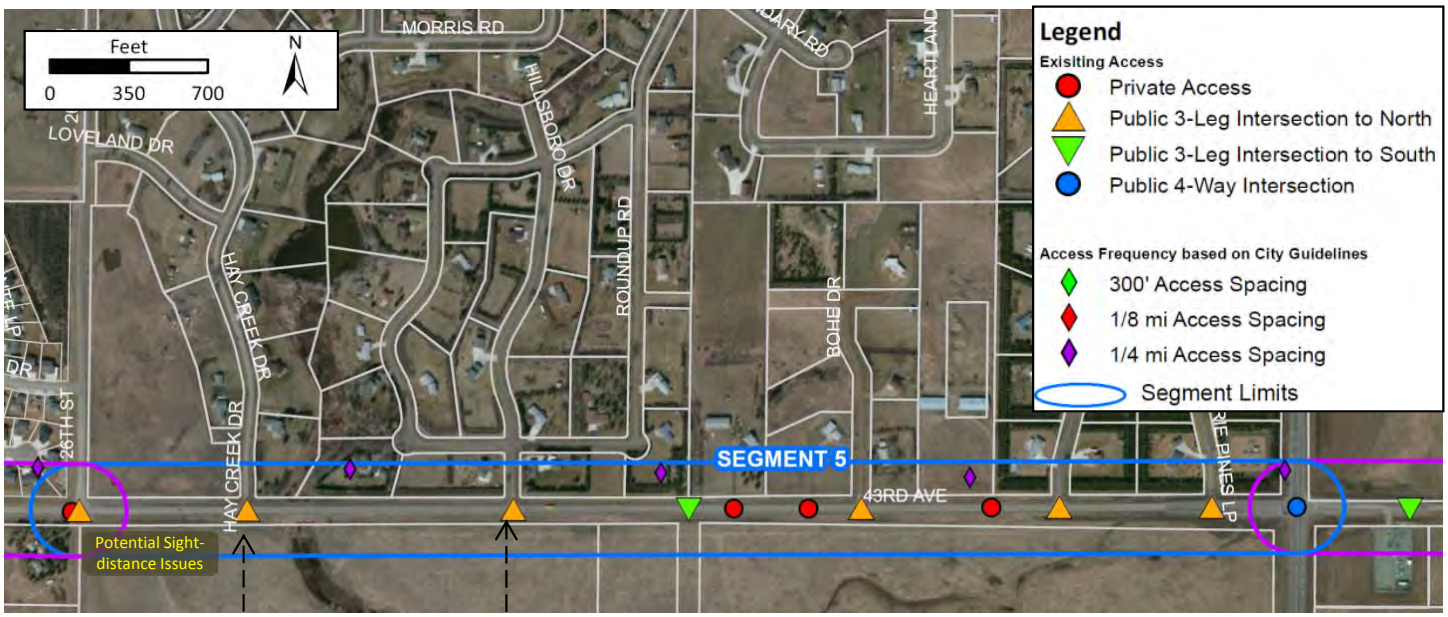
SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

Figure 3-16 presents the access and crash locations within this segment. In reviewing the information, it appears that there could be a correlation between access and crashes at two of these locations.

43rd Avenue: 26th Street to Centennial Road (1.0 mile)

Existing Access Spacing Compared to Spacing per Policy Guidelines



Common Access and Crash Location s

Crash Locations:

Observation / Assessment:

Two common access and crash location.

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Figure 3 -16

Segment 5 - Assessment of Access and Crash Locations

Segment 6 – 43rd Avenue from Centennial Road to Roosevelt Drive (0.5 mile)

Segment 6 of the corridor is a section of 43rd Avenue that extends from Centennial Road to Roosevelt Drive, a distance of approximately 0.50 mile. The land adjacent to 43rd Avenue consists primarily of undeveloped land with a few single family homes on the south side of 43rd Avenue. The existing speed limit is 55-mph and the 2010 traffic volume was less than 500 vehicles per day.

The existing right-of-way for this segment ranges from 100 to 120 feet

Access:

For access management assessment purposes, it is assumed that the land-use is classified as low-density residential. Within the segment, there are 6 access points to the roadway of which 4 are public and 2 are private. The average access density equates to 12 access points per mile.

Safety:

The crash rate of 42.6 per mvmt is ten times that of the Burleigh County average. Similar to Segment 5, this segment had a lot of crashes and the daily traffic volumes were low. **Table 3-11** shows the crash characteristics of this segment for the 2009 -2011 time frame.

Table 3-11. Segment 6: Centennial Road to Roosevelt Drive

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
14	3	5	1	3	1	1	**42.6**	0	6	8	12
na	21%	36%	7%	21%	7%	7%		0%	43%	57%	

SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

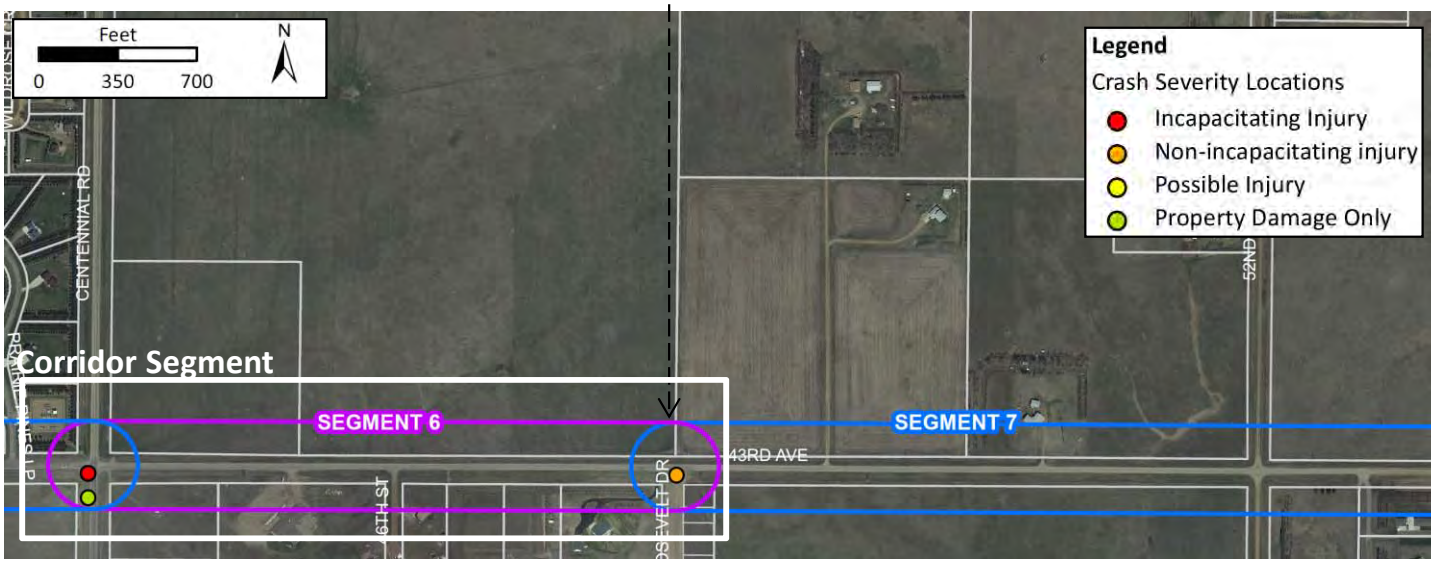
Figure 3-17 presents the access and crash locations within this segment. In reviewing the information, it appears that there could be a correlation between access and crashes at one of these locations.

43rd Avenue: Centennial Road to Roosevelt Drive (0.5 miles)

Existing Access Spacing Compared to Spacing per Policy Guidelines

Common Access and Crash Location

Crash Locations:



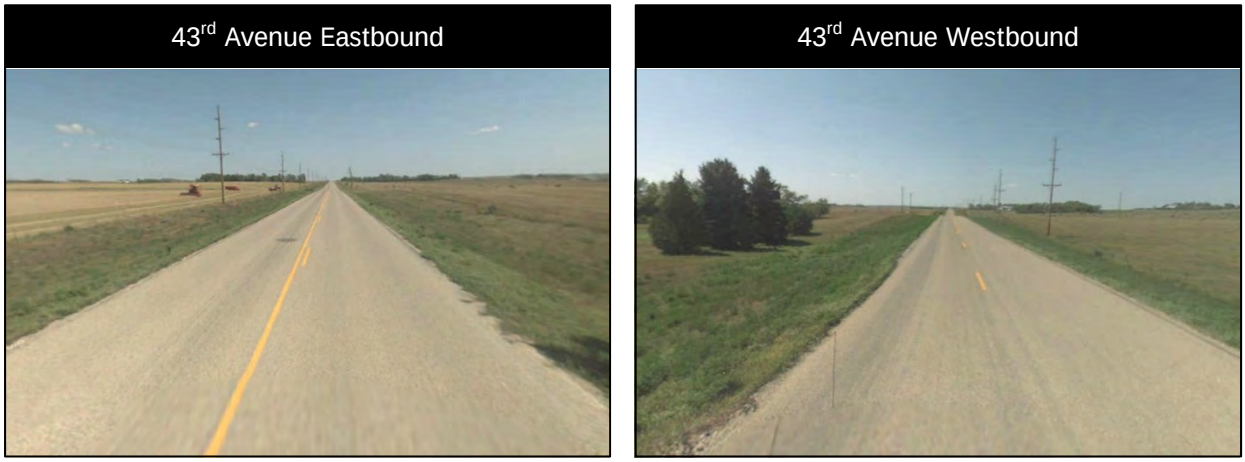
Observation / Assessment:

One common access and crash location.

Segment 7 – 43rd Avenue from Roosevelt Drive to 66th Street (1.5 miles)

Segment 7 of the corridor is a section of 43rd Avenue that extends from Roosevelt Drive to 66th Street, a distance of approximately 1.50 miles. The existing speed limit is 55-mph and the 2010 traffic volume was less than 500 vehicles per day.

The land adjacent to 43rd Avenue consists primarily of undeveloped land with a few single family homes on the each side of 43rd Avenue.



The existing right-of-way for this segment ranges from 66 feet to 120 feet, with the 66-foot section extending for on-half mile from Roosevelt Drive to 52nd Street. The remainder of the 1.5 mile long segment has between 100 and 120 feet of right-of-way.

Access:

For access management assessment purposes, it is assumed that the land-use is classified as rural residential. Within the segment, there are 11 access points to the roadway of which 4 are public and 7 are private. The average access density equates to 7 access points per mile.

Safety:

This segment had a crash rate of 8.1 per mvmt, which is double the Burleigh County average and 4 times the average for all roadways in North Dakota. **Table 3-12** shows the crash characteristics of this segment for the 2009 -2011 time frame.

Table 3-12. Segment 7: Roosevelt Drive to 66th Street

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
4	0	0	0	0	4	0	**8.1**	0	2	2	7
na	0%	0%	0%	0%	100%	0%		0%	50%	50%	

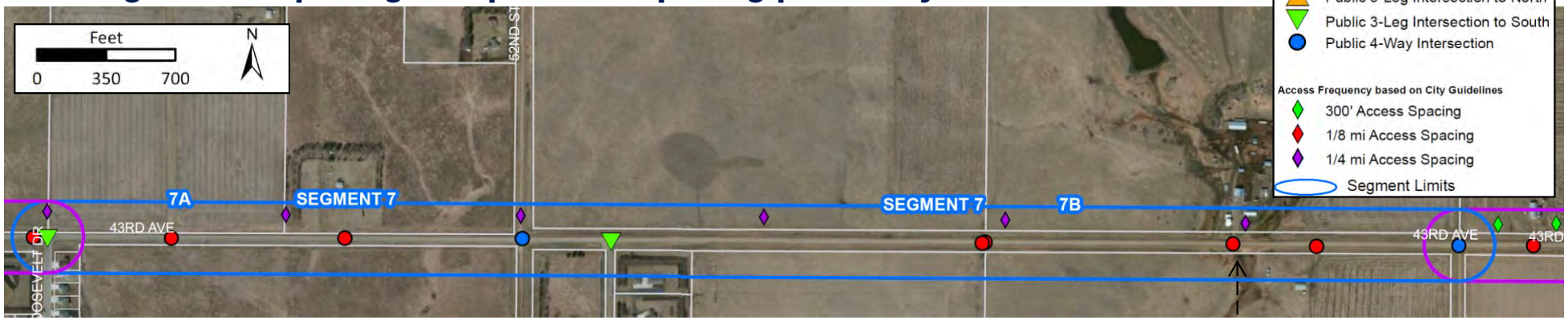
SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

Figure 3-18 presents the access and crash locations within this segment. reviewing the information, it appears that there could be a correlation between access and crashes at one of these locations.

43rd Avenue: Roosevelt Drive to 66th Street (1.5 miles)

Existing Access Spacing Compared to Spacing per Policy Guidelines



Common Access and Crash Location

Crash Locations:

Observation / Assessment:

One common access and crash location.

43RD AVENUE CORRIDOR STUDY
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Figure 3 -18

Segment 7 - Assessment of Access and Crash Locations

Segment 8 – 43rd Avenue from 66th Street to 80th Street (1.0 miles)

Segment 8 of the corridor is a section of 43rd Avenue that extends from 66th Street to 80th Street, a distance of approximately 1.0 mile. The existing speed limit is 55-mph and the 2010 traffic volume was less than 500 vehicles per day.

The land adjacent to 43rd Avenue consists primarily of undeveloped land.

The existing right-of-way for this segment ranges from 100 to 120 feet

Access:

For access management assessment purposes, it is assumed that the land-use is classified as rural residential. Within the segment, there are 6 access points to the roadway of which 2 are public and 4 are private. The average access density equates to 6 access points per mile

Safety:

Only one crash was reported on this segment during the 2009 – 2011 timeframe as shown on **Table 3-13**. While it doesn't appear that sight-distance was a factor in the crash, there is a crest of a hill approximately 1,500 east of 66th Street that could create issues in the future as traffic volumes and access points increase. Upon reconstruction of the roadway, the profile should be designed to provide the appropriate stopping and decision sight-distance per AASHTO guidelines.

Table 3-13. Segment 8: 66th Street to 80th Street

TOTAL CRASHES	CRASH TYPE						CRASH RATE	CRASH SEVERITY TYPE			Access Density (per mile)
	Right Angle	Rear End	Left Turn	Sideswipe	Non-Collision	Other		Fatal	Injury	Property Damage Only	
1	0	0	0	0	1	0	**3.0**	0	1	0	6
na	0%	0%	0%	0%	100%	0%		0%	100%	0%	

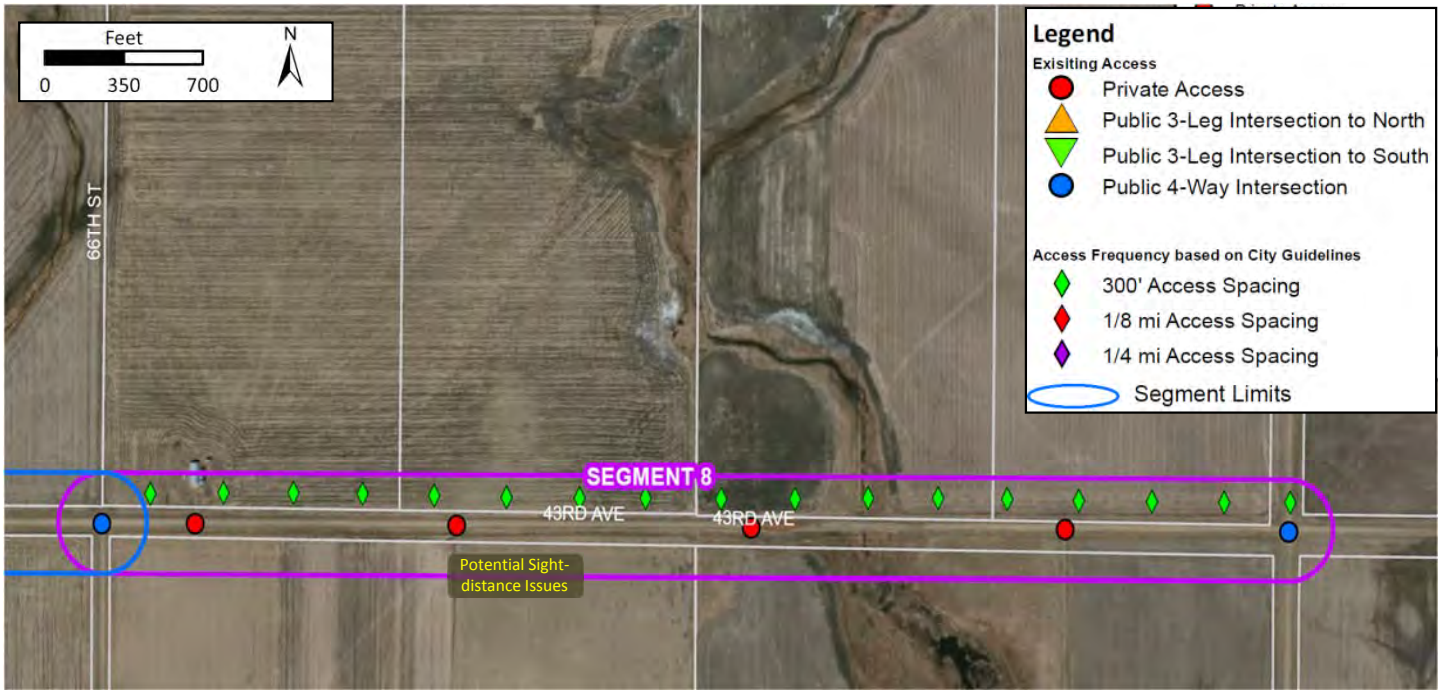
SOURCE: NDDOT, Bismarck - Mandan MPO, and WSB & Associates, Inc.

K:\02081-000\Traffic\Crash Data\[Crash_Tables for Report.xlsx]43rd Ave Segments

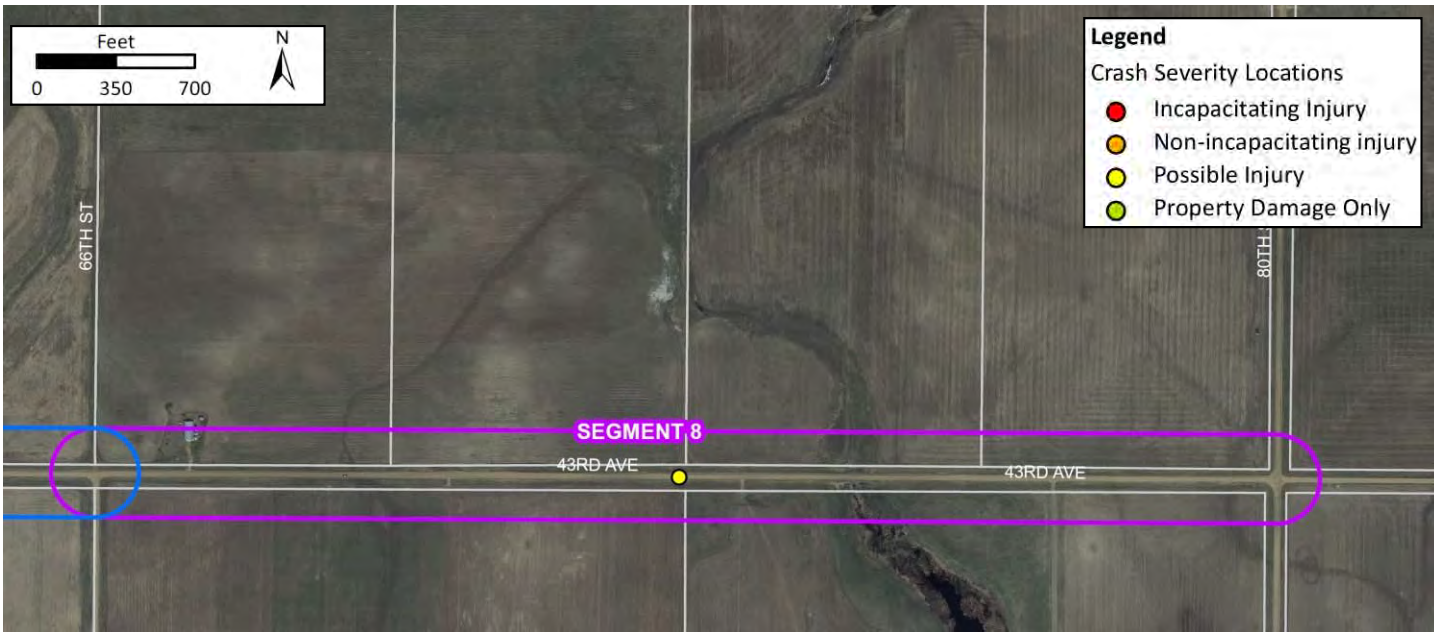
Figure 3-19 presents the access and crash locations within this segment. In reviewing the information, the location of the crash was not at an access point.

43rd Avenue: 66th Street to 80th Street (1.0 mile)

Existing Access Spacing Compared to Spacing per Policy Guidelines



Crash Locations:



Observation / Assessment:

No common access and crash location.

Figure 3 -19

Segment 8 - Assessment of Access and Crash Locations

3.5 Traffic Capacity Analyses

The roadway system has a finite vehicle-carrying capacity. The maximum number of vehicles that a roadway segment or intersection can accommodate is defined as *Roadway Capacity*. As traffic volumes increase and approach the capacity of a segment or intersection, travel delays increase. When traffic volumes are at the roadway's capacity threshold, delays are excessive and traffic flow breaks down. This is also referred to as a *Capacity Deficiency*. The approach to the capacity analysis is derived from the established methodologies documented in the Highway Capacity Manual (HCM), 2000. The HCM contains a series of analysis techniques that are used to evaluate the operation of transportation facilities under specified conditions.

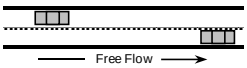
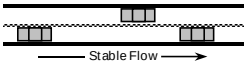
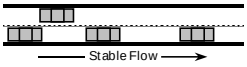
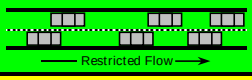
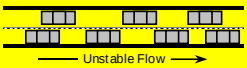
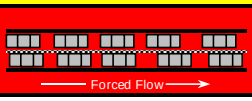
Traffic Terminology
Roadway Capacity is the maximum number of vehicles a street segment / intersection can accommodate. As traffic volumes approach roadway capacity, travel delays increase.
Capacity Deficiency is the condition where traffic volumes reach a level that causes undesirable travel delays.

The results of the traffic analysis are typically presented in the form of a letter grade (A-F) that provides a qualitative indication of the operational efficiency or effectiveness. The letter grade assigned to traffic operations analysis results is referred to as level of service (LOS). By definition, LOS A conditions represent free-flow conditions (i.e., low traffic volumes and no delay) and LOS F conditions represent forced-flow conditions (i.e., heavy traffic volumes with long delays). In very large urban areas where congestion is severe, the local transportation agencies realize that it isn't realistic to plan on providing the necessary infrastructure to accommodate LOS conditions of C or better as it would be too costly. Furthermore, motorists in these large urban areas tend to have a higher threshold for traffic congestion. In smaller urban areas such as the Bismarck – Mandan Area, residents are used to relatively congestion-free travel and as such, the Bismarck – Mandan MPO has established a LOS D as representing a capacity deficiency. Therefore, in planning and designing roadway improvements, the guideline is to provide enough capacity to maintain stable traffic flow, or LOS C conditions.

3.5.1 Existing Segment Level of Service (LOS)

In general, the capacity of a roadway segment is a measure of its ability to accommodate a certain volume of moving vehicles. The segment LOS in this context refers to a quantitative comparison between the existing volume on a roadway and the maximum volume of traffic or capacity the roadway can be expected to accommodate. In analyzing roadway segment LOS, traffic volume and capacity are often evaluated in terms of daily traffic volumes. Because traffic is not spread out evenly throughout the day, the daily traffic capacity value accounts for the approximate amount of daily traffic levels that occurs during times of the day, including peak travel periods as well as times when traffic volumes are lowest, such as late-night hours. **Figure** 3-20 provides a description and illustration of the different capacity levels and how they relate to LOS or congestion levels and **Table 3-14** contains a summary of generalized traffic thresholds for specific roadway types, levels of service, and number of traffic lanes. The volumes shown are the maximum daily traffic volumes for each level of service category. For the 43rd Avenue Corridor Study, we use the values on this table to establish the LOS for 43rd Avenue and adjacent roadways for existing travel conditions and for future traffic projections that were developed for these roadways.

Figure 3-20. Roadway Capacity Levels

Capacity Level	LOS	Traffic Flow	Description
Under	A		**FREE FLOW** Low volumes and no delays.
	B		**STABLE FLOW** Low volumes and speeds dictated by travel conditions.
	C		**STABLE FLOW** Speeds and maneuverability closely controlled due to higher volumes.
Approaching	D		**RESTRICTED FLOW** Higher density traffic restricts maneuverability and volumes approaching capacity.
At	E		**UNSTABLE FLOW** Low speeds, considerable delays, and volumes at or slightly over capacity.
Over	F		**FORCED FLOW** Very low speeds, volumes exceed capacity, and long delays with stop-and-go traffic.

SOURCE: Highway Capacity Manual and WSB & Associates, Inc.

Table 3-14. Planning Level Capacity Thresholds

Daily Traffic Level of Service (LOS) Capacity Thresholds (upper limits)						
Roadway Type and Number of Lanes [1]	**LOS A**	**LOS B**	**LOS C**	Restricted Flow **LOS D**	Unstable Flow **LOS E**	Forced Flow Congestion **LOS F**
Freeway (6-lanes)	Under 32,400	< 51,600	< 77,300	< 98,900	< 120,000	Over 120,000
Freeway (4-lanes)	Under 15,800	< 33,600	< 50,400	< 64,400	< 78,100	Over 78,100
Divided Arterial (6-lanes)	Under 18,000	< 28,800	< 46,100	< 51,600	< 57,500	Over 57,500
Divided Arterial (4-lanes)	Under 11,900	< 19,100	< 30,500	< 34,400	< 38,100	Over 38,100
Principal Arterial (5-lanes)	Under 11,400	< 18,200	< 29,100	< 32,600	< 36,300	Over 36,300
Principal Arterial (4-lanes)	Under 7,600	< 12,100	< 19,400	< 23,300	< 27,600	Over 27,600
Principal Arterial (3-lanes)	Under 4,900	< 7,900	< 12,700	< 17,000	< 21,100	Over 21,100
Principal Arterial (2-lanes)	Under 3,100	< 5,000	< 8,000	< 12,000	< 15,900	Over 15,900
Minor Arterial (5-lanes)	Under 10,400	< 16,600	< 26,500	< 30,000	< 33,100	Over 33,100
Minor Arterial (4-lanes)	Under 6,600	< 10,600	< 17,000	< 20,500	< 24,200	Over 24,200
Minor Arterial (3-lanes)	Under 4,300	< 6,900	< 11,100	< 14,800	< 18,500	Over 18,500
Minor Arterial (2-lanes)	Under 2,700	< 4,300	< 6,900	< 10,300	< 13,700	Over 13,700
Collector (3-lanes)	Under 3,700	< 5,900	< 9,400	< 12,500	< 15,700	Over 15,700
Collector (2-lanes)	Under 2,200	< 3,600	< 5,800	< 8,800	< 11,700	Over 11,700

[1] Number of lanes refers to through-lanes. 3 lanes and 5 lanes represent a continuous center left-turn lane.

SOURCE: Highway Capacity Manual and WSB & Associates

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Using the capacity thresholds contained in this table for the various roadway types, a base year condition was established for the 43rd Avenue Corridor.

As the table to the right shows, all analyzed roadways within the corridor function at a LOS C or better.

2010 Measurement	LOS A-C Under Capacity	LOS D Approaching Capacity	LOS E At Capacity	LOS F Over Capacity	Total
Miles	7.1	0.0	0.0	0.0	7.1
Percentage	100.0%	0.0%	0.0%	0.0%	0%

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Detailed information on the capacity analysis of existing conditions is shown **Tables 3-15** and **3-16.**

Table 3-15. 43rd Avenue Capacity Analysis for Existing Conditions (2010)

Corridor / Roadway Segment		From	To	Length (mi.)	Functional Classification	Roadway Typical Section [1]	Daily Traffic Volume	Level of Service (LOS) [2]
Corridor Segments	1A	Butte Drive	Valley Drive	0.55	Minor Arterial	2-lanes	1,400	A
	1B	Valley Drive	Washington Street	0.55	Minor Arterial	2-lanes	3,000	B
	2A	Washington Street	Coleman Street	0.60	Principal Arterial	2-lanes	2,800	A
	2B	Coleman Street	US 83 (State Street)	0.40	Principal Arterial	2-lanes	4,400	B
	3	US 83 (State Street)	19th Street	0.50	Principal Arterial	2-lanes	2,400	A
	4	19th Street	26th Street	0.50	Principal Arterial	2-lanes	3,400	B
	5	26th Street	Centennial Road	1.00	Principal Arterial	2-lanes	2,300	A
	6	Centennial Road	Roosevelt Drive	0.50	Minor Arterial	2-lanes	300	A
	7A	Roosevelt Drive	52nd Street	0.50	Minor Arterial	2-lanes	300	A
	7B	52nd Street	66th Street	1.00	Collector	2-lanes	300	A
	8	66th Street	80th Street	1.00	Collector	2-lanes	300	A
80th Street			106th Street	--	Collector	2-lanes	300	A

[1] The Typical Section for the identified roadway segments refers to the travel-lane geometry of the roadway, i.e., a 2-lane section means there is one lane in each direction of travel.

[2] The LOS presented in this table represents a Planning Level of Service to determine the capacity or congestion on roadway segments, not intersections. This level of analysis does not calculate LOS at intersections, which is determined through an operations analysis.

SOURCE: Bismarck - Mandan MPO and WSB & Associates, Inc.

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Table 3-16. Existing Segment Level of Service: North-South Roadways

Roadway	Segment *(North or South of 43rd Avenue)*	Functional Classification	Roadway Typical Section [1]	Daily Traffic Volume	Level of Service (LOS) [2]
Valley Drive	North	Collector	2-lanes	1,500	A
Washington Street	North	Principal Arterial	2-lanes	3,000	A
Washington Street	South	Principal Arterial	2-lanes	6,700	C
US-83	North	Principal Arterial	4-lane Divided	14,700	B
US-83	South	Principal Arterial	6-lane Divided	22,700	B
19th Street	North	Collector	3-lanes	1,600	A
19th Street	South	Collector	3-lanes	2,300	A
26th Street	North	Minor Arterial	2-lanes	na	na
Centennial Road	South	Principal Arterial	2-lanes	5,700	A
Centennial Road	North	Principal Arterial	2-lanes	6,700	A
Roosevelt Drive	South	Local	2-lanes	1,300	A
52nd Street	North	Local	2-lanes	na	na
52nd Street	South	Local	2-lanes	na	na
66th Street	South	Local	2-lanes	na	na
80th Street	North	Local	2-lanes	na	na
80th Street	South	Local	2-lanes	na	na

na: not available

[1] The Typical Section for the identified roadway segments refers to the travel-lane geometry of the roadway, i.e., a 2-lane section means there is one lane in each direction of travel.

[2] The LOS presented in this table represents a Planning Level of Service to determine the capacity or congestion on roadway segments, not intersections. This level of analysis does not calculate LOS at intersections, which is determined through an operations analysis.

SOURCE: Bismarck - Mandan MPO and WSB & Associates, Inc.

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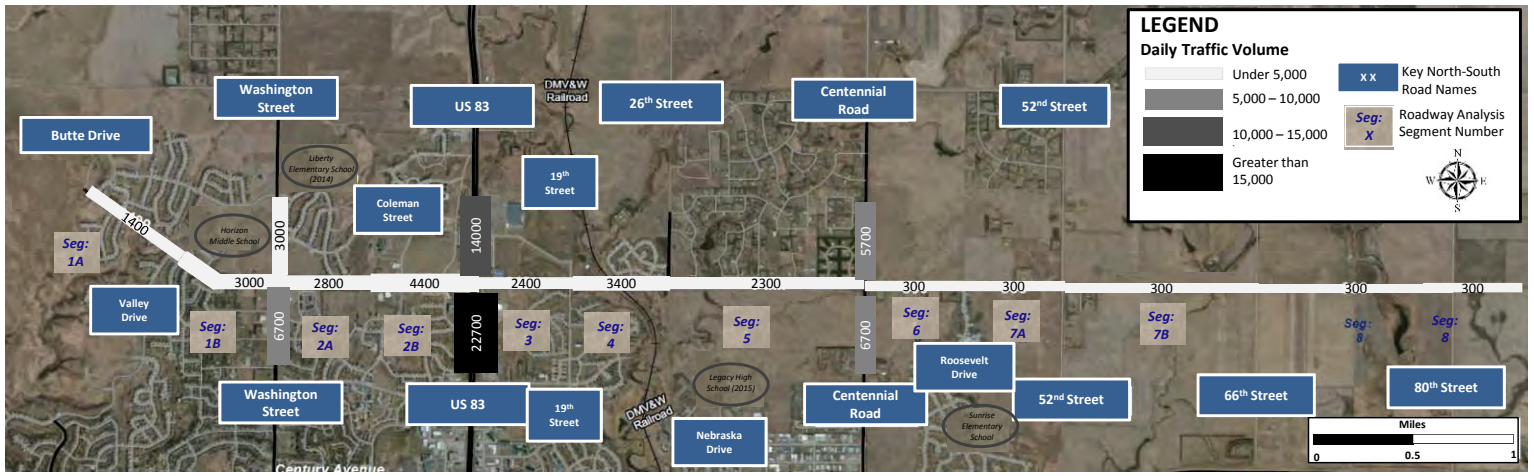
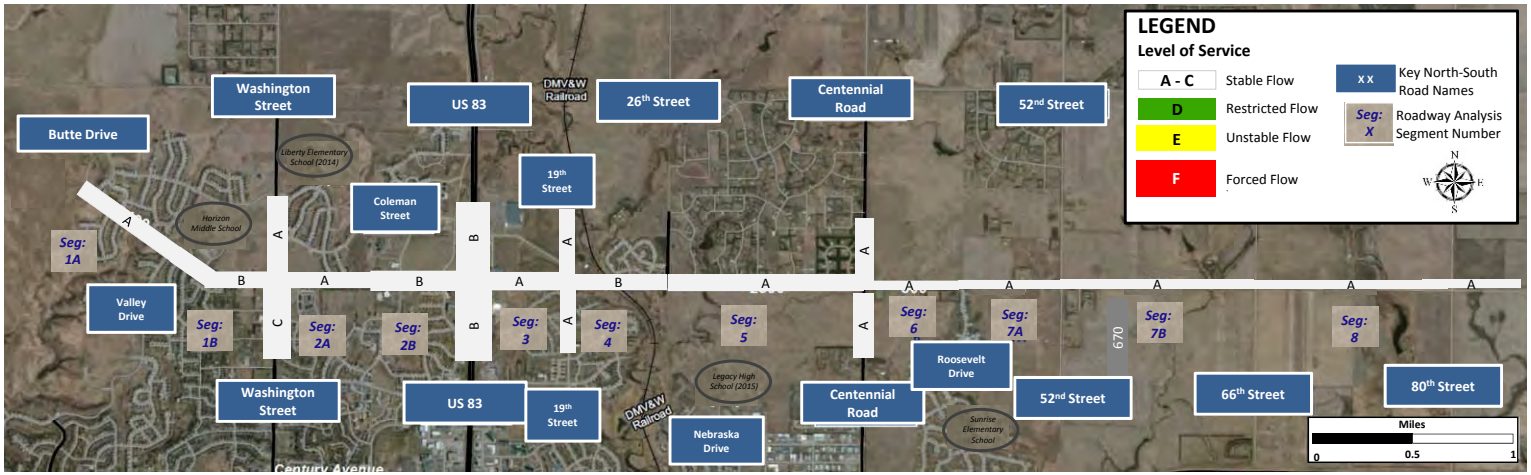
Figure 3-21 displays the 2010 traffic and congestion levels for the corridor, including the major intersecting north-south roadways.

Existing Daily Traffic Volumes



Existing Daily Traffic Congestion



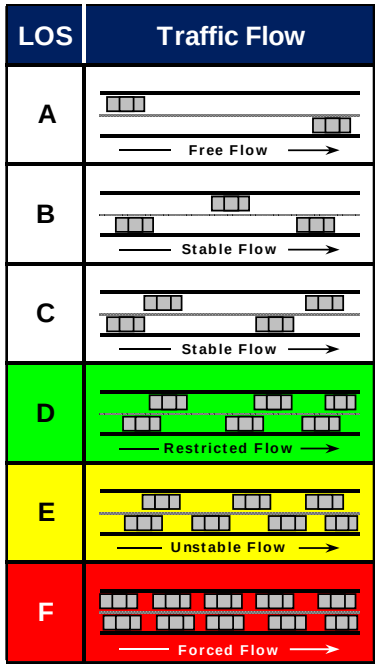


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Figure 3-21

Existing Daily Traffic and Congestion Levels

Existing Intersection Control Techniques within the Corridor

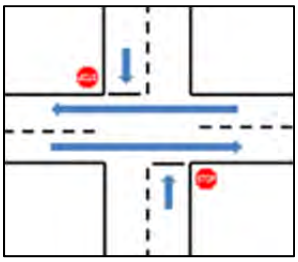
Within the corridor there are currently two techniques used for intersection traffic control, these area:

- Stop Sign Control
- Signal Control – Traffic Light

Provided in the following sections are an overview of the use of these within the corridor, and secondly and operations analysis of the signalized intersection of 43rd Avenue and US 83

Within the corridor there are two signalized intersections. One location is at US 83 and the other is at Washington Street, which was recently installed in February, 2013. All other intersections are stop sign controlled. Below are descriptions and general information related to the existing traffic control along the 43rd Avenue Corridor.

Stop Sign Control

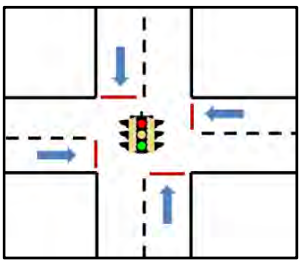


Description: Stop signs are often used to control conflicting traffic movements at intersections which are not busy enough to justify the installation of a traffic signal or roundabout. A stop sign notifies drivers that they must stop before proceeding into the intersection. Drivers on the stopped approaches must yield the right-of-way to drivers traveling on the uncontrolled roadway or those within the intersection. Stop signs may be erected on some approaches (side-street stop condition) or all approaches (all-way stop condition).

Typical Applications: Intersections where the minor street traffic volumes are relatively low.

Typical Cost: Low cost involving signing and striping.

Signal Control – Traffic Light



Description: Signal devices positioned at road intersections, pedestrian crossings, and other locations to control competing flows of traffic. Traffic signals alternate the right of way accorded to road users by displaying lights of a standard color (red, yellow/amber, and green). A green light allows traffic to proceed in the direction denoted. A yellow/amber light denoting prepare to stop at the intersection. A red signal prohibits any traffic from proceeding.

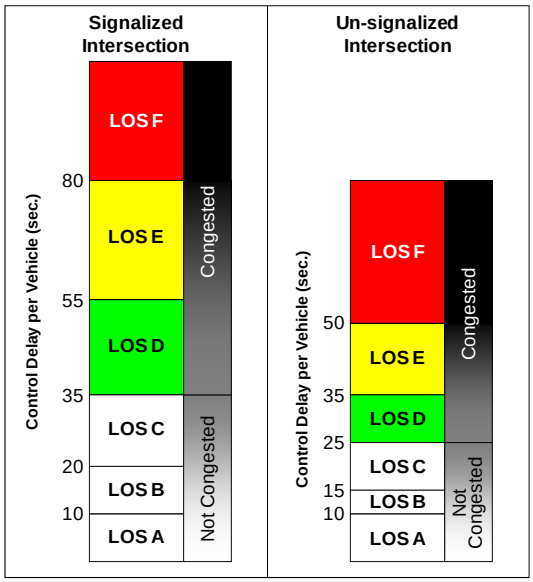
Typical Applications: Intersections where traffic volumes are high enough to justify its installation. High pedestrian crossing volumes may also justify a signal.

Typical Cost: Moderate cost involving a signal system consisting of poles and mast arms or cable to hold the signals. Additional through and turn lanes may also be needed in order to store queued vehicles. The cost of a new signal system typically ranges from $150,000 to $250,000 (not including the cost to update the intersection geometry).

3.5.2 Existing Intersection Capacity Analysis

Intersection level of service typically focuses on operations during the periods of the day with the highest traffic volumes. Thus, the intersection LOS analysis gives a "worst-case" result for each intersection and more clearly identifies operational problems at the intersections. Presented below is a graphic showing intersection LOS thresholds, in terms of average vehicle delay (seconds), as defined in the Highway Capacity Manual.

Intersection Level of Service Thresholds



SOURCE: Highway Capacity Manual and Bismarck – Mandan LRTP.
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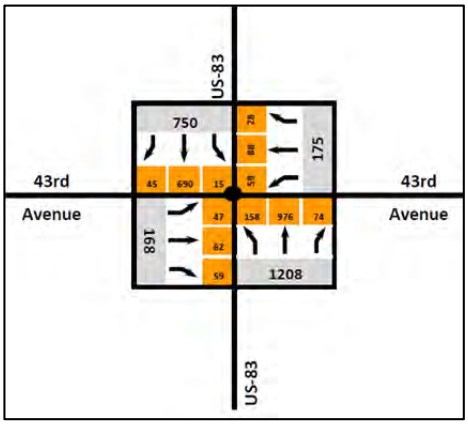
The intersection operational analysis process includes determining the level of service for each of the key intersections under the existing peak hour conditions. As with the roadway segment capacity analysis, the LOS C/D boundary is the indicator of acceptable traffic operations and congestion. LOS C indicates that the intersection is operating at the minimum acceptable standard during peak hours and it should be monitored to ensure that acceptable operations are maintained.

3.5.2.1.1 Intersection Level of Service

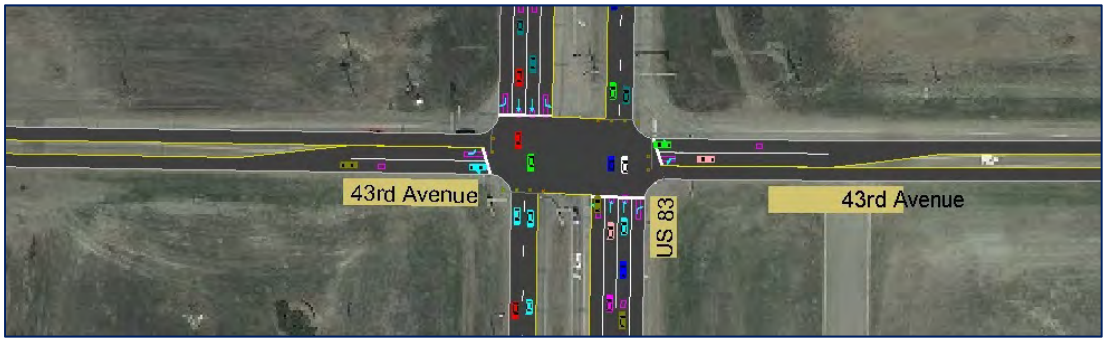


Within the corridor there are currently two intersections with traffic signals. One is at the intersection of Washington Street with Ash Coulee Drive/43rd Avenue, which was recently installed, and the other one is at the intersection of 43rd Avenue and US-83. Using P.M. Peak-hour turning movement traffic counts from 2010 (shown in image to the right), this intersection was analyzed to assess its existing operation in terms of level of service.

The analysis was performed using Synchro / SimTraffic modeling software to define existing conditions using existing traffic count information. Synchro was used to build each intersection and provide an input database for turning-movement volumes, lane geometrics, and traffic control design and characteristics.

Outputs from Synchro were then transferred to SimTraffic, the traffic simulation model. SimTraffic simulates each individual vehicle's characteristics and driver behavior in response to traffic volumes, intersection configuration, and signal operations. It outputs estimated vehicle delay and queue lengths at each intersection being analyzed. Presented below is a snapshot of the modeling at the 43rd Avenue and US-83 intersection using existing traffic volumes.

Existing P.M. Peak-Hour Traffic Operations at 43rd Avenue and US-83



Existing Conditions Assessment:
Modeling the peak hour traffic (PM peak hour) revealed that:

- The intersection was operating at LOS B conditions. All approaches were also operating at LOS B conditions.
- Queue lengths for the turn lanes were maintained in the available storage. Through queues ranged from four to eight vehicles long.

US 83 Existing Conditions Summary:
The intersection is operating at acceptable conditions with existing traffic volumes and the existing geometry. Vehicle queues are within acceptable levels.

Overview of Information presented in Chapter 3:
Presented in Chapter 3 was an assessment of existing conditions within the corridor, including information on land-use, environmental considerations, and the overall transportation system including facilities and or service for travel by bicycle, walking, and transit. Also presented was extensive information on the roadway network, specifically an assessment in terms of access management, safety (crash analysis), and system performance with respect to congestion levels through the corridor. From this assessment, it was found that there is a lack of accommodations for bicyclists and pedestrians (lack of sidewalks and/or trails), and there are also deficiencies for motorists. Specifically, the corridor lacks adequate shoulders, which are necessary for two-lane roadways, particularly those with ditch drainage like 43rd Avenue, to allow motorists an area outside of the travel lane for maneuvering their vehicle in cases where evasive action is required (animal in roadway, etc.). Also, the lack of adequate travel shoulders may put motorists at risk for emergency stops, such as in the case where the vehicle becomes disabled (flat-tire) or police pull-overs.

Provide in Chapter 4 is information on travel conditions expected in the years 2025 and 2040 based on projected growth in the area.

Chapter 4
Future Year Conditions

This chapter presents information on growth projections for the overall Bismarck-Mandan area, with a focus of the 43rd Avenue Corridor. Also, the travel conditions for the years 2025 and 2040 will be analyzed to determine future issues and needs within the corridor.

4.1 Future Population and Employment

The recently developed population and employment projections for the area show tremendous growth for the entire Bismarck-Mandan Area, but the growth projected for the 43rd Avenue Corridor is particularly impressive. In 2010, the corridor area had a population of approximately 17,000 and contained 6,000 jobs. As a percentage of the entire region, this accounted for approximately 16 percent of the total population and 9 percent of all jobs. Over the next 20 to 30 years, it is projected that the entire region will add nearly 70,000 people and over 60,000 jobs with the 43rd Avenue Corridor accounting for a large percentage of the growth as displayed in **Table 4-1.**

Table 4-1. Population and Employment within the Corridor and Region

Geographic Area	Area (Sq. Mi.)	2010		2040		Increase in Population	Increase in Employment
		Pop.	Emp.	Pop.	Emp.		
43rd Avenue Corridor Area	18.0	16,700	6,000	47,500	29,400	30,800	23,400
Bismarck - Mandan MPO Area or Region	430.8	106,800	64,100	176,000	124,200	69,200	60,100
Bismarck - Mandan MPO Area or Region	4.2%	15.6%	9.4%	27.0%	23.7%		

SOURCE: Bismarck - Mandan MPO and WSB & Associates, Inc.

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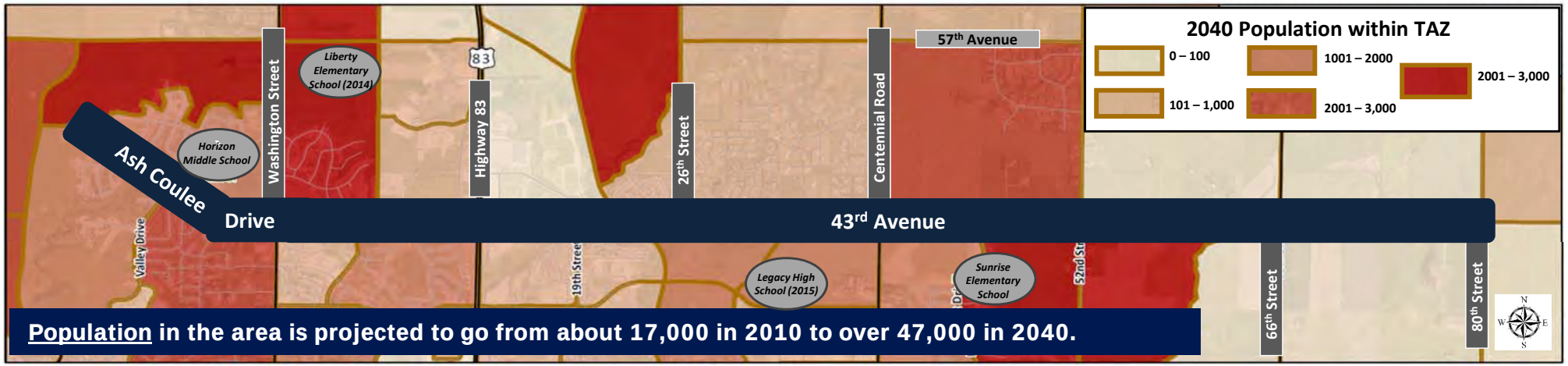
The growth in population and employment is displayed visually on **Figure 4-1.** The areas of darker shading indicate a higher density in development.



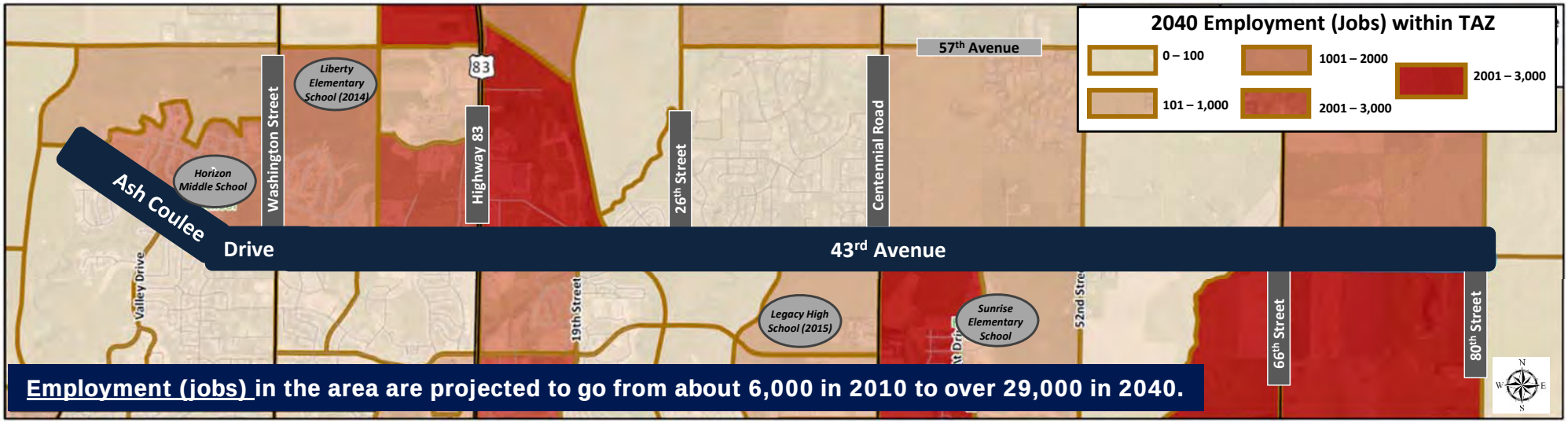


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Figure 4-1

Projected 2040 Population and Employment

4.2 Future Transportation Analysis

The projected growth in population and employment within the area will generate additional travel trips that will use the 43rd Avenue Corridor as well as all the transportation facilities within the Bismarck-Mandan area.

Working with the Advanced Traffic Analysis Center (ATAC) at North Dakota State University (NDSU), traffic forecasts were developed for years 2025 and 2040 for a range of transportation scenarios. A travel demand forecasting model converts population and employment data into traffic levels to project future year travel patterns. This is done using a computer model, which incorporates a series of mathematical equations that are used to represent how choices are made when people travel.

Through the use of the travel demand model, it was possible to determine the effectiveness of the transportation system for accommodating the increase in traffic. Presented in the following sections are the planned or programmed transportation improvements that have been identified by the MPO for the entire Bismarck-Mandan area. These scenarios or transportation improvements are not specific to this study and therefore it is likely that there will be additional needs identified to support the improvement to the 43rd Avenue Corridor.

4.2.1 Transportation Improvement Scenarios

The transportation improvements that were evaluated to assess their effectiveness for accommodating future travel within the corridor include those improvements that are either programmed for funding or have been identified in the MPO's 2010 – 2035 Long Range Transportation Plan (LRTP), which was produced in 2010.

Programmed Improvements

For the City of Bismarck and Burleigh County the programmed projects are included within the MPO's Transportation Improvement Program (TIP), which is updated annually and includes programmed projects for the next four years. For purposes of identifying transportation improvement scenarios, these projects, together with the existing infrastructure are referred to as the Existing (E) plus Committed projects (C) Scenario, or commonly referred to as E plus C. This scenario includes the transportation system as it exists today plus those projects that are committed or programmed for funding. **Table 4-2** identifies the programmed improvement projects, which are included within the 2025 and the 2040 travel demand model.

Table 4-2. Existing plus Committed (E plus C) Projects

Map ID	Roadway Project	From	To	Improvement	Model Year
EC 1	Washington Street	Calgary Avenue	57th Avenue	Roadway Expansion	2025
EC 2	19th Street	Skyline Boulevard	LaSalle Drive	Roadway Extension	2025

SOURCE: Bismarck-Mandan MPO 2013 - 2016 Transportation Improvement Program (TIP), the City of Bismarck, and Burleigh County.

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LRTP Improvements

Improvement projects identified in the MPO's 2010 – 2035 LRTP are identified as short-term, mid-term, or long-term improvements. The short and mid-term improvements were identified as those that would be implemented by 2024 with the long-term improvements to be implemented by 2035.

Table 4-3 identifies the LRTP transportation improvement projects within the general corridor area that are included in the travel demand model. This list comprises those projects that are most likely to affect travel patterns within the corridor. Projects such as pavement overlays or line-striping are not included in this table as they would have minimal or no impact on peoples travel patterns. Also, it should be noted that while the LRTP identifies a future interchange location at 66th Street by 2025, this improvement, as with others listed in the table, is not necessarily bound by a certain year. The interchange could occur prior to 2025, however, for planning purposes it is helpful to set a horizon year for both population and employment projections and transportation improvements. The Existing plus Committed or E+C projects with those identified in the LRTP comprise the base scenario for analyzing future travel conditions for the 43rd Avenue Corridor study. Presented in **Table 4-3**, and shown on **Figure 4-2**, are the transportation improvement projects from the LRTP that are within or near the general study area.

Table 4-3. 2010 - 2035 Long Range Transportation Plan (LRTP) Improvement Projects

Map ID	Roadway Project	From	To	Improvement	Model Year
LRTP Improvements identified for implementation by 2025					
L1	Highway 83	Calgary Avenue	57th Avenue	Expansion to 6-lanes	2025
L2	43rd Avenue	26th Street	Centennial Road	Addition of turn-lanes	2025
L3	Centennial Road	Jericho Avenue	71st Street	Addition of turn-lanes	2025
LRTP Improvements identified for implementation after 2025					
L4	I-94 Interchange	66th Street	66th Street	Interchange	2040
L5	North-South Beltway (66th St.)	Lincoln Road	71st Avenue	New or Expanded Roadway	2040
L6	Highway 83	57th Avenue	71st Avenue	Addition of turn-lanes	2040
L7	43rd Avenue	Centennial Road	66th Street	Addition of turn-lanes	2040
L8	Washington Street	57th Avenue	71st Avenue	Addition of turn-lanes[1]	2040
Northwest Area Study Improvements identified for implementation by 2025					
NW 9	North-south Arterial	Ash Coulee Drive	57th Avenue	Extension	2025
NW 10	North-south arterial	Medora Avenue	64th Lane NW	Extension	2025
NW 11	East-west Arterial	North-south Arterial	Washington Street	Extension	2025
NW 12	East-west Arterial	Tyler Parkway extension	Sonora Way extension	Extension	2025
NW 13	Tyler Parkway extension	Valley Drive	57th Avenue	Extension	2025
NW 14	Ash Coulee Drive extension	Clairmont Road extension	Butte Drive	Extension	2025
NW 15	Clairmont Road extension	Valley Drive	Ash Coulee extension	Extension	2025
NW 16	Valley Drive extension	Chisholm Trail	Domino Drive	Extension	2025

NOTE: In the 2010 - 2035 LRTP, Table 5. Recommended Roadway Project Descriptions and Cost identifies as project number 9, three miles of arterial roadway improvements to be identified in the Northwest Subarea Study (2011) will be recommended mid-term (2014-2024) improvements. At the outset of the 43rd Avenue Corridor Study the Project Team (PT) identified the projects that should be included as part of the 43rd Avenue Corridor Study. from the Northwest Subarea Study (2011) to be included in this study. Projects identified as NW 9 through NW 16 represent those projects from the Northwest Subarea Study. It should also be noted that Washington Street from Calgary Avenue to 57th Avenue is in the 2013-2016 TIP.

SOURCE: Bismarck-Mandan 2010 - 2035 Long Range Transportation Plan (LRTP), City of Bismarck, and the Bismarck-Mandan MPO.

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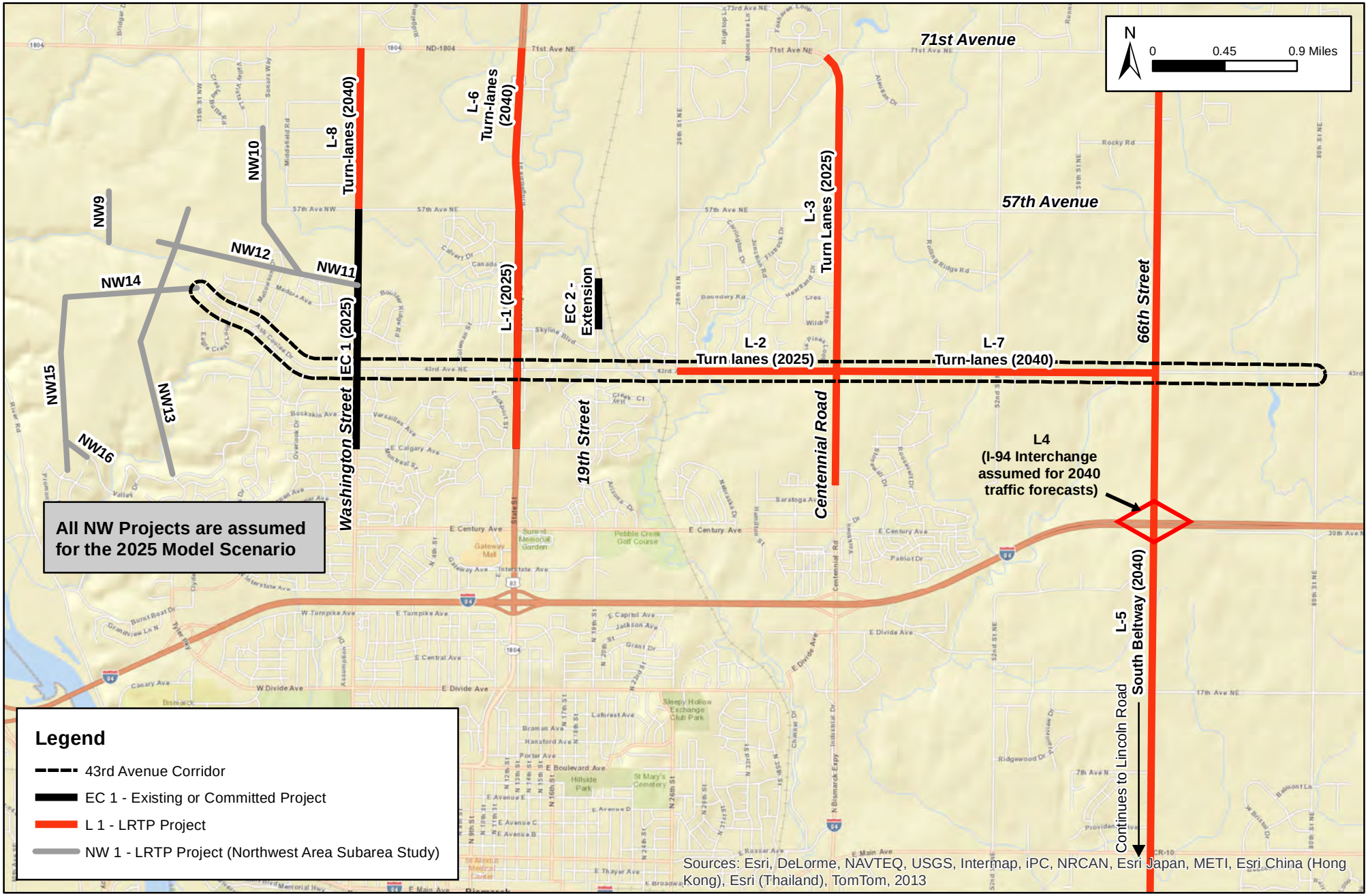

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Figure 4-2

Existing (E) Plus Committed (C) and LRTP Improvement Projects

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

4.3 Traffic Capacity Analyses - Segment LOS

An analysis was performed for the individual roadway segments within the corridor as well as the major north-south roadways for both the 2025 and the 2040 time horizons. This information is presented in the following sections.

4.3.1 2025 Scenario

2025 E plus C + LRTP Short and Midterm Projects:

For the 2025 E plus C + LRTP Short and Midterm Projects, the projects identified as Existing plus Committed and those LRTP improvements identified for implementation by 2025 were included within the travel demand model to assess the performance of the corridor transportation system to accommodate the 2025 traffic levels.

Under the 2025 E plus C + LRTP Short and Midterm Projects scenario, less than 40 percent of the corridor operated at an acceptable LOS of C or better.

2025 E plus C + LRTP Short / Midterm Projects	LOS A-C	LOS D	LOS E	LOS F	
Measurement	Under Capacity	Approaching Capacity	At Capacity	Over Capacity	Total
Miles	2.6	2.2	1.9	0.5	7.1
Percentage	35.9%	30.3%	26.8%	7.0%	100%

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Detailed information on the capacity analysis of the 2025 E plus C + LRTP Short and Midterm Projects scenario is shown on **Table 4-4** and **Table 4-5.**

Table 4-4. 43rd Avenue 2025 Capacity Analysis: E plus C + LRTP Short and Midterm Projects

	Corridor / Roadway Segment	From	To	Length (mi.)	Functional Classification	Roadway Typical Section [1]	Projected Daily Traffic	Level of Service (LOS) [2]
	Tyler Parkway Extension		Butte Drive	--	Minor Arterial	3-lanes	4,500	B
Corridor Segments	1A	Butte Drive	Valley Drive	0.55	Minor Arterial	2-lanes	4,500	C
	1B	Valley Drive	Washington Street	0.55	Minor Arterial	2-lanes	7,900	D
	2A	Washington Street	Coleman Street	0.60	Principal Arterial	2-lanes	11,500	D
	2B	Coleman Street	US 83 (State Street)	0.40	Principal Arterial	2-lanes	14,400	E
	3	US 83 (State Street)	19th Street	0.50	Principal Arterial	2-lanes	14,800	E
	4	19th Street	26th Street	0.50	Principal Arterial	2-lanes	16,100	F
	5	26th Street	Centennial Road	1.00	Principal Arterial	2-lanes	14,200	E
	6	Centennial Road	Roosevelt Drive	0.50	Principal Arterial	2-lanes	14,000	E
	7A	Roosevelt Drive	52nd Street	0.50	Principal Arterial	2-lanes	12,200	E
	7B	52nd Street	66th Street	1.00	Principal Arterial	2-lanes	6,700	C
	8	66th Street	80th Street	1.00	Minor Arterial	2-lanes	4,000	B
	80th Street		106th Street	--	Minor Arterial	2-lanes	1,200	A

[1] The Typical Section for the identified roadway segments refers to the travel-lane geometry of the roadway, i.e., a 2-lane section means there is one lane in each direction of travel.

[2] The LOS presented in this table represents a Planning Level of Service to determine the capacity or congestion on roadway segments, not intersections. This level of analysis does not calculate LOS at intersections, which is determined through an operations analysis.

NOTE: The Travel Demand Model incorporated the improvements identified in the 2013 - 2016 TIP, the 2035 LRTP (2010), NWA Study (2011), and information provided by the City of Bismarck and Burleigh County.

SOURCE: Bismarck - Mandan MPO, the Advanced Traffic Analysis Center (ATAC), and WSB & Associates, Inc.

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Table 4-5. N-S Roadway 2025 Capacity Analysis: E plus C + LRTP Short and Midterm Projects

Roadway	Segment *(North or South of 43rd Avenue)*	Functional Classification	Roadway Typical Section	Projected Daily Traffic	Level of Service (LOS)
Valley Drive	South	Collector	2-lanes	3,200	**B**
Washington Street	North	Principal Arterial	5-lanes	15,800	**B**
Washington Street	South	Principal Arterial	5-lanes	21,600	**C**
US-83	North	Principal Arterial	6-lane Divided	32,500	**C**
US-83	South	Principal Arterial	6-lane Divided	43,800	**C**
19th Street	North	Minor Arterial	3-lanes	8,600	**C**
19th Street	South	Collector	3-lanes	7,400	**C**
26th Street	North	Minor Arterial	2-lanes	4,100	**B**
Nebraska Drive	South	Collector	2-lanes	3,200	**B**
Centennial Road	North	Principal Arterial	2-lanes	9,100	**D**
Centennial Road	South	Principal Arterial	2-lanes	20,500	**F**
Roosevelt Drive	South	Collector	2-lanes	2,800	**B**
52nd Street	North	Minor Arterial	2-lanes	3,600	**C**
52nd Street	South	Minor Arterial	2-lanes	4,100	**B**
66th Street	South	Local	2-lanes	1,300	**A**
80th Street	North	Local	2-lanes	1,600	**A**
80th Street	South	Local	2-lanes	1,600	**A**

[1] The Travel Demand Model incorporated the improvements identified in the 2013 - 2016 TIP, the 2035 LRTP (2010), NWA Study (2011), and information provided by the City of Bismarck and Burleigh County.

SOURCE: Bismarck - Mandan MPO, the Advanced Traffic Analysis Center (ATAC), and WSB & Associates, Inc.

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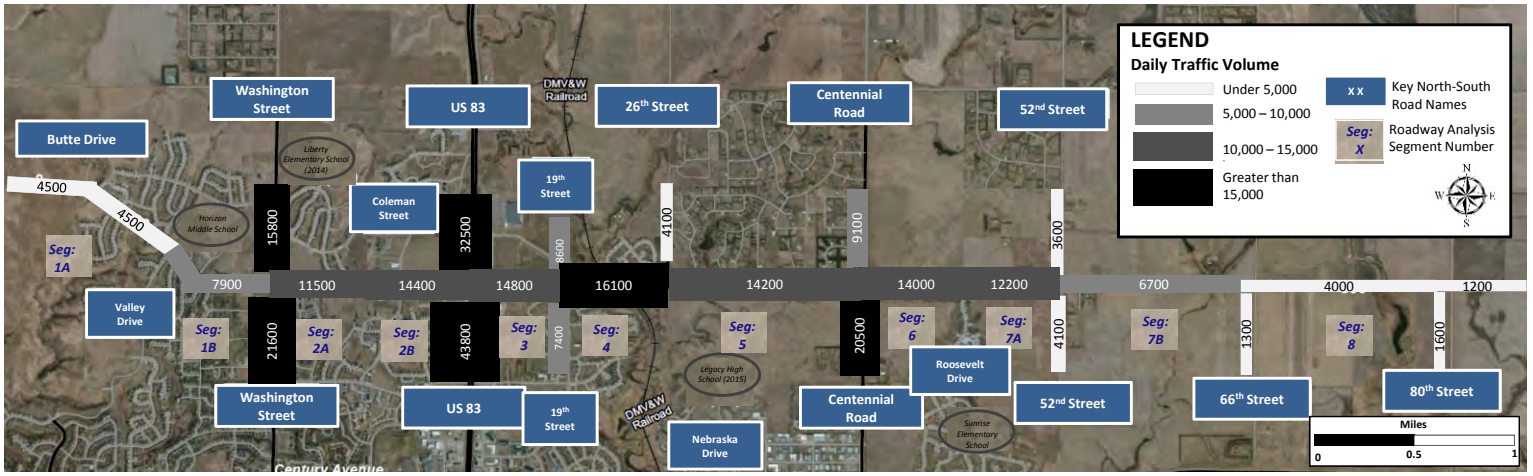
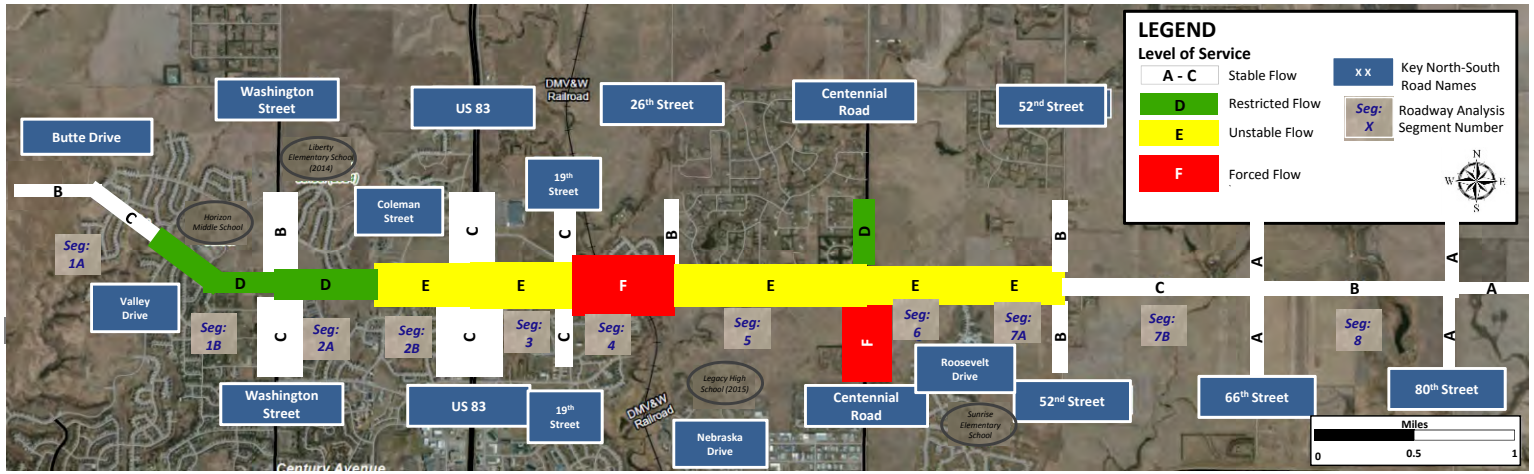
Figure 4-3 displays the 2025 E plus C + LRTP Short and Midterm Projects traffic and congestion levels for the corridor.

2025 E+C plus LRTP Daily Traffic Volumes



2025 E+C plus LRTP Daily Traffic Congestion



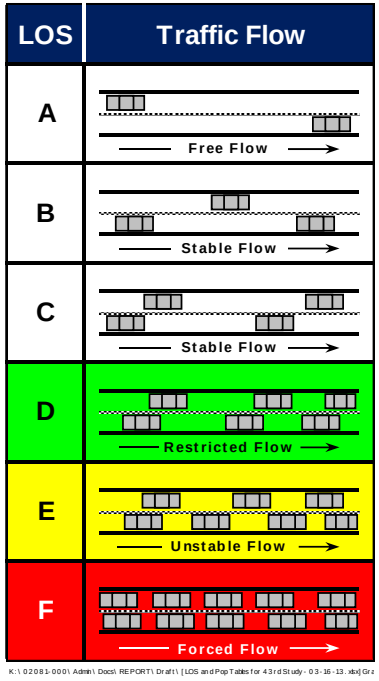


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Figure 4-3

2025 E plus C + LRTP Short and Midterm Projects Traffic and Congestion Levels

4.3.2 2040 Scenario

2040 E plus C + All LRTP Projects Scenario:

For this scenario, the projects identified as E plus C and all LRTP improvements were included to assess the performance of the corridor transportation system to accommodate 2040 traffic levels.

2040 E plus C + All LRTP Projects Measurement	LOS A-C Under Capacity	LOS D Approaching Capacity	LOS E At Capacity	LOS F Over Capacity	Total
Miles	0.0	5.1	1.0	1.0	7.1
Percentage	0.0%	71.8%	14.1%	14.1%	100%

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Under the 2040 E plus C + All LRTP Projects Scenario, all 7.1 miles of the corridor operated at an unacceptable LOS.

Detailed information on the capacity analysis of the 2040 E plus C + All LRTP Projects scenario is shown on **Tables 4-6** and **4-7.**

Table 4-6. 43rd Avenue 2040 E plus C + All LRTP Projects Capacity Analysis:

Corridor / Roadway Segment		From	To	Length (mi.)	Functional Classification	Roadway Typical Section	Projected Daily Traffic	Level of Service (LOS)
Tyler Parkway Extension			Butte Drive	--	Minor Arterial	3-lanes	8,000	C
Corridor Segments	1A	Butte Drive	Valley Drive	0.55	Minor Arterial	2-lanes	7,600	D
	1B	Valley Drive	Washington Street	0.55	Minor Arterial	2-lanes	9,300	D
	2A	Washington Street	Coleman Street	0.60	Principal Arterial	2-lanes	13,300	E
	2B	Coleman Street	US 83 (State Street)	0.40	Principal Arterial	2-lanes	15,700	E
	3	US 83 (State Street)	19th Street	0.50	Principal Arterial	2-lanes	16,000	F
	4	19th Street	26th Street	0.50	Principal Arterial	2-lanes	16,900	F
	5	26th Street	Centennial Road	1.00	Principal Arterial	2-lanes	15,200	E
	6	Centennial Road	Roosevelt Drive	0.50	Principal Arterial	2-lanes	16,200	E
	7A	Roosevelt Drive	52nd Street	0.50	Principal Arterial	2-lanes	14,400	E
	7B	52nd Street	66th Street	1.00	Principal Arterial	2-lanes	15,800	E
	8	66th Street	80th Street	1.00	Minor Arterial	2-lanes	9,200	D
80th Street			106th Street	--	Minor Arterial	2-lanes	1,600	A

SOURCE: Bismarck - Mandan MPO, the Advanced Traffic Analysis Center (ATAC), and WSB & Associates, Inc.

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Table 4-7. N-S Roadway 2040 E plus C + All LRTP Projects Capacity Analysis:

Roadway	Segment *(North or South of 43rd Avenue)*	Functional Classification	Roadway Typical Section	Projected Daily Traffic	Level of Service (LOS)
Valley Drive	South	Collector	2-lanes	4,000	C
Washington Street	North	Principal Arterial	5-lanes	17,500	B
Washington Street	South	Principal Arterial	5-lanes	26,600	C
US-83	North	Principal Arterial	6-lane Divided	34,700	C
US-83	South	Principal Arterial	6-lane Divided	45,100	C
19th Street	North	Collector	3-lanes	10,600	D
19th Street	South	Collector	3-lanes	9,200	C
26th Street	North	Minor Arterial	2-lanes	5,200	C
Nebraska Drive	South	Collector	2-lanes	4,100	C
Centennial Road	North	Principal Arterial	2-lanes	12,100	E
Centennial Road	South	Principal Arterial	2-lanes	25,000	F
Roosevelt Drive	South	Collector	2-lanes	4,900	C
52nd Street	North	Minor Arterial	2-lanes	6,100	C
52nd Street	South	Minor Arterial	2-lanes	6,800	C
66th Street	North	Principal Arterial	3-lanes	6,300	B
66th Street	South	Principal Arterial	3-lanes	14,800	D
80th Street	North	Minor Arterial	2-lanes	3,900	B
80th Street	South	Minor Arterial	2-lanes	4,100	B

SOURCE: Bismarck - Mandan MPO, the Advanced Traffic Analysis Center (ATAC), and WSB & Associates, Inc.

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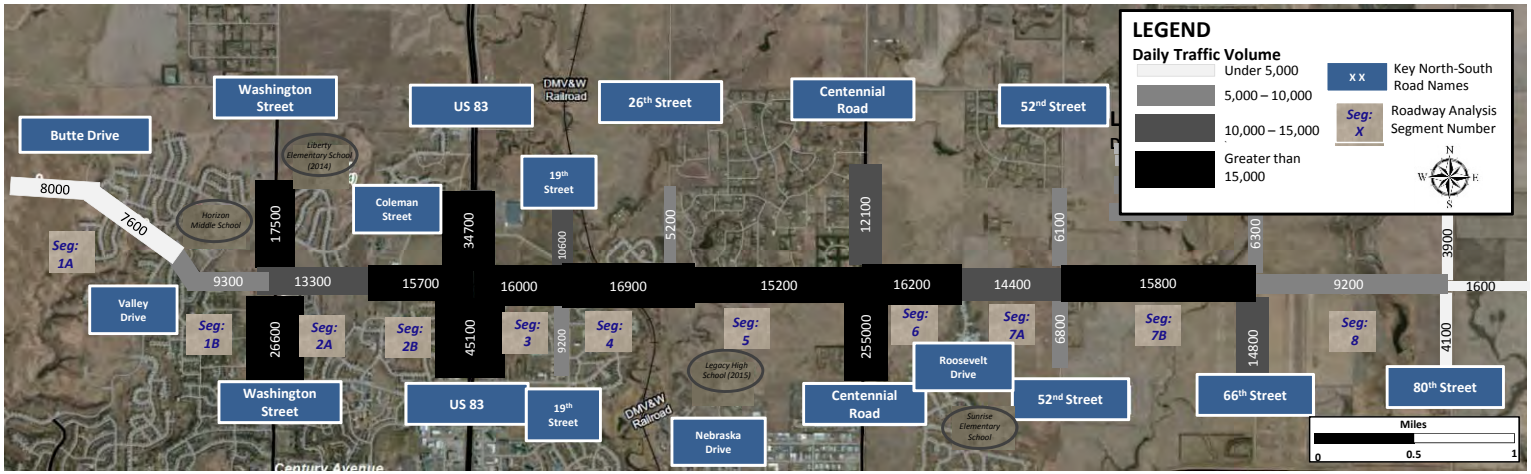
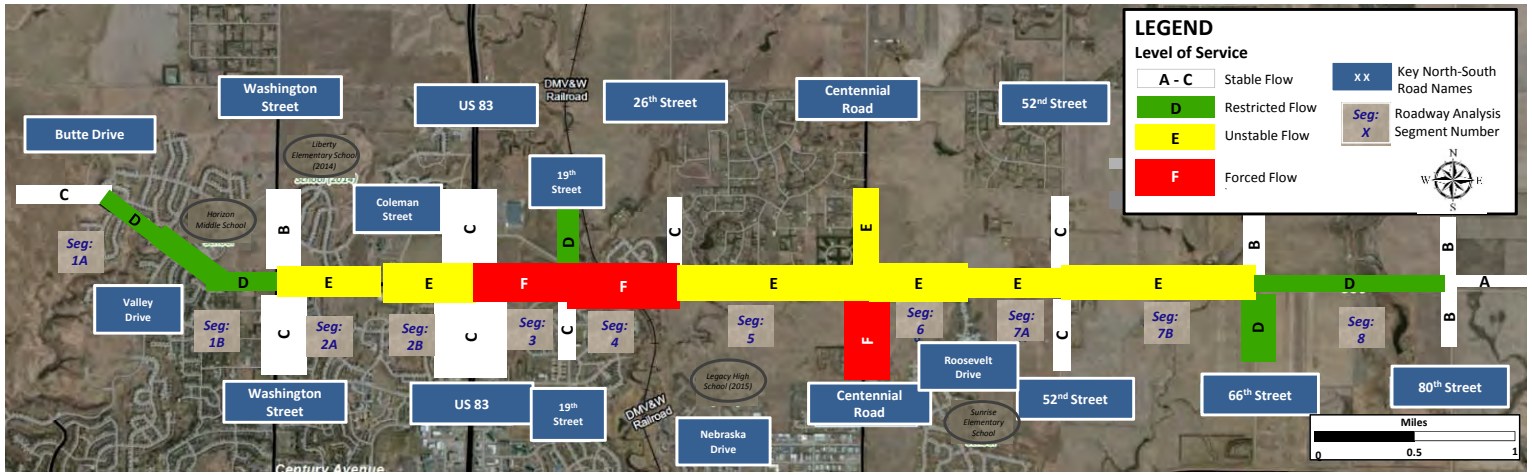
Figure 4-4 displays the 2040 E plus C + All LRTP Projects traffic and congestion levels for the corridor.

2040 E+C plus LRTP Daily Traffic Volumes



2040 E+C plus LRTP Daily Traffic Congestion



LOS	Traffic Flow
A	Free Flow
B	Stable Flow
C	Stable Flow
D	Restricted Flow
E	Unstable Flow
F	Forced Flow

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Figure 4-4

2040 E plus C + All LRTP Projects Traffic and Congestion Levels

4.4 Traffic Operations Analyses - Intersection LOS

An analysis was performed for the major intersections within the corridor for both the 2025 and the 2040 time horizons. This information is presented in the following sections.

A traffic operations analysis was completed for the intersections with the major north-south roadways along the corridor. These roadways include: Washington Street, US-83, Centennial Road, and 66th Street (Year 2040). For this scenario, the projects identified as E plus C and all LRTP improvements were included.

4.4.1 2025 Scenario

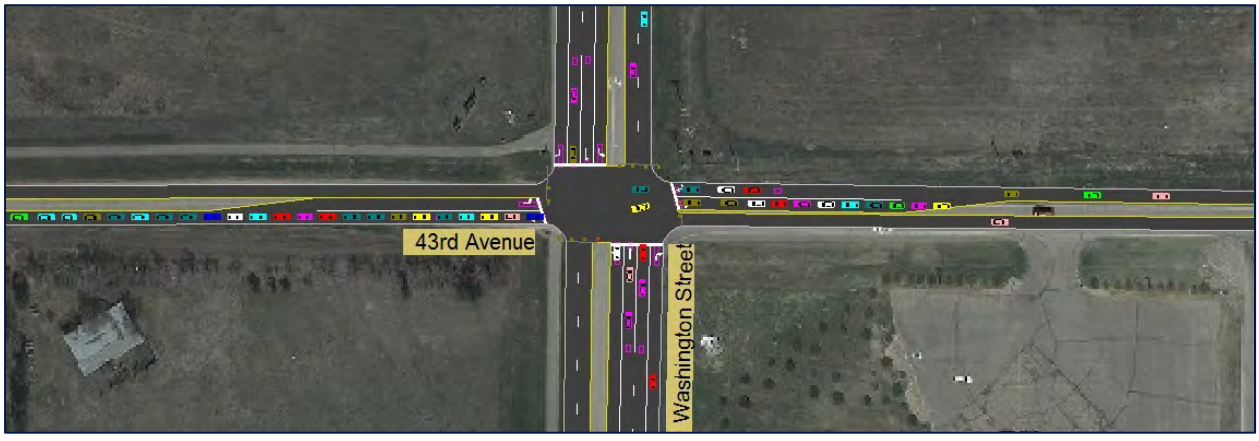
Roadway improvements that have recently occurred or are programmed for funding include those at:

- Washington Street – Improved to include two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 43rd Avenue. It should be noted that with this improvement, the City of Bismarck will also rebuild the east-west approaches to the intersection.
- US-83 – Improved to include three through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 43rd Avenue.
- Centennial Road / 43rd Avenue – Improved to include a traffic signal.

Provided below are the analysis of the intersections for the 2025 E plus C + LRTP Short and Midterm Projects. The traffic period analyzed is the PM Peak-hour, which represents the highest one-hour period of traffic on a typical day. In Bismarck, the PM peak-hour accounts for approximately 13 percent of all daily traffic.

Washington Street Intersection – 2025

The intersection operated at unacceptable conditions with 2025 traffic volumes. Long eastbound and westbound queues added to the congestion at the traffic signal



Specific observations from the analysis include:

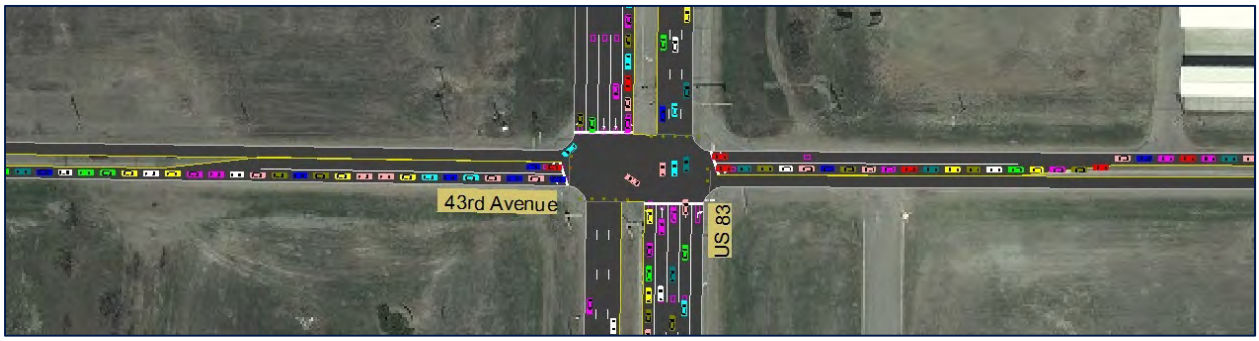
- The intersection operated at LOS D conditions. The northbound and southbound approaches operated at LOS C conditions. The westbound and eastbound approaches operated at LOS D and LOS F, respectively.

- Eastbound and westbound queuing vehicles often blocked turn bays or backed up into through lanes. The maximum eastbound queues reached approximately 1,000 feet while the maximum westbound queues reached approximately 450 feet.

It needs to be emphasized that the scenarios above is for 2025 traffic levels. With the planned reconstruction of Washington Street, tentatively scheduled for 2015, the level of traffic will be considerably less than that assumed for 2025.

US-83 Intersection – 2025

The intersection operated at unacceptable conditions with 2025 traffic volumes. Long queues added to the congestion at the traffic signal.

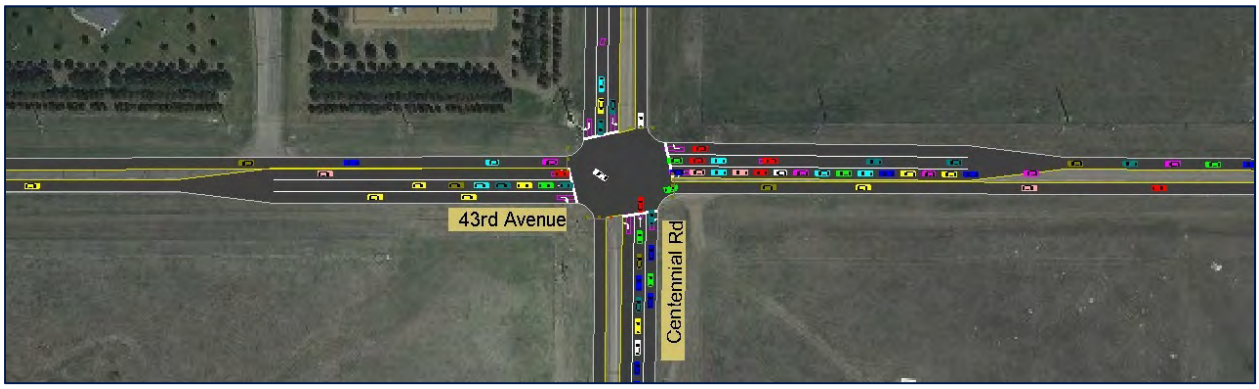


Specific observations from the analysis include:

- The intersection as a whole and all approaches operated at LOS F conditions.
- Eastbound and westbound queuing vehicles often blocked turn bays or backed up into through lanes. Northbound left-turn vehicles often exceeded the available storage. The maximum queues on the northbound, eastbound, and westbound approaches reached 1,000 feet or more.

Centennial Road Intersection – 2025

The intersection operated at unacceptable conditions with 2025 traffic volumes. Long queues added to the congestion at the traffic signal.



Specific observations from the analysis include:

- The intersection operated at LOS F conditions. The approaches operated at LOS D through F conditions. The westbound approach operated at LOS F conditions.
- Northbound and westbound queuing vehicles often blocked turn bays or backed up into through lanes. Northbound and westbound left-turn vehicles often exceeded the available storage. The maximum queues on the northbound and westbound approaches exceeded 1,000 feet.

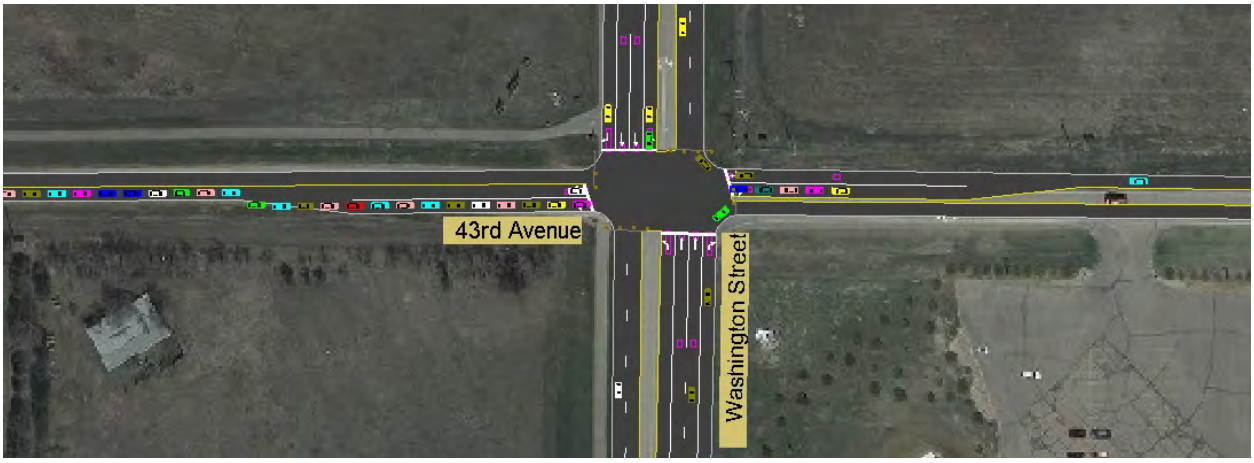
4.4.2 2040 Scenario

Improvements that were considered to occur include:

- Washington Street was upgraded to have two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 43rd Avenue.
- US-83 was upgraded to have three through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 43rd Avenue.
- Centennial Road was upgraded to have two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 43rd Avenue.
- The 66th Street interchange at I-94 was constructed. 66th Street was built with two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 43rd Avenue.

Washington Street Intersection – 2040

The intersection operated at unacceptable conditions with 2040 traffic volumes. Long eastbound queues added to the congestion at the traffic signal.

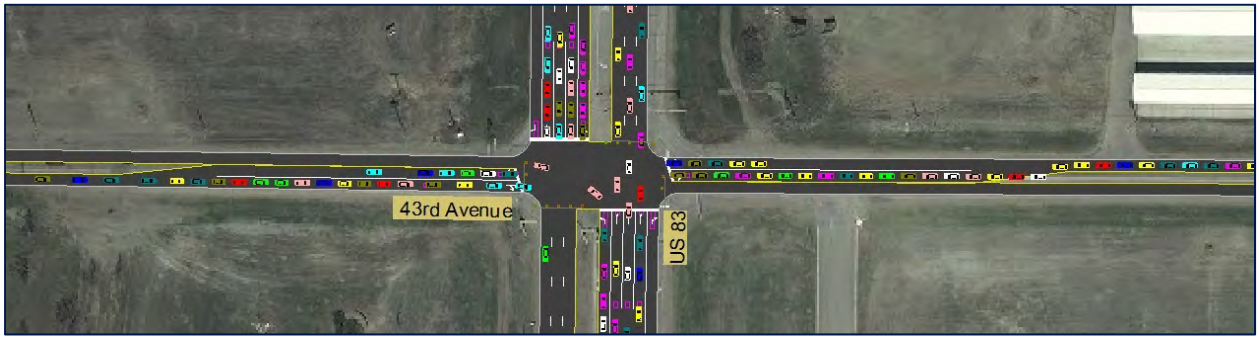


Specific observations from the analysis include:

- The intersection operated at LOS D conditions. The eastbound approach operated at LOS F conditions while the westbound and southbound approaches operated at LOS D conditions.
- The eastbound queuing vehicles often blocked the left-turn bay. The maximum eastbound queues reached approximately 900 feet.

US-83 Intersection – 2040

The intersection operated at unacceptable conditions with 2040 traffic volumes. Long queues added to the congestion at the traffic signal.

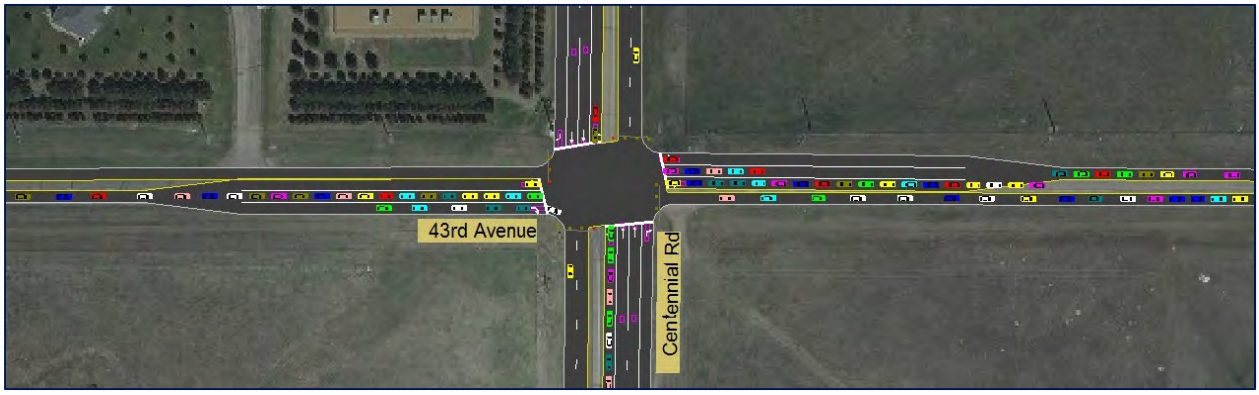


Specific observations from the analysis include:

- The intersection operated at LOS F conditions. The northbound, westbound, and eastbound approaches operated at LOS F conditions. The southbound approach operated at LOS E conditions.
- Northbound, eastbound, and westbound queuing vehicles often blocked turn bays or backed up into through lanes. Turn lane storage is often exceeded. The maximum queues on the northbound, eastbound, and westbound approaches reached 1,000 feet or more.

Centennial Road Intersection - 2040

The intersection operated at unacceptable conditions with 2040 traffic volumes. Long queues added to the congestion at the traffic signal.

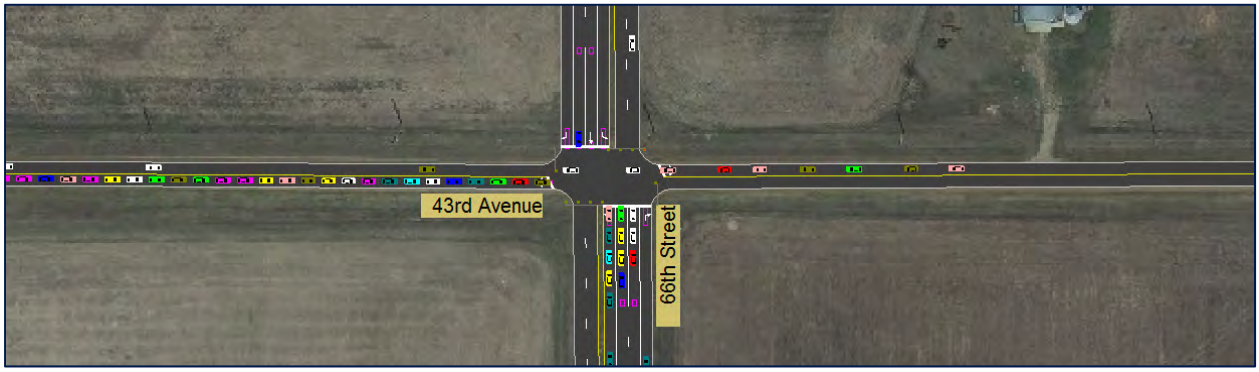


Specific observations from the analysis include:

- The intersection operated at LOS F conditions. The northbound, westbound, and eastbound approaches operated at LOS F conditions. The southbound approach operated at LOS C conditions.
- Northbound, eastbound, and westbound queuing vehicles often blocked turn bays or backed up into through lanes. Turn lane storage is often exceeded. The maximum queues on the northbound, eastbound, and westbound approaches reached 1,000 feet or more.

66th Street Intersection – 2040

The intersection operated at unacceptable conditions with 2040 traffic volumes. Long eastbound queues added to the congestion at the traffic signal.



Specific observations from the analysis include:

- The intersection operated at LOS F conditions. The eastbound approach operated at LOS F conditions. The westbound approach operated at LOS D conditions. The northbound and southbound approaches operated at LOS C conditions.
- The eastbound vehicle queue averaged more than 1,000 feet with the maximum reaching over 2,000 feet in length.

Overview of Information presented in Chapter 4:

Presented in Chapter 4 was an assessment of future travel conditions within the corridor assuming only those improvements either currently programmed for funding or identified in the LRTP. From the analysis, it was determined that by 2025, 60 percent of the corridor will operate at unacceptable levels of congestion (LOS D or worse), and by 2040 the entire 7.1 mile corridor will be at LOS D or worse. In addition to 43rd Avenue, major north-south cross streets and their intersection will also operate at unacceptable congestion levels.

The analysis of existing conditions revealed that the corridor lacks many features or characteristics necessary to accommodate a range of travel users. There is not a continuous sidewalk and/or trail to provide a safe travel-way for pedestrians, transit users, and recreational bikers. There is not a paved shoulder to accommodate disabled vehicles as well as more advanced bicyclists. The lack of an adequate shoulder on the two-lane roadway as well as deep ditch sections may also contribute to the high crash rate through-out the corridor, which at 5.8 crashes per million vehicle miles traveled is over three times higher than the average for all roadways within North Dakota.

Based on these needs, there is a clear purpose for improving travel within and through the 43rd Avenue Corridor. Chapter 5 identifies several transportation improvement concepts or alternatives that are evaluated to determine how well they address the established purpose and need for the project.

Chapter 5
Development and Evaluation of Alternatives

This chapter presents the transportation strategies considered for addressing the existing and future transportation needs within the 43rd Avenue Corridor. Based on the analysis of future conditions assuming only committed projects or those identified in the LRTP, it was determined that there will still be unmet travel needs without additional improvements within the corridor. Based on discussions with the Project Team, a range of multiple mode transportation improvements were identified and evaluated.

5.1 Overview of Corridor Improvement Strategies

As established in the analysis of future 2025 and 2040 conditions without additional improvements, there will be unmet needs for motorists, pedestrian and bicyclists, and transit users. Therefore, the improvement measures considered for 43rd Avenue must possess within their design the ability to address the needs of each of these traveler types.

Motorists:

- The corridor improvement plan must provide the necessary roadway capacity to allow for acceptable travel flow (LOS C or better).

Pedestrians and Bicyclists:

- The corridor improvement plan must provide a paved surface away from motorist traffic for travel by walking or bicycling.

Transit Users:

- The corridor improvement plan must provide a paved surface for accessing future transit stops along the corridor as well as sufficient right-of-way to accommodate shelters and bus pull-out bays.

Fatal Flaw Screening:

If an alternative is not able to address any of the needs established for the purpose of the project it is identified as a Fatal Flaw and is dropped from consideration. Likewise, if it possesses a characteristic that would prohibit it from being implemented, such as it doesn't or can't conform to required standards or guidelines, it is also considered a Fatal Flaw.

5.1.1 Corridor Improvement Options

Provided in this section of the report are the design options that were developed to determine if they would meet the user needs within each of the corridor segments.

Common Features of all Corridor Designs:

In developing improvement concepts, it was determined that all of the alternatives would contain the following elements:

- Right-of-Way: Per the City of Bismarck's direction, the desired right-of-way for the reconstructed travel corridor is 120 feet from Butte Drive to 52nd Street, representing a distance of approximately 5.1 miles, and 150 feet from 52nd Street to 80th Street. Within the right-of-way would be the roadway section, drainage, utilities, and pedestrian/bicycling accommodations.

- Drainage: Upon reconstruction, the majority of the corridor will have a curb and gutter section rather than a ditch drainage system. The segment on the eastern end of the corridor between 66th Street and 80th Street, which is projected to remain rural could have either a ditch or curb and gutter drainage.

- Access Management: All new access points along the corridor should conform with the City of Bismarck's Access Management Policy discussed earlier in this report.

- Walking and Bicycling: A sidewalk and/or a paved surface trail separated from the roadway by a boulevard should be provided.

- Transit: Each design should be able to for transit accommodations such as bus stop shelters and bicycle storage areas upon needed based on transit service and usage. These areas would be accessible via the walking and bicycle accommodations provided with the corridor design. The ROW provided (either 120 or 150 feet) would allow for bus turnout bays along the corridor.

- Vertical Curvature or Roadway Profile: Per the NDDOT Design Manual, the vertical curvature for new or reconstruction projects must adhere using stopping sight distance for crest curve design (hills) and comfort curve design for sag curves (valleys). [1]

  For the 43rd Avenue corridor, a profile was developed that meets the NDDOT requirements for arterial roadways. If a profile is developed and pursued that is not in compliance with NDDOT standards, a Design Exception (Section I-06.04 Design Exceptions) is required and must obtain approval of a formal design exception from the Secretary of Transportation to the Division Administrator (DA). Obtaining a Design Exception is dependent upon being able to demonstrate

[1] Refer to Table 3-5 - Sight-Distances by Driver Maneuver for additional information.

the design would not negatively affect the operation of the roadway. Information considered when reviewing a Design Exception includes:

- Crash history to determine any history of operational problems.
- Functional classification of the roadway.
- Effect of the variance from the design standard on safety and operations.
- The degree of the variance from the standard.
- Compatibility with adjacent sections of roadway.
- Should not degrade the relative safety of the roadway.
- Amount and character of the traffic.
- Posted and actual speed on the route.
- Type of project contemplated.
- Cost of attaining full standards (including environmental impacts).
- Cost-effective means of mitigating the reduction in standard.
- Engineering discretion.

While it is not implausible that a Design Exception for a roadway profile change could be achieved for the project, it is worth noting that each design element on a project that does not meet standards requires a separate Design Exception. For the reconstructed roadway it is recommended that the profile as well as all design elements conform to the NDDOT Design Manual. Deviation from standard design could negatively impact the ability to obtain funding for its construction in a funding solicitation process that is getting more competitive.

5.2 Evaluation Process

Using the methodology described in Chapter 2 of this report, potential transportation improvements were evaluated to determine how well they addressed the needs for the different travel user types. Briefly, the evaluation methodology entailed these steps: Using the methodology described in earlier in the Executive Summary, the various transportation improvement alternatives were evaluated to determine how well they addressed the needs for the different travel user types. Briefly, the evaluation methodology entailed these steps:

1. Development of Scoring Matrices for each of the travel user types, which include:
   - motorists,
   - pedestrians
   - bicyclists, and
   - transit users

2. For each of these matrices, the various alternative measures is assigned a value from one to six based on how well they satisfy or address the primary objective for the goal. A value of 6 meant the alternative was very good, while a value of 1 meant it was very poor at addressing the goal

3. After the raw scores are calculated, they are then adjusted based on the weighting factors generated from the survey of area decision-makers. From this matrix, alternatives are identified that address the needs for the project that best reflect the values or priorities of the community.

In the following sections, potential transportation options are identified and evaluated for each of the travel users. At the conclusion of the individual evaluations to determine appropriate improvement measures a comprehensive improvement strategy for the entire corridor will be presented.

5.3 Alternatives to Address the Needs of Motorists:

Based on the varying needs within the various corridor segments for roadway capacity, six alternative roadway sections were identified for evaluation. These sections and their characteristics are described in the following sections.

5.3.1 Section Design Options:

The variation in the designs is with respect to roadway capacity (number of travel lanes) and drainage (either a ditched section or curb/gutter). Another variation is whether a paved shoulder is to be provided. Research has shown that a paved shoulder provides many travel safety benefits, particularly in instances where only one travel lane is provided per direction of travel.[2] This is particularly true for higher speed facilities, such as 43rd Avenue, where the speed limit is at least 45-mph for the majority of the corridor. Because of the high crash rate along 43rd Avenue, coupled with the safety benefits of paved shoulders, the roadway sections with only one travel lane per direction are provided with a 6-foot paved shoulder. Also, as cited earlier in this report, shoulders along 2 or 3-lane roadways provide an area away from the traveled way for vehicles to stop because of mechanical difficulties, flat tires, or other emergencies. They also provide space for evasive maneuvers to avoid potential crashes or reduce their severity.

Provided in the following sections are the corridor designs that were evaluated for applicability to each of the segments. Shown for the alternative section types are crash rates, daily capacity at the LOS C/D threshold.[3] Also presented is a general or planning level cost estimate range per mile developed by WSB & Associates, Inc. These costs do not include those incurred for utility work, intersection improvements and signalization, nor right-of-way.

It should be noted that the figures showing the various designs include trails and/or sidewalks. Trails and sidewalks are evaluated under the report sub-headings referencing each of the travel user types consisting of: bicyclists, pedestrians, and transit users. Provided below are the alternatives.

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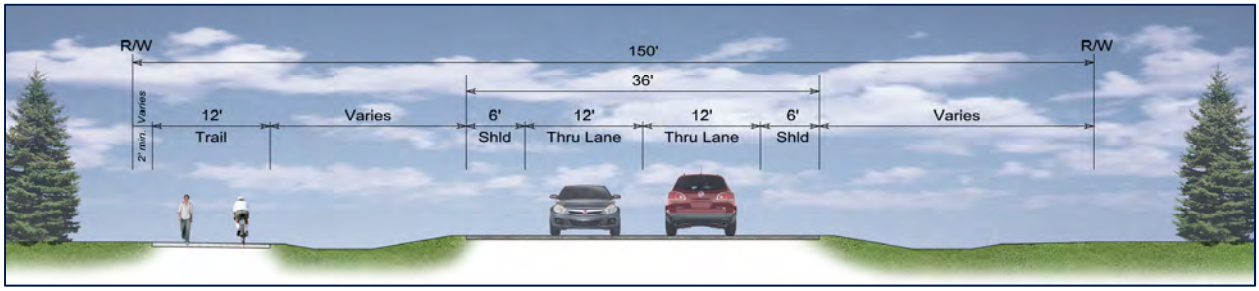
[2] Research completed by the Federal Highway Administration (FHWA) revealed that the presence of a paved shoulder on a roadway resulted in the reduction of crash rates for the following types of collisions: head-on crashers (15 – 75% reduction), sideswipe crashes (15 – 41% reduction), fixed object crashes (29 – 49% reduction). Overall, it was estimated that in cases of rural two-lane roads without shoulders, the provision of 6-foot shoulders could reduce the crash rate by 35 to 40 percent (Low Cost Treatments for Horizontal Curve Safety, Chapter 6. Minor Roadway Improvements – FHWA Report No. FHWA-SA-07-002, 2006. NOTE: The statistics cited represent rural 2-lane roadways, regardless of horizontal curvature).

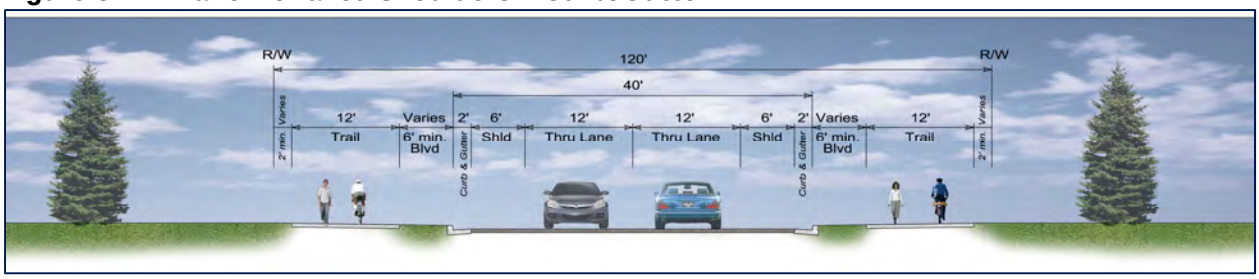
[3] Crash rate by section type was derived from information developed by The New York State Department of Transportation as they had a comprehensive list of roadway section types and they are a cold weather state similar to North Dakota. The information presented is for roadways in rural or semi-rural areas. New York City data is not represented in these rates. While it is recognized that the travel behavior is not identical to that of North Dakota drives, this information does provide a relative comparison for the different design types. LOS C/D capacity thresholds were developed by WSB & Associates, Inc. using information contained within the Highway Capacity Manual.

Figure 5-1. 2-lane w/Paved Shoulders - Ditch



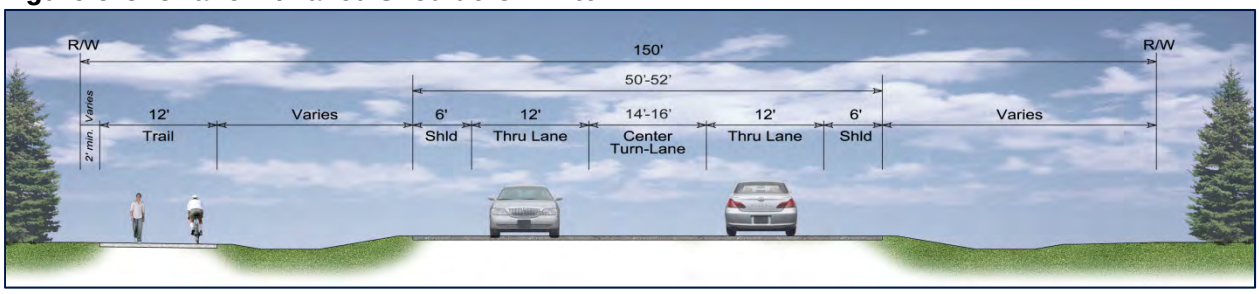
Crash Rate: 2.57
Daily Capacity at LOS C/D Threshold: 12,000 (Principal Arterial)
Cost per Mile: $1,000,000 – $2,000,000.

Figure 5-2. 2-lane w/Paved Shoulders – Curb/Gutter



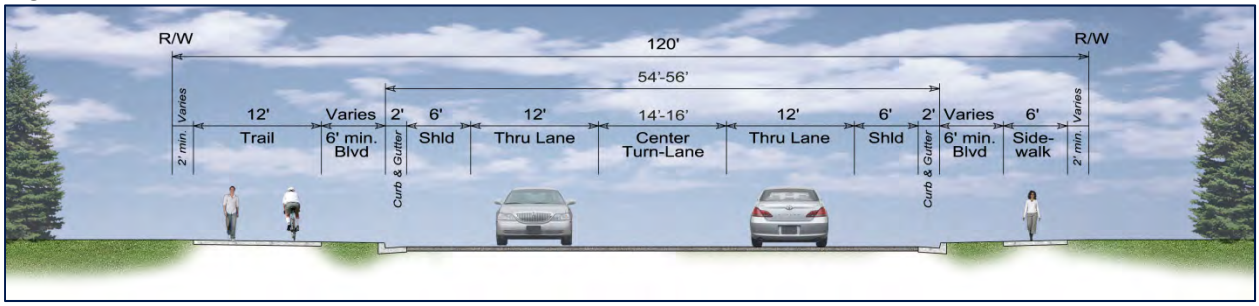
Crash Rate: 2.57.
Daily Capacity at LOS C/D Threshold: 12,000 (Principal Arterial)
Cost per Mile: $1,500,000 – $2,500,000

Figure 5-3. 3-lane w/Paved Shoulders – Ditch



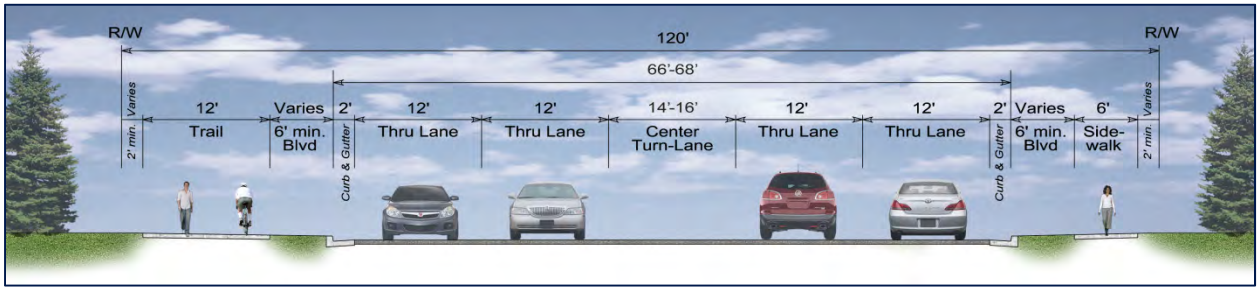
Crash Rate: 2.02
Daily Capacity at LOS C/D Threshold: 17,000 (Principal Arterial)
Cost per Mile: $2,500,000 - $3,500,000

Figure 5-4. 3-lane w/Paved Shoulders – Curb/Gutter



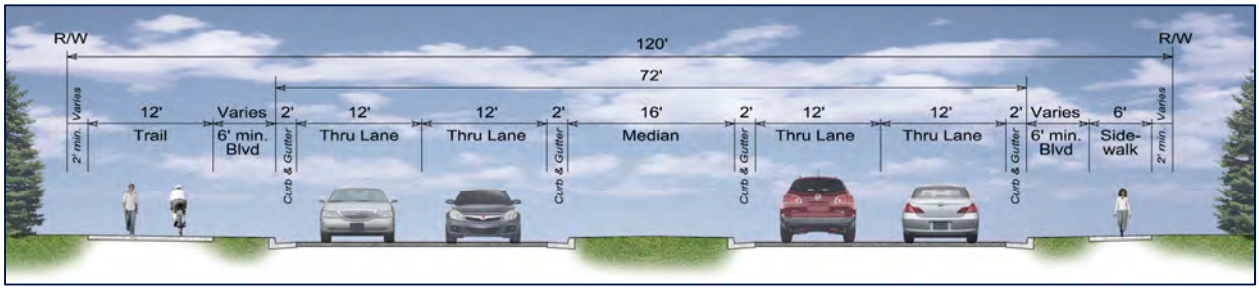
Crash Rate: 2.02
Daily Capacity at LOS C/D Threshold: 17,000 (Principal Arterial)
Cost per Mile: $3,000,000 - $4,500,000

Figure 5-5. 5-lane – Curb/Gutter



Crash Rate: 2.03
Daily Capacity at LOS C/D Threshold: 32,600 (Principal Arterial)
Cost per Mile: $4,000,000 - $5,500,000

Figure 5-6. 4-lane Divided – Curb/Gutter



Crash Rate: 2.03
Daily Capacity at LOS C/D Threshold: 34,400 (Principal Arterial)
Cost per Mile: $5,000,000 – $6,500,000

5.3.2 Evaluation of Segment Section Design Options

Each of the design sections were evaluated to determine their appropriateness for each of the eleven segments subdividing the corridor. This analysis focuses primarily on the Needs that were identified for motorists. However, each alternative is evaluated based on how well they score for each of the six established goals for the project. If alternative is determined to contain a Fatal Flaw it is dropped from consideration. It should be noted that while the figures shown above include trails and/or sidewalks, this evaluation is only for the roadway portion. The trails and sidewalks are evaluated under the report sub-headings referencing each of the travel user types consisting of: bicyclists, pedestrians, and transit users.

2025 Needs and Improvements

Table 5.1 presents the Weighted or Final scores to determine roadway sections to address 2025 Motorists Needs.

Table 5-1. 2025 Results Summary - Roadway Section Evaluation Matrix

TRAVEL USER TYPE: 2025 Motorists Needs	WEIGHTED SCORES Roadway Section Alternatives					
Corridor Segment	2-lane w/paved shoulders - Ditch	2-lane w/paved shoulders - Curb/Gutter	3-lane w/paved shoulders - Ditch	3-lane w/paved shoulders - Curb/Gutter	5-lane, no shoulders - Curb/Gutter	4-lane Divided - Curb/Gutter
1A - Butte to Valley	NA: Fatal Flaw 1	201.1	NA: FF 1	219.2	155.6	143.0
1B - Valley to Washington	NA: FF 1	NA: FF 2	NA: FF 1	232.0	162.2	149.6
2A - Washington to Coleman	NA: FF 1	NA: FF 2	NA: FF 1	203.6	194.0	175.2
2B - Coleman to US 83	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
3 - US 83 to 19th Street	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
4 - 19th Street to 26th Street	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
5 - 26th Street to Centennial	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
6 - Centennial to Roosevelt	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
7A - Roosevelt to 52nd Street	NA: FF 1	NA: FF 2	NA: FF 1	232.0	155.6	143.0
7B - 52nd Street to 66th Street	201.1	201.1	219.2	219.2	155.6	143.0
8 - 66th Street to 80th Street	201.1	201.1	219.2	219.2	155.6	143.0

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Feasible

NOTES:

Fatal Flaw 1 (FF 1) - Ditch sections would not be permitted per City policy. New or reconstructed arterial roadways are to be curb and gutter.

Fatal Flaw 2 (FF 2) - A minimum of two travel lanes in each direction is necessary to achieve acceptable LOS conditions.

Progression of 2025 Scenario Improvements

Table 5-2 presents the progression of traffic volumes and associated improvements that would address the needs of motorists through 2025. The first improvement column, labeled 1, shows the number of travel lanes under the 2025 E plus C + the short and midterm LRTP projects scenario.
Column 2 shows the resulting 2025 LOS with only the E plus C plus LRTP improvement projects.
Column 3 shows the necessary number of lanes to achieve a LOS of C or better for 2025 traffic. and
Column 4 shows the resulting 2025 LOS with that improvement.

Table 5-2. 2025 43rd Avenue Corridor Improvement Phasing

	Roadway Segment	From	To	2025 E+C plus LRTP S/M Projects - Typical Section [1]	2025 LOS w/o Additional 43rd Avenue Improvements	Year 2025 Improvement necessary to Achieve LOS C or Better for 2025 Traffic [2]	2025 LOS with 43rd Avenue Improvement(s)
Corridor Segments	1A	Butte Drive	Valley Drive	1 2-lanes	2 C	3 none	4 C
	1B	Valley Drive	Washington Street	2-lanes	D	3-lanes	C
	2A	Washington Street	Coleman Street	2-lanes	D	3-lanes	C
	2B	Coleman Street	US 83 (State Street)	2-lanes	E	4 or 5-lanes	B
	3	US 83 (State Street)	19th Street	2-lanes	E	4 or 5-lanes	B
	4	19th Street	26th Street	2-lanes	F	4 or 5-lanes	B
	5	26th Street	Centennial Road	2-lanes	E	4 or 5-lanes	B
	6	Centennial Road	Roosevelt Drive	2-lanes	E	4 or 5-lanes	B
	7A	Roosevelt Drive	52nd Street	2-lanes	E	3-lanes	C
	7B	52nd Street	66th Street	2-lanes	C	none	C
	8	66th Street	80th Street	2-lanes	B	none	B

[1] This includes projects identified as Existing (E) or Committed (C), plus projects identified in the LRTP for implementation by 2025.

[2] The Year 2025 Improvement represents the measure or typical section necessary to bring segments up to an acceptable LOS for the 2025 E+C plus LRTP Projects. The intent is to establish a phasing plan for improvement measures based on travel needs.

SOURCE: WSB & Associates, Inc.

Under the 2025 43rd Avenue Improvement Scenario, all 7.1 miles of the corridor operate at an acceptable LOS of C or better.

2025 Improved Measurement	LOS A-C Under Capacity	LOS D Approaching Capacity	LOS E At Capacity	LOS F Over Capacity	Total
Miles	7.1	0.0	0.0	0.0	7.1
Percentage	100.0%	0.0%	0.0%	0.0%	0%

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2040 Needs and Improvements

By 2040, additional traffic on the eastern side of the corridor will require more capacity, requiring two travel lanes in each direction from Roosevelt Drive to 66th Street. Also, the last segment from 66th Street to 80th Street would need a 3-lane section to accommodate the increased traffic over the 2025 scenario.

Table 5.3 presents the feasible section design options to address the 2025 and/or the 2040 travel needs for motorists through the corridor.

Table 5-3. 2025 and 2040 Results Summary - Roadway Section Evaluation Matrix

TRAVEL USER TYPE: Future Motorist Needs	WEIGHTED SCORES Roadway Section Alternatives					
Corridor Segment	2-lane w/paved shoulders - Ditch	2-lane w/paved shoulders - Curb/Gutter	3-lane w/paved shoulders - Ditch	3-lane w/paved shoulders - Curb/Gutter	5-lane, no shoulders - Curb/Gutter	4-lane Divided - Curb/Gutter
1A - Butte to Valley	NA: Fatal Flaw 1	201.1	NA: FF 1	219.2	155.6	143.0
1B - Valley to Washington	NA: FF 1	NA: FF 2	NA: FF 1	232.0	162.2	149.6
2A - Washington to Coleman	NA: FF 1	NA: FF 2	NA: FF 1	203.6	194.0	175.2
2B - Coleman to US 83	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
3 - US 83 to 19th Street	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
4 - 19th Street to 26th Street	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
5 - 26th Street to Centennial	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
6 - Centennial to Roosevelt	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
7A - Roosevelt to 52nd Street	NA: FF 1	NA: FF 2	NA: FF 1	NA: FF 2	219.6	200.8
7B - 52nd Street to 66th Street	NA: FF 2	NA: FF 2	NA: FF 2	NA: FF 2	155.6	143.0
8 - 66th Street to 80th Street	NA: FF 2	NA: FF 2	219.2	219.2	155.6	143.0

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Feasible for 2025 Scenario

NOTES:

Fatal Flaw 1 (FF 1) - Ditch sections would not be permitted per City policy. New or reconstructed arterial roadways are to be curb and gutter.

Fatal Flaw 2 (FF 2) - A minimum of two travel lanes in each direction is necessary to achieve acceptable LOS conditions.

Progression of 2040 Scenario Improvements

Table 5-4 presents the progression of traffic volumes and improvements through 2040 as well as how many of the improvements necessary to address the 2025 capacity needs will also address 2040 needs.
Column 1 shows the number of travel lanes under the 2040 E plus C + ALL LRTP Projects scenario.
Column 2 shows the resulting 2040 LOS with only the E plus C plus LRTP improvement projects.
Column 3 shows the improvement that was identified to achieve an acceptable 2025 LOS.
Column 4 shows the 2040 LOS with the improvement measures necessary to achieve an acceptable LOS in the 2025 scenario.
Column 5 shows the additional improvement measure over and above that identified for the 2025 scenario that would be required to achieve an acceptable LOS in 2040.
Column 6 shows the resulting 2040 LOS with that improvement.

Table 5-4. 2025 to 2040 43rd Avenue Corridor Improvement Phasing

	Roadway Segment	From	To	2040 E+C plus All LRTP Projects - Typical Section [1]	2040 LOS w/o Additional 43rd Avenue Improvements	Year 2025 Improvement necessary to Achieve LOS C or Better for 2025 Traffic [2]	2040 LOS with Additional 2025 Improvement(s)
Corridor Segments	1A	Butte Drive	Valley Drive	2-lanes	D	3-lanes	C
	1B	Valley Drive	Washington Street	2-lanes	D	3-lanes	C
	2A	Washington Street	Coleman Street	2-lanes	E	3-lanes	C
	2B	Coleman Street	US 83 (State Street)	2-lanes	E	4 or 5-lanes	B
	3	US 83 (State Street)	19th Street	2-lanes	F	4 or 5-lanes	B
	4	19th Street	26th Street	2-lanes	F	4 or 5-lanes	B
	5	26th Street	Centennial Road	3-lanes	D	4 or 5-lanes	B
	6	Centennial Road	Roosevelt Drive	3-lanes	D	4 or 5-lanes	B
	7A	Roosevelt Drive	52nd Street	3-lanes	D	3-lanes	D
	7B	52nd Street	66th Street	3-lanes	D	3-lanes	E
	8	66th Street	80th Street	2-lanes	D	2-lanes	D

	Roadway Segment	From	To	Improvements Beyond 2025 Measure to Achieve LOS C or Better in 2040	2040 LOS with All Identified Improvements
Corridor Segments	1A	Butte Drive	Valley Drive	none	C
	1B	Valley Drive	Washington Street	none	C
	2A	Washington Street	Coleman Street	none	B
	2B	Coleman Street	US 83 (State Street)	none	B
	3	US 83 (State Street)	19th Street	none	B
	4	19th Street	26th Street	none	B
	5	26th Street	Centennial Road	none	B
	6	Centennial Road	Roosevelt Drive	none	B
	7A	Roosevelt Drive	52nd Street	4 or 5-lanes	B
	7B	52nd Street	66th Street	4 or 5-lanes	B
	8	66th Street	80th Street	3-lanes	C

[1] This includes those projects identified as Existing (E) or Committed (C), plus projects identified in the LRTP for implementation by 2040. No addtiional improvements to 43rd Avenue are assumed.

[2] The Year 2025 Improvement represents the measure or typical section necessary to bring segments up to an acceptable LOS for the 2025 E+C plus LRTP Projects. The intent is to establish a phasing plan for improvement measures based on travel needs.

SOURCE: Bismarck - Mandan MPO and WSB & Associates, Inc.

Under the 2040 Improvement Scenario, all 7.1 miles of the corridor operate at an acceptable LOS of C or better.

2040 Improved Measurement	LOS A-C Under Capacity	LOS D Approaching Capacity	LOS E At Capacity	LOS F Over Capacity	Total
Miles	7.1	0.0	0.0	0.0	7.1
Percentage	100.0%	0.0%	0.0%	0.0%	0%

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North-south Roadways Analysis

As with the 43rd Avenue Corridor, a similar analysis was performed for the primary north-south roadways to determine the necessary capacity improvements to achieve acceptable LOS' for 2025 and 2040 traffic levels. **Table 5-5** presents the progression of traffic volumes and associated improvements that would address the needs of motorists through 2025.

Table 5-5. 2025 North-South Roadway Improvement Phasing

ROADWAY	Segment (North or South of 43rd Avenue)	2035 E+C plus LRTP Projects - Typical Section [1]	2025 LOS w/o Additional N-S Roadway Improvements	Improvement Measure needed to Achieve LOS C or Better for 2025 Traffic Levels	2025 LOS with N-S Roadway Improvement(s)
Valley Drive	South	2-lanes	B	none	na
Washington Street	North	5-lanes	B	none	na
Washington Street	South	5-lanes	C	none	na
US-83	North	6-lane Divided	C	none	na
US-83	South	6-lane Divided	C	none	na
19th Street	North	3-lanes	C	none	na
19th Street	South	3-lanes	C	none	na
26th Street	North	2-lanes	B	none	na
Nebraska Drive	South	2-lanes	B	none	na
Centennial Road	North	3-lanes	C	none	na
Centennial Road	South	3-lanes	E	4 or 5-lanes	C
Roosevelt Drive	South	2-lanes	B	none	na
52nd Street	North	2-lanes	C	none	na
52nd Street	South	2-lanes	B	none	na
66th Street	South	2-lanes	A	none	na
80th Street	North	2-lanes	A	none	na
80th Street	South	2-lanes	A	none	na

na: not applicable as LOS is operating at an LOS of C or better with E+C plus LRTP Projects.

[1] Includes projects identified as Existing (E) or Committed (C), plus projects identified in the LRTP for implementation by 2025.

SOURCE: WSB & Associates, Inc.

Table 5-6. 2025 to 2040 North-South Roadway Improvement Phasing

ROADWAY	Segment (North or South of 43rd Avenue)	2040 E+C plus LRTP Projects [1]	2040 LOS w/o Additional N-S Roadway Improvements	Year 2025 Improvement necessary to Achive LOS C or Better for 2025 Traffic Levels	2040 LOS with Additional 2025 Improvement(s)	Improvements Beyond 2025 Measure to Achieve LOS C or Better in 2040	2040 LOS with All Identified Improvements
Valley Drive	South	2-lanes	C	none	na	none	C
Washington Street	North	5-lanes	B	none	na	none	B
Washington Street	South	5-lanes	C	none	na	none	C
US-83	North	6-lane Divided	C	none	na	none	C
US-83	South	6-lane Divided	C	none	na	4 or 5-lanes	B
19th Street	North	3-lanes	D	None (2025 LOS was C)	na	4 or 5-lanes[2]	B
19th Street	South	3-lanes	C	none	na	none	C
26th Street	North	2-lanes	C	none	na	none	C
Nebraska Drive	South	2-lanes	C	none	na	4 or 5-lanes	C
Centennial Road	North	3-lanes	C	none	na	4 or 5-lanes	C
Centennial Road	South	3-lanes	F	4 or 5-lanes	B	none	B
Roosevelt Drive	South	2-lanes	C	none	na	none	C
52nd Street	North	2-lanes	C	none	na	none	C
52nd Street	South	2-lanes	C	none	na	none	C
66th Street	North	2-lanes	B	none	na	none	B
66th Street	South	2-lanes	D	None (2025 LOS was A)	na	4 or 5-lanes	B
80th Street	North	2-lanes	B	none	na	none	B
80th Street	South	2-lanes	B	none	na	none	B

[1] Includes projects identified as Existing (E) or Committed (C), plus projects identified in the LRTP for implementation by 2040. No additional improvements to 43rd Avenue are assumed.

[2] Collector roadways typically are not major roadways requiring more than a 3-lane section. If 19th Street is expanded to 4 or 5 lanes, it is recommended that it be reclassified as a Minor Arterial.

SOURCE: WSB & Associates, Inc.

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5.3.3 Identification and Evaluation of Intersection Design Options

Provided in the following sections are the traffic control options were considered for application within the corridor. A figure is provided for each option that presents the results of the evaluation for the primary north-south cross streets intersecting the Corridor. Presented on the left side of the figure is the un-weighted matrix and on the right is the weighted matrix that identifies traffic control alternatives.

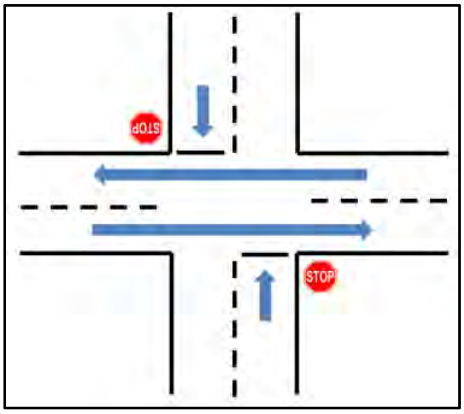
Common Features of all Intersection Control Alternatives:

In developing intersection control alternatives, it was determined that all of the alternatives need to accommodate travel by vehicle, walking, bicycling, and transit. Provided below are the five traffic control devices or options that were determined to have applicability within the corridor.

- Stop Sign Control
- Roundabout Control
- Signal Control
  - Traffic Light
  - HAWK Beacon
- Continuous Flow Intersection (CFI), and
- Interchange

Each of these options are briefly described below.

Stop Sign Control



Refer to the description provided previously in Chapter 3

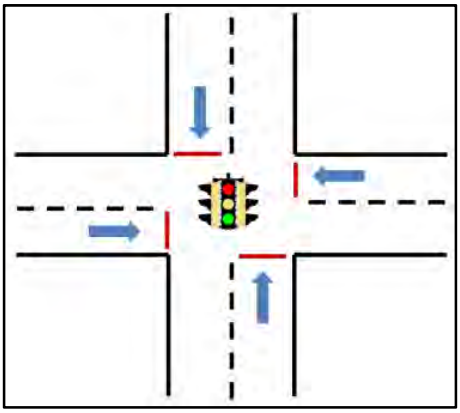
Roundabout Control

Description: A roundabout is a type of circular intersection in which road traffic is slowed and flows almost continuously in one direction around a central island to several exits onto the various intersecting roads. In a modern roundabout, entering traffic must always yield to traffic already in the circle. The greatest benefit of the roundabout design is that they virtually eliminate the opportunity for the most deadly crashes at intersections (T-bone or perpendicular crashes).

Typical Applications: Roundabouts can be designed for low, medium, and high volume intersections. They work especially well where entering traffic volumes are relatively equal on all approaches.

Typical Cost: Moderate cost involving construction of the roadway geometry including splitter islands, the center island, and signing. The cost to construct a two-lane roundabout is approximately $350,000.

Signal Control – Traffic Light



Refer to the description provided previously in Chapter 3

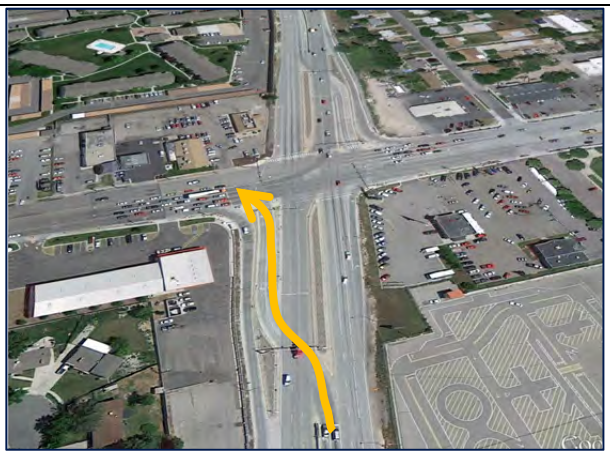
Signal Control – HAWK Beacon

Description: A HAWK Beacon (**H**igh-Intensity **A**ctivated cross**W**al**K** beacon) is a traffic signal used to stop road traffic and allow pedestrians to cross safely.

Typical Applications: High volume pedestrian areas. They are installed at mid-block locations where they are not likely to interfere with intersection operations.

Typical Cost: Low – Moderate cost of $80,000 to $100,000 to install the beacon system.

Continuous Flow Intersection (CFI)



Intersection of 3500 South and Bangerter Highway, Salt Lake City, UT – Simulation image and Aerial Photo)

Description: A Continuous Flow Intersection (CFI) is an at-grade intersection that moves the left-turning vehicles that conflict with the through movements out of the main intersection, thus increasing the main intersections capacity. This can be done on one of the roadways (2-Leg CFI) or both of the roadways (4-Leg CFI). A CFI moves the crossover left-turn movement down the road several hundred feet, eliminating some or all of the left-turn signal phases at the main intersection. CFIs have been estimated to increase intersection traffic flow by over 30 percent while also obtaining a reduction in wait time of nearly 50 percent.

Typical Applications: Junction of high volume roadways where heavy through and left-turning movements exist making it difficult to achieve acceptable operations at a conventional traffic signal.

Typical Cost: In general, a CFI could be considered a moderate cost improvement ranging from $3 million to $5 million for an intersection. Depending on the configuration, a CFI can require a significant amount of right-of-way to implement. However, the amount of right-of-way necessary is still typically less than that of an interchange and since there is no grade separation involved, the cost is considerably less.

Interchange

Description: A road junction that typically uses grade separation and one or more ramps to permit traffic on at least one highway to pass through the junction without directly crossing any other traffic stream. It differs from a standard intersection where roads cross at-grade.

Typical Applications: Interchanges are almost always used when at least one of the roads is a limited-access divided highway (expressway or freeway), though they may occasionally be used at junctions between two surface streets.

Typical Cost: Interchange costs are highly dependent upon many factors and variables and in general, costs can range from $15 million to more than $25 million. For application within the corridor, specifically the intersection of 43rd Avenue and US 83, four interchange designs were reviewed, which include: a Standard Diamond Interchange, a tight Diamond Interchange (TDI), a Single Point Urban Interchange (SPUI), and a Diverging Diamond Interchange (DDI).

Information on how each of these designs might fit within the existing right-of-way are provided in **Appendix B** – Footprints of Different Interchange Types.

5.3.4 43rd Avenue – 2025 Traffic Signalization

In addition to the assumed improvements identified for the 2025 E plus C + Short and Mid-term LRTP scenario, the following improvements were assumed for the 2025 43rd Avenue Improvement Scenario:

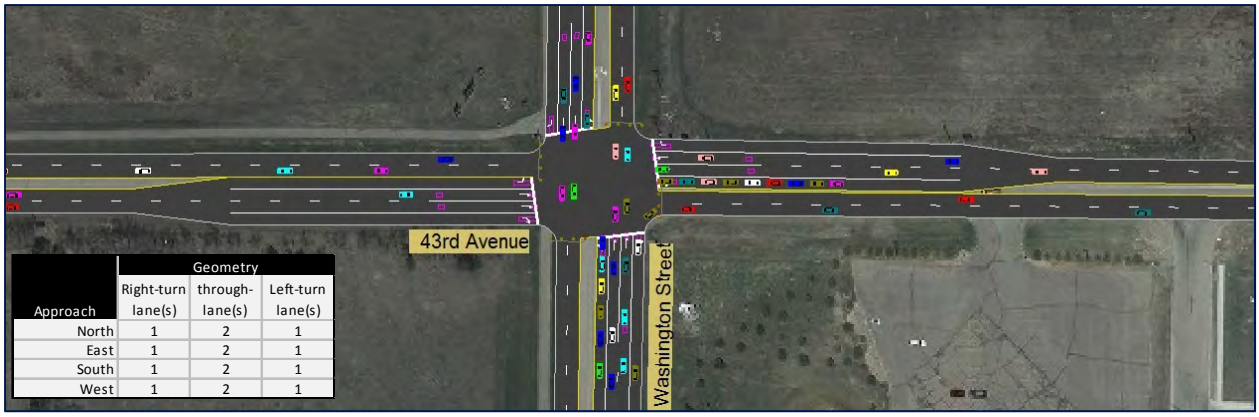
- 43rd Avenue was upgraded to have two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with Washington Street.
- 43rd Avenue was upgraded to have two through lanes in each direction with right-turn and dual left-turn lanes at its signalized intersection with US-83. US-83 also received dual left-turn lanes both northbound and southbound.
- Centennial Road and 43rd Avenue were both upgraded to have two through lanes in each direction. The northbound and westbound approached have right-turn and dual left-turn lanes. The eastbound and southbound approaches have right-turn and left-turn lanes.

For each of these intersections, the geometry that was analyzed and represents the improvement necessary to achieve an acceptable LOS is provided and listed by approach. If an intersection was not able to achieve an acceptable LOS, the geometry that results in its best operation is listed.

Figures 5-7 through **5-9** show the computer model that was developed for the intersections of Washington Street, US 83, and Centennial Road for 2025 conditions.

Washington Street Intersection

Figure 5-7. 2025 Improvement Option 1 Traffic Operations: 43rd Avenue / Washington Street



Modeling the peak hour traffic (PM peak hour) revealed that:

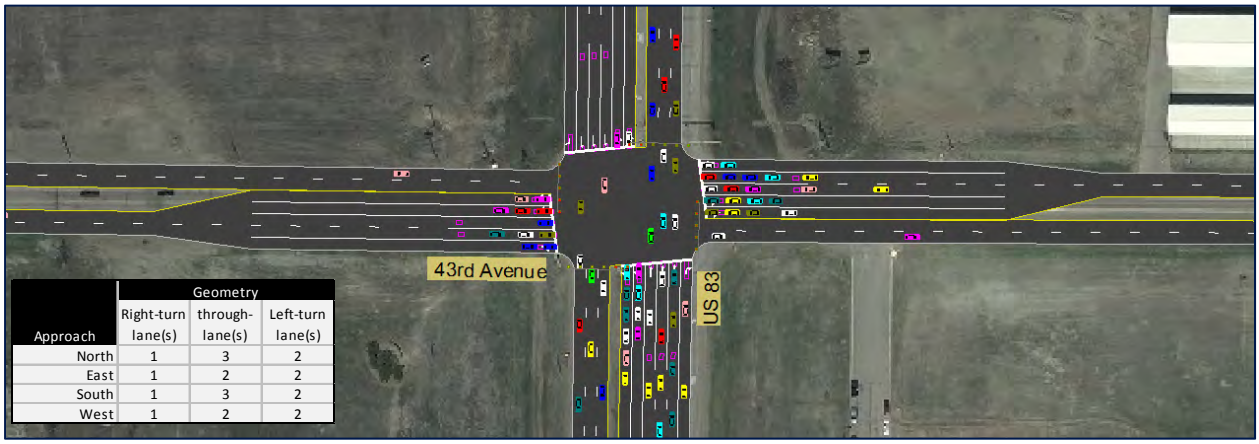
- The intersection as a whole and all of the approaches operated at LOS C conditions.
- Queue lengths for the turn lanes were maintained in the available storage. A few times during the hour, the northbound left-turn queue exceeded the storage. Through queues averaged from four to eight vehicles long.

2025 Washington Street Summary:

The intersection operated at acceptable conditions with 2025 traffic volumes and improvements to 43rd Avenue. Vehicle queues are within acceptable levels.

US-83 Intersection

Figure 5-8. 2025 Improvement Option 1 Traffic Operations: 43rd Avenue / US-83



Modeling the peak hour traffic (PM peak hour) revealed that:

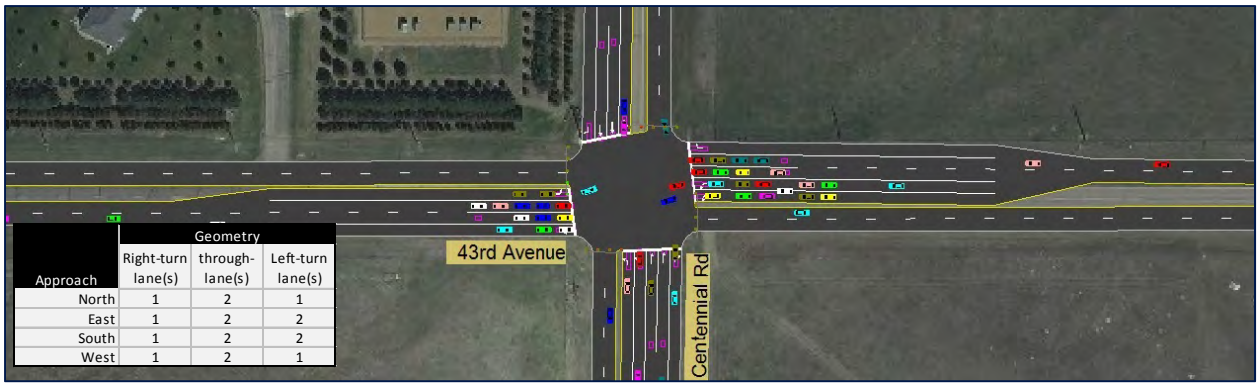
- The intersection as a whole and all of the approaches operated at LOS C conditions.
- Queue lengths for the turn lanes were maintained in the available storage. Through queues averaged from four to eight vehicles long.

2025 US-83 Summary:

The intersection operated at acceptable conditions with 2025 traffic volumes and improvements to 43rd Avenue. Vehicle queues are within acceptable levels.

Centennial Road Intersection

Figure 5-9. 2025 Improvement Option 1 Traffic Operations: 43rd Avenue/Centennial Road



Modeling the peak hour traffic (PM peak hour) revealed that:

- The intersection as a whole and all of the approaches operated at LOS C conditions.
- Queue lengths for the turn lanes were maintained in the available storage. Through queues averaged from three to six vehicles long.

2025 Centennial Road Summary:

The intersect ion operated at acceptable conditions with 2025 traffic volumes and improvements to 43rd Avenue. Vehicle queues are within acceptable levels.

5.3.5 43rd Avenue - 2040 Traffic Signalization

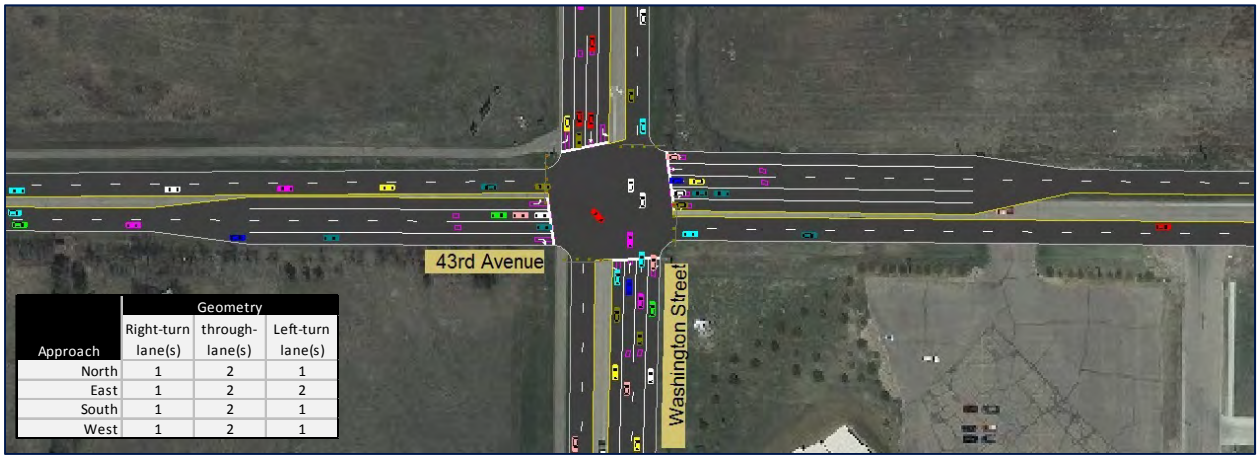
In addition to the assumed improvements mentioned for the 2040 E plus C + All LRTP Projects scenario, the following improvements were assumed for the 2040 Improvement Option 1 Scenario:

- 43rd Avenue was upgraded to have two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with Washington Street. The westbound approach received dual left-turn lanes.
- 43rd Avenue was upgraded to have two through lanes in each direction with right-turn and dual left-turn lanes at its signalized intersection with US-83. US-83 also received dual left-turn lanes both northbound and southbound.
- Centennial Road and 43rd Avenue were both upgraded to have two through lanes in each direction. The northbound and westbound approached have right-turn and dual left-turn lanes. The eastbound and southbound approaches have right-turn and left-turn lanes.
- 43rd Avenue was upgraded to have two through lanes in each direction with right-turn and left-turn lanes at its signalized intersection with 66th Street.

Figures 5-10 through **5-13** show images of the computer model developed for the intersections of Washington Street, US 83, Centennial Road, and 66th Street for 2040 conditions.

Washington Street Intersection

Figure 5-10. 2040 Improvement Option 1 Traffic Operations: 43rd Avenue/Washington Street



Approach	Geometry		
	Right-turn lane(s)	through-lane(s)	Left-turn lane(s)
North	1	2	1
East	1	2	2
South	1	2	1
West	1	2	1

Modeling the peak hour traffic (PM peak hour) revealed that:

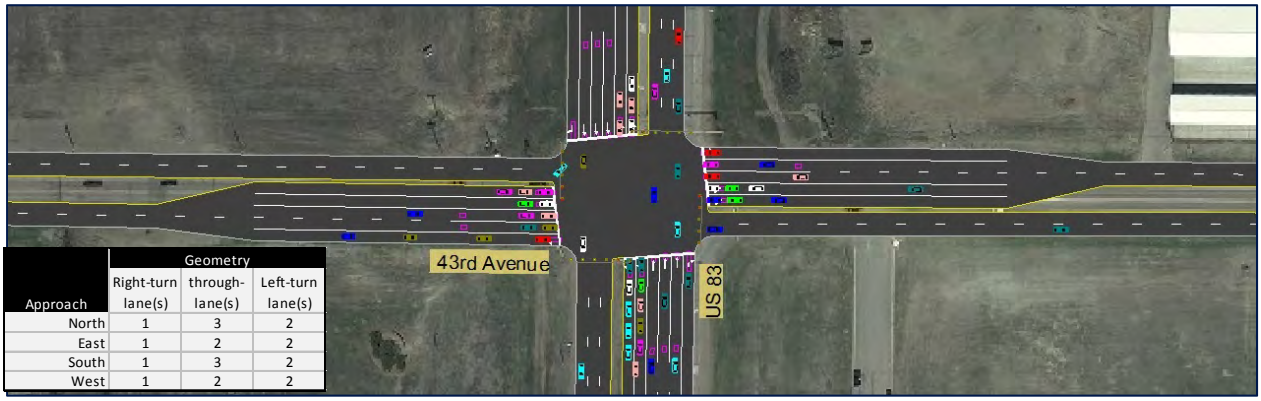
- The intersection as a whole and all of the approaches operated at LOS C conditions.
- Queue lengths for the turn lanes were maintained in the available storage. A few times during the hour, the northbound left-turn queue exceeded the storage. Through queues averaged from four to nine vehicles long.

2040 Washington Street Summary:

The intersection operated at acceptable conditions with 2040 traffic volumes and improvements to 43rd Avenue. Vehicle queues are within acceptable levels.

US-83 Intersection – Standard Signal

Figure 5-11. 2040 Improvement Option 1 Traffic Operations: 43rd Avenue/US-83



Approach	Geometry		
	Right-turn lane(s)	through-lane(s)	Left-turn lane(s)
North	1	3	2
East	1	2	2
South	1	3	2
West	1	2	2

Modeling the peak hour traffic (PM peak hour) revealed that:

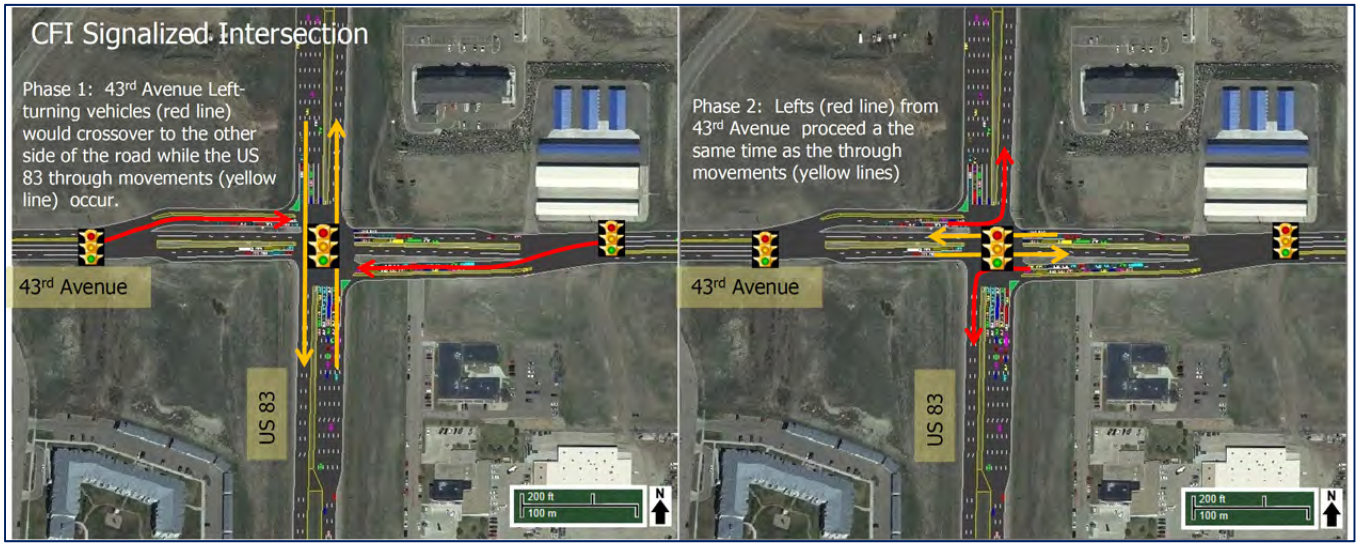
- The intersection as a whole and all of the approaches operated at LOS D conditions.

- Queue lengths for the turn lanes were maintained in the available storage. Through queues averaged from eight to fourteen vehicles long.

US-83 Intersection – Continuous Flow Intersection (CFI)

Figure 5-11 shows the micro-simulation model of a CFI for the intersection of 43rd Avenue and US 83. Demonstrated on this image is how a CFI signal system works, with the initial phase involving vehicles on 43rd Avenue that want to turn left onto US 83 advancing to the left side of the roadway up to the stop bar while US 83 traffic advances. During phase 2, the left-turning vehicles as well as all 43rd Avenue traffic is in motion. This system would have a three interconnected signals. Signals would be provided on 43rd Avenue for advancing eastbound and westbound left-turning vehicles up to the intersection stop-line, and a signal would also be provided at the intersection. Through separating these movements, the intersection is able to function more efficiently, enabling it to process more vehicles than a standard signal system.

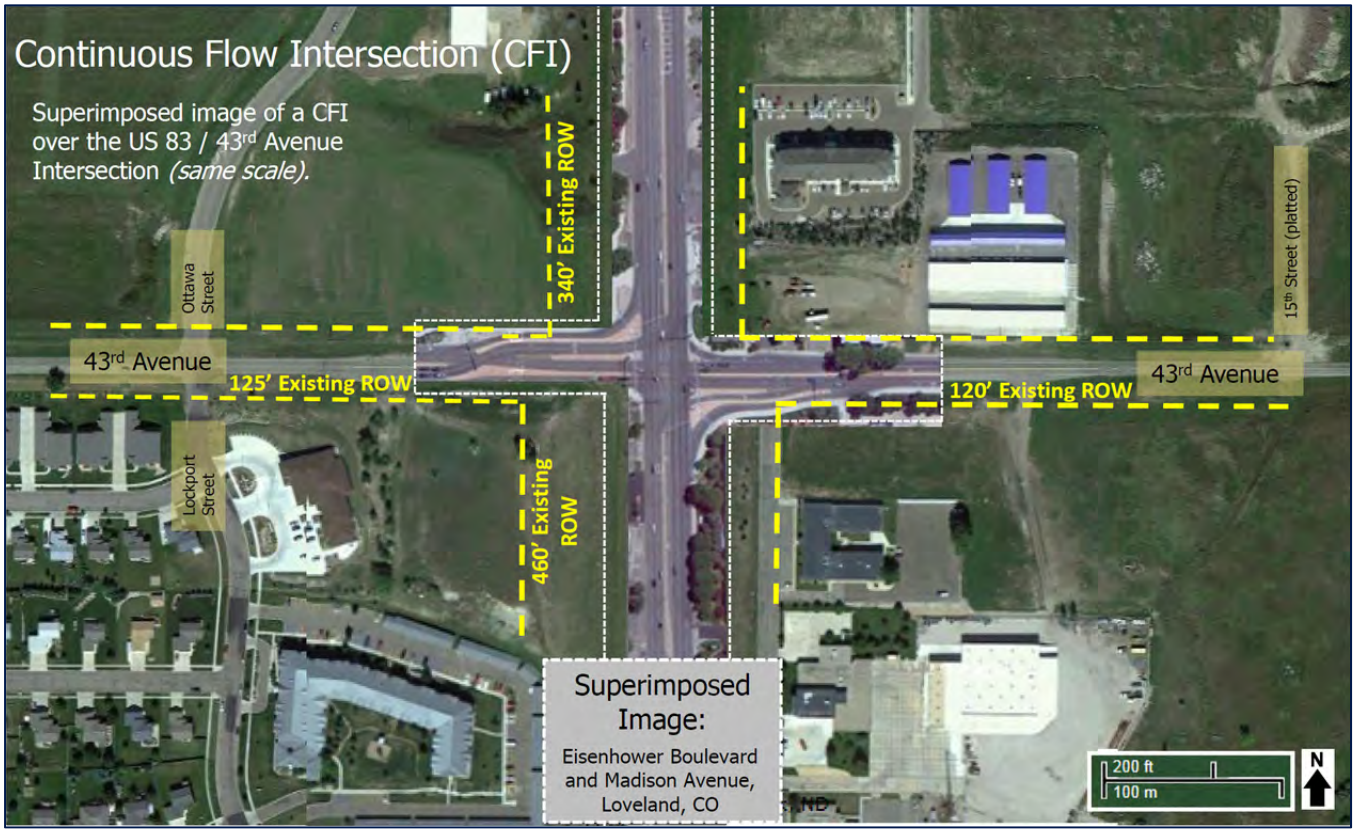
Figure 5-12. 2040 Improvement Option 2 (CFI) Traffic Operations: 43rd Avenue/US-83



Modeling the peak hour traffic (PM peak hour) revealed that:

- The intersection as a whole and all of the approaches would operate at LOS C conditions.
- Queue lengths for all turn lanes were well within the available storage

The following image displays an existing CFI placed over the US 83 / 43rd Avenue intersection. Shown in yellow dashed lines is the existing right-of-way, which for 43rd Avenue is 125 feet and 120 feet west and east of US 83, respectively. For US 83, the existing ROW is 340 feet north and 460 feet south of 43rd Avenue, respectively. The area within the dashed white line is the superimposed image of the US 34 (Eisenhower Boulevard) / Madison Avenue (4-lanes) intersection in Loveland, Colorado, which processes approximately 75,000 vehicles per day (vpd). Eisenhower Boulevard is a major north-south route with 6 travel lanes and Madison Avenue is the east-west route and has 4 travel lanes. The geometry is similar to what has been developed for the US 83 and 43rd Avenue intersection, which is projected to process approximately 53,000 vpd and 56,000 by 2025 and 2040, respectively. Considering the capacity of this type of intersection as well as its relatively compact design, a CFI may be a viable option at this location.



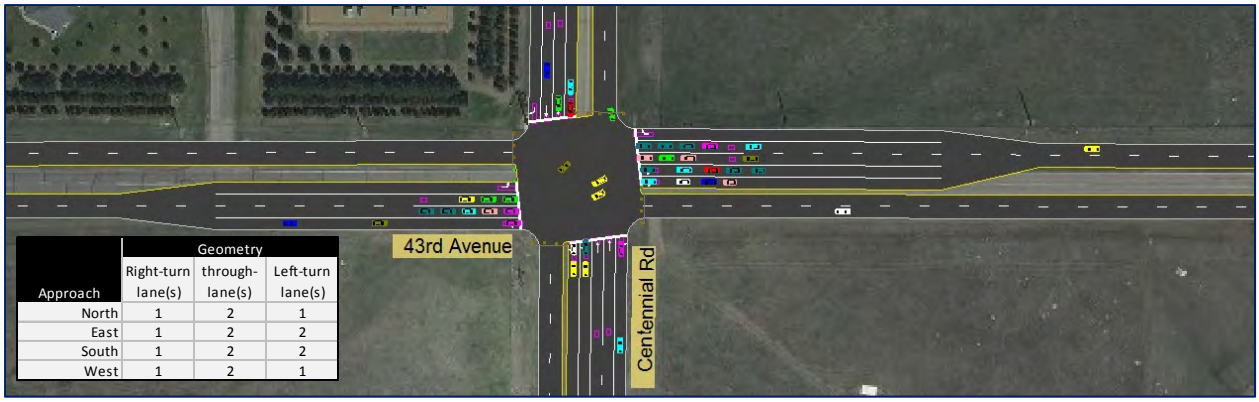
2040 US 83 Summary:

It was determined that US 83 / 43rd Avenue would be able to achieve a LOS D operating as a standard signalized intersection. As this is below the MPO threshold of LOS D, other intersection designs were considered, including a Continuous Flow Intersection (CFI). As a CFI, the intersection is able to process traffic more efficiently and would achieve an acceptable LOS. To see how a CFI might be accommodated at this intersection, an aerial image of an existing CFI was placed over 43rd Avenue/US 83 at the same scale. From a cursory review, it appears as though a CFI might be accommodated with minimal right-of-way impact.

In addition to the CFI, four types of interchanges -- Standard Diamond Interchange, Tight Diamond Interchange (TDI), Single Point Urban Interchange (SPUI), and a Diverging Diamond Interchange (DDI) -- were reviewed to determine how they might fit over the intersection. This information is presented in **Appendix B** – Footprints of Different Interchange Types.

Centennial Road Intersection

Figure 5-13. 2040 Improvement Option 1 - Traffic Operations: 43rd Avenue/Centennial Road



Modeling the peak hour traffic (PM peak hour) revealed that:

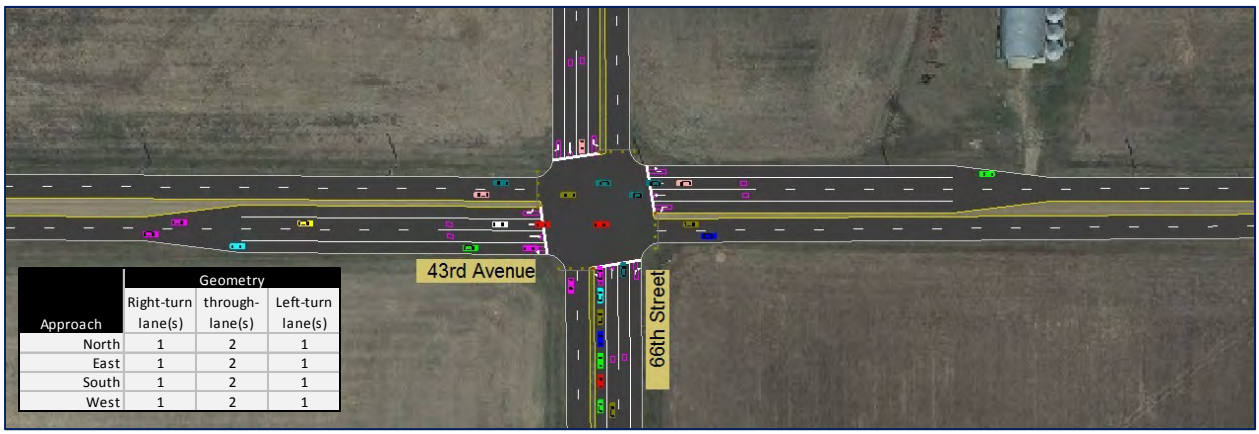
- The intersection as a whole and all of the approaches operated at LOS C conditions.
- Queue lengths for the turn lanes were maintained in the available storage. A few times during the hour, the northbound left-turn queue exceeded the storage. Through queues averaged from four to seven vehicles long.

2040 Centennial Road Summary:

The intersection operated at acceptable conditions with 2040 traffic volumes and improvements to 43rd Avenue. Vehicle queues are within acceptable levels.

66th Street Intersection

Figure 5-14. 2040 Improvement Option 1 - Traffic Operations: 43rd Avenue / 66th Street



Modeling the peak hour traffic (PM peak hour) revealed that:

- The intersection as a whole operated at LOS B conditions while the approaches operated at LOS B and C conditions.
- Queue lengths for the turn lanes were maintained in the available storage. Through queues averaged from two to four vehicles long.

2040 66th Street Summary:
The intersection operated at acceptable conditions with 2040 traffic volumes and improvements to 43rd Avenue. Vehicle queues are within acceptable levels.

5.3.6 Evaluation of the intersection Designs

Each design was evaluated to determine their appropriateness for primary north-south roadways. In addition, the evaluation included a hypothetical roadway with an assumed daily traffic volume of 5,000 as this could represent many of the existing or planned roadways in the corridor.

Primary North-South Intersections within the Corridor

The primary north-south roadway intersections were evaluated to determine appropriate or feasible improvements for the following traffic control strategies:

- All-way Stop
- Roundabout
- Signal
- Continuous Flow Intersection (CFI), and
- Interchange

As presented in **Table 5.7**, a traffic signal is among the alternatives for each of the five intersections, although at US 83, it would perform at LOS D during the PM Peak-hour, which is below the LOS threshold of C. While not being able to meet the necessary capacity to accommodate traffic demand constitutes a Fatal Flaw, this option should still be considered a feasible alternative at this location. The other feasible option at this location is a Continuous Flow Intersection (CFI), which would provide for acceptable LOS and based on a cursory review it appears it may fit within the existing right-of-way.

Other traffic control options include stop control, roundabouts, and interchanges. With respect to interchanges, it was determined they aren't necessary to achieve an acceptable LOS and due to potential ROW impacts they should not be considered as feasible alternatives.

Table 5-7. Results Summary - Intersection Evaluation Matrix

TRAVEL USER TYPE: Motorists Needs	WEIGHTED SCORES Intersection Alternatives					
Intersecting Cross-street [1]	Sidestreet Stop	All-way Stop	Roundabout	Signal	Continuous Flow Intersection	Interchange [2]
Washington Street	FF	FF	213.7	207.4	150.7	136.6
US 83	FF	FF	151.9	187.9	196.2	169.3
Centennial Road	FF	FF	206.1	207.4	157.0	136.6
66th Street	FF	188.6	207.1	200.8	150.7	136.6
80th Street	FF	188.6	200.5	187.6	150.7	136.6
Low to medium volume roadways [3]	202.8	182.0	213.0	181.0	150.7	136.6

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Feasible

[1] The named roadway intersections represent the key routes spaced at one-mile intervals within the corridor.

[2] An interchange was determined not to be necessary at any of the intersections along 43rd Avenue as other alternatives with less impact would provide for acceptable levels of service with minimal impacts, i.e., if an interchange were to be constructed at US 83 and 43rd Avenue, it appears from the review of ROW requirements that it would require additional ROW and may affect planned developments.

[3] This category represents roadways typically with daily traffic volumes in the range of 3,000 - 5,000.

Fatal Flaw (FF) - The projected traffic volumes require more intersection capacity than could be accommodated with this alternative.

5.3.7 Pedestrian, Transit-user, and Bicycle Options:

Provided in the following sections are the primary improvements considered for accommodating the needs of pedestrians, transit-users, and bicyclists within the corridor.

Infrastructure improvements to accommodate pedestrians and transit-users include the following:

- Sidewalks
- Trails or Shared-Use Paths

Infrastructure improvements to accommodate bicyclists include:

- Sidewalks
- Trails or Shared-Use Paths
- Bicycle Lanes
- Shoulders

Provided in the following sections are descriptions of these measures.

Sidewalks

Sidewalks within the corridor would be 6-foot wide and made of concrete. Sidewalks within the corridor would allow pedestrians to walk to their destinations as well as for providing a safe route for transit users (existing and future) to reach bus stops. Although bicyclists can use sidewalks, it is generally not viewed as favorable by pedestrians or bicyclists. Within the Corridor, sidewalks would be placed near the outside edge of the corridor right-of-way but would be brought in towards the roadway at intersection locations to align with crosswalks.

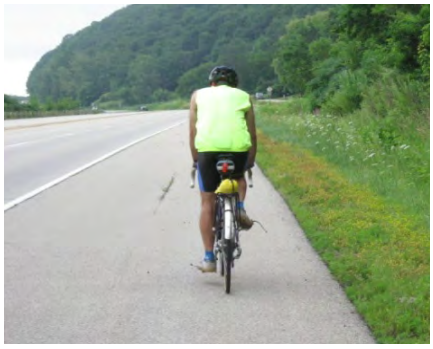
Trails or Shared-Use Paths

Trails within the corridor would be 10 to 12 feet wide and constructed out of asphalt. They are intended and designed for shared use by bicyclists and pedestrians. Shared-use paths allow two-way travel and may be constructed along one or both sides of a roadway. As with sidewalks, the trails would be located near the edge of the corridor right-of-way.

Bike Lanes

Bicycle Lanes are typically 5-7 foot lanes striped on the roadway for the exclusive use of bicycles. Bicycle lanes use a combination of pavement symbols and signage to designate a portion of the roadway for bicycles.

Shoulders



Paved shoulders typically of 8 to 10 feet wide are often used by more accomplished bicyclists where bike lanes are not provided. However, they are also used by recreational bicyclists as well if other options are not provided.

5.3.8 Evaluation of Pedestrian and Transit User Options

Provided in **Table 5-8** are the results of the evaluation for pedestrians and transit-users. A sidewalk, trail, or both are feasible alternatives.

Table 5-8. Results Summary – Pedestrian and Transit

TRAVEL USER TYPE: Pedestrians and Transit Users	WEIGHTED SCORES Improvement Alternatives	
GOAL / OBJECTIVE	Sidewalk	Trail (Shared-use Path)
A. Promote use of Alt. Modes of Transportation	18.6	37.2
B. Improve Travel Safety	56.4	56.4
C. Improve Travel Mobility	45.6	45.6
D. Promote Economic Benefits	37.8	37.8
E. Promote Environmental Stewardship	24.8	24.8
F. Promote right-sizing (project scale and cost)	39.6	39.6
WEIGHTED SCORE	222.8	241.4

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Feasible

It should be noted that in addition to these measures, there are also design elements that can be incorporated into the roadway design to accommodate other improvements such as bus turn-outs. These are presented on the layout figures at the end of this report.

5.3.9 Evaluation of Bicycle User Options

Table 5-9 presents the results of the evaluation for bicyclists. A trail as well as bicycle lanes would be feasible alternatives for addressing bicyclists' needs.

Table 5-9. Results Summary – Bicyclists

TRAVEL USER TYPE: Bicyclists	WEIGHTED SCORES Improvement Alternatives				
GOAL / OBJECTIVE	Sidewalk	Trail (Shared-use Path)	Bicycle Lanes	Shared Lane Markings / Signs	Shoulders
A. Promote use of Alt. Modes of Transportation	18.6	37.2	12.4	12.4	24.8
B. Improve Travel Safety	37.6	56.4	47.0	28.2	37.6
C. Improve Travel Mobility	7.6	45.6	45.6	30.4	30.4
D. Promote Economic Benefits	37.8	37.8	37.8	25.2	18.9
E. Promote Environmental Stewardship	24.8	24.8	31.0	37.2	31.0
F. Promote right-sizing (project scale and cost)	6.6	39.6	39.6	26.4	39.6
WEIGHTED SCORE	133.0	241.4	213.4	159.8	182.3

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Feasible

Chapter 6
Feasible Alternatives

6.1 Feasible Alternatives

Through the evaluation process an array of multi-modal transportation improvements were identified that meet the existing and projected needs of the travel various users of the corridor. Contained on Figures 6-1 through 6-14 are the individual segments of the corridor showing feasible transportation improvements. As shown in the analysis, there are many different options that would address the identified needs.

On Figures 6-1 through 6-14, the design layout shown assumes 120 feet of right-of-way(ROW) from Butte Drive to 52nd Street, from which point the is 150 feet to 80th Street. Detailed aerial images showing the existing ROW is provided in **Appendix C** – Existing Land Use and Right of Way Mapbook.[4]

From Butte Drive to Washington Drive, Ash Coulee is shown as a 3-lane roadway with paved shoulders, curb and gutter drainage and a trail on both sides of the roadway.

From Washington Street to Centennial Road the section shown is 5-lanes with curb and gutter drainage, a sidewalk on the north side of the roadway and a trail south of 43rd Avenue.

From Centennial Road to 66th Street the section shown is 5-lanes with curb and gutter drainage and a trail south of 43rd Avenue.

From 66th Street to 80th Street the section shown is 3-lanes with ditch drainage and a trail on the south side of 43rd Avenue.

Shown on these figures are other considerations such as the use of service or reverse frontage roads that would parallel 43rd Avenue. These roads provide areas for development that would be visible or adjacent from 43rd Avenue from which access to the service roads would be provided per the City's Access Spacing Policy.

Figure 6-15 (sheets 1 through 9) shows a conceptual plan and profile of the corridor that would provide acceptable sight distance per NDDOT and AASHTO standards. Also shown on this figure are

[4] The mapbook covers the corridor up to 66th Street. East of 66th Street the right-of-way is 100 to 120 feet.

construction limits. It needs to be emphasized that the profile represents a conceptual level design and that a final design of the roadway would entail much more detail in identifying both the vertical and horizontal alignment of a reconstructed roadway and travel corridor.

6.2 Next Steps

With the completion of this document, the next steps in the improvement process will be preliminary design layout and environmental documentation. This would then be followed by final design and construction provided funding is obtained. Construction would likely occur over a period of several years based on need and corridor development.

Corridor Segment 1B - Valley Drive to Washington Street (0.55 mile)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder, steep grades.
Trails/Sidewalks: Trail along south side of roadway, crossing at Amber Glow Drive to north side of roadway.
Transit Service: None
ROW: 100 to 120 feet

Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
Feet
0 100 200
N

1A
SEGMENT 1
ROW: 100'
ROW: 120'
Trail
MELLOWSUN DR
AMBERGLOW PL
AMBERGLOW DR
ASH COULEE PL
Trail
EAGLE CREST DR
GOLDEN EAGLE

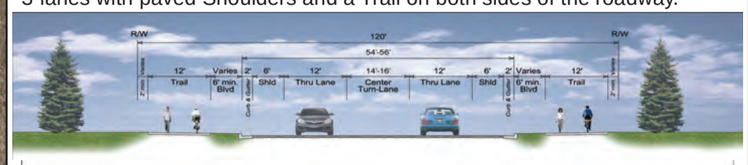
Sidewalks and/or trails to should be provided along the entire corridor to safely accommodate pedestrians, transit-users, and bicyclists.

Roadway Profile change with reconstruction to eliminate grades above 6% and reduce sight distance concerns.

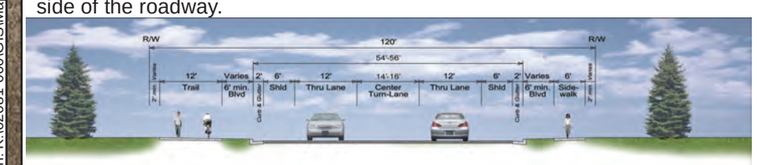
The profile grade of the roadway should allow for safe travel for all users by providing sight distance in accordance with NDDOT and AASHTO design standards. Generally, this coincides with a grade of 6 percent.

Designs that Would Address Future Travel Needs

Design 1 (shown on layout):
3-lanes with paved Shoulders and a Trail on both sides of the roadway.



Design 2:
3-lanes with paved Shoulders with a continuous trail and sidewalk on either side of the roadway.



How User Needs are Addressed by the Design Options:

Motorists:
A three-lane roadway section would provide stable travel flow for future traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	4,500	Stable travel flow / LOS B
2040:	7,800	Stable travel flow / LOS C

-Paved shoulders will provide an area for stopped or disabled vehicles that doesn't block traffic.
-Upon reconstruction, the roadway profile will be designed to improve sight-distance.
-As opportunity arises, there should be an effort to reduce or consolidate existing access points.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

Path: K:\02081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout1_Recommended.mxd

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-1

Corridor Concept: Segment 1A - Butte Drive to Valley Drive

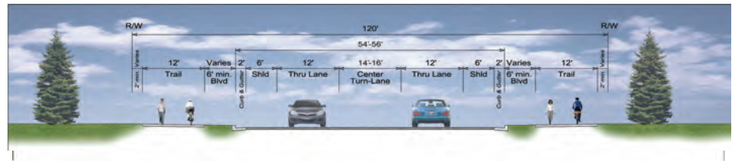
Corridor Segment 1B - Valley Drive to Washington Street (0.55 miles)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder, steep grades.
Trails/Sidewalks: Trail along north side of roadway.
Transit Service: None
ROW: 100 to 120 feet

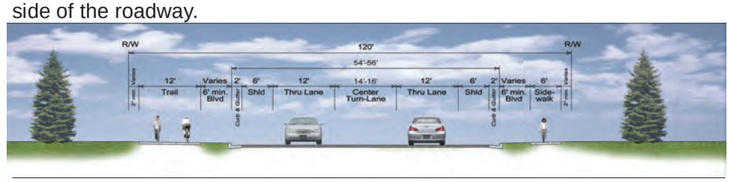
To address pedestrian and traffic congestion near Horizon Middle School, potential improvements include: the realignment of the school access roads to eliminate offset intersections and the presence of an adult crossing guard or the installation of a High-Intensity Activated crossWalK beacon (HAWK) system.

Designs that would Address Future Travel Needs

Design 1 (shown on layout):
3-lanes with paved Shoulders and a Trail on both sides of the roadway.



Design 2:
3-lanes with paved Shoulders with a continuous trail and sidewalk on either side of the roadway.



POTENTIAL HAWK Beacon Pedestrian Crossing

POTENTIAL Roundabout

To address pedestrian and traffic congestion near Horizon Middle School, potential improvements include: the realignment of the school access roads to eliminate offset intersections and the presence of an adult crossing guard or the installation of a High-Intensity Activated crossWalK beacon (HAWK) system.

Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
Feet
0 100 200
N

EAGLE CRES
ASH COULEE PL
AMBERGLOW PL
ASH COULEE DR
Horizon Middle School
Crossing Guard for School
SEGMENT 1
Connection to Valley Dr Trail
ROW: 100'
BOULDER RIDGE
SLATE DR
BOULDER R
Expansion of Washington St. (2016)
Washington Street Trail
1B
2A
SE
Sidewalk
ROW: 100'
ROW: 125'
ROW: 150'
43RD AVE
Trail
HURON DR
REGINA LN
RD
HIGH CREEK RD
OVERLAND RD
MUSTANG DR
VALLEY DR
MUSTANG DR
KINGSTON DR
AL ST

How User Needs are Addressed by the Design Options:

Motorists:
A three-lane roadway section would provide stable travel flow for future traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	7,900	Stable travel flow / LOS C
2040:	9,500	Stable travel flow / LOS C

-Paved shoulders will provide an area for stopped or disabled vehicles that doesn't block traffic.
-Upon reconstruction, the roadway profile will be designed to improve sight-distance.
-As opportunity arises, there should be an effort to reduce or consolidate existing access points and future access should follow the guidelines established in the City of Bismarck Access Policy.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

Path: K:\102081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout2 Recommended.mxd

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-2

Corridor Concept: Segment 1B - Valley Drive to Washington Street

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Corridor Segment 2A - Washington Street to Coleman Street (0.60 miles)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder.
Trails/Sidewalks: None
Transit Services: CAT Route D-2 (Eastbound)
ROW: 100 to 150 feet

Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200

Expansion of Washington St. (2016)

POTENTIAL 2040 SIGNAL

Washington Street Trail

N WASHINGTON ST

Length of median is a function of traffic volumes. The design shown on this layout represents an intersection design for projected 2040 traffic volumes.

2A

SEGMENT 2

Potential future bus turnout location

Sidewalk

ROW: 100' ROW: 100' ROW: 125' ROW: 150' ROW 150' ROW: 110'

43RD AVE

SLATE DR

BOULDER RIDGE RD

QUARTZ DR

SILICA PL

BURGANDY CR

LORRAIN DR

Source: Esri, DigitalGlobe, Ge

How User Needs are Addressed by the Design Options:

Motorists: A three-lane roadway section would provide stable travel flow for future 2025 traffic levels and a five-lane roadway section for future 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	11,500	Stable travel flow / LOS C
2040:	13,600	Stable travel flow / LOS B

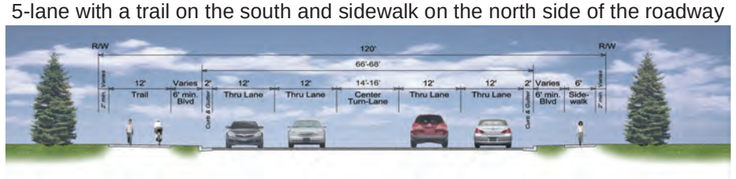
-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
- As opportunity arises, there should be an effort to reduce or consolidate existing access points.

Pedestrians / Bicyclists:
The sidewalk and trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

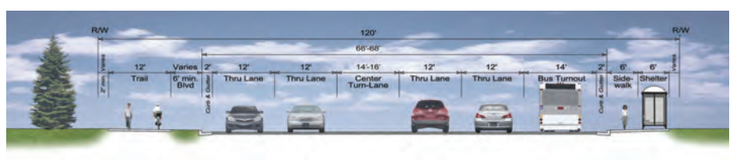
Transit users:
The sidewalk and trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area. The roadway design will incorporate transit accommodations such as bus turn-out lanes and transit shelters where feasible.

Designs that would Address Future Travel Needs

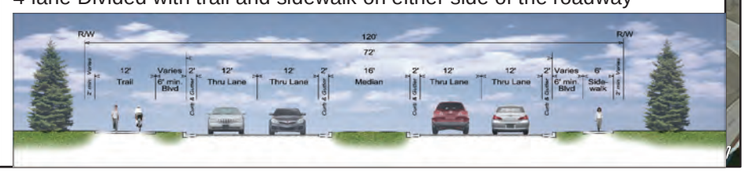
Design 1 (shown on layout):
5-lane with a trail on the south and sidewalk on the north side of the roadway



Design 1 with Bus Turn-out
5-lane with bus turn-out



Design 2:
4-lane Divided with trail and sidewalk on either side of the roadway



43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-3

Corridor Concept: Segment 2A - Washington Street to Coleman Street

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Path: K:\02081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout3 Recommended.mxd

Corridor Segment 2B - Coleman Street to US 83 (0.40 miles)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder.
Trails/Sidewalks: None
Transit Services: CAT Route D-2 (Eastbound)
ROW: 110 to 125 feet

POTENTIAL 2040 SIGNAL

POTENTIAL 2040 CONTINUOUS FLOW INTERSECTION

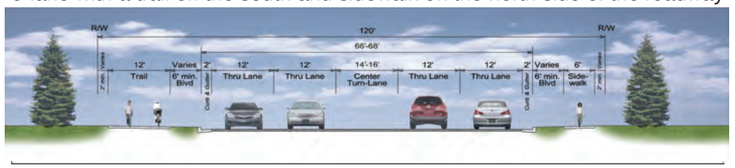
POTENTIAL Bike Lane

Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200

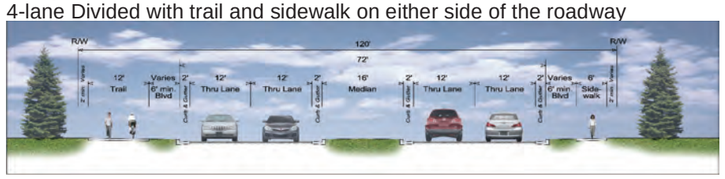
OTTAWA ST
COLEMAN ST
Future Expansion to 6 Lanes
SEGMENT 2
2B
ROW: 110'
ROW: 105'
ROW: 125'
ROW: 125'
Sidewalk
Mountable Median
(firetrucks and authorized vehicles only)
ROW 125'
ROW 110'
ROW: 120'
43RD AVE
Trail
LAMBTON AVE
Firestation
Roadw
Lanes
Expansion to 6 Lanes

Designs that would Address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and sidewalk on the north side of the roadway



Design 2:
4-lane Divided with trail and sidewalk on either side of the roadway



How User Needs are Addressed by the Design Options:

Motorists:
Either a four-lane divided or five-lane roadway section would provide stable travel flow for future 2025 and 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	14,400	Stable travel flow / LOS B
2040:	16,600	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-As opportunity arises, there should be an effort to reduce or consolidate existing access points.

Pedestrians / Bicyclists:
The sidewalk and trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The sidewalk and trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area. The roadway design will incorporate transit accommodations such as bus turn-out lanes and transit shelters where feasible.

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43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-4

Corridor Concept: Segment 2B - Coleman Street to US 83

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Corridor Segment 3 - US 83 to 19th Street (0.50 miles)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with steep grades (6% plus) and steep grades and side-slopes.
Trails/Sidewalks: None
Transit Service: CAT Route D-2 (10th Street)
ROW: 100 to 125 feet

POTENTIAL 2040 SIGNAL

POTENTIAL 2040 CONTINUOUS FLOW INTERSECTION

Legend
- Median
- Road
- Sidewalk
- Trail
- Existing Signal
- Future Signal
- Segment Limits

N

Feet
0 100 200

Designs that would address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and sidewalk on the north side of the roadway

Design 2:
4-lane Divided with trail and sidewalk on either side of the roadway

How User Needs are Addressed byt the Design Options:

Motorists:
Either a four-lane divided or five-lane roadway section would provide stable travel flow for future 2025 and 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	14,800	Stable travel flow / LOS B
2040:	16,600	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-As opportunity arises, there should be an effort to reduce or consolidate existing access points and future access should follow the guidelines established in the City of Bismarck Access Policy.

Pedestrians / Bicyclists:
The sidewalk and trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The sidewalk and trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area. The roadway design will incorporate transit accommodations such as bus turn-out lanes and transit shelters where feasible.

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43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-5

Corridor Concept: Segment 3 - US 83 to 19th Street

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Corridor Segment 4 - 19th Street to 26th Street (0.50 miles)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder, and steep grades.
Trails/Sidewalks: None
Transit Services: CAT Route C-2 (Westbound)
ROW: 100 to 125 feet

POTENTIAL Bike Lane

POTENTIAL Roundabout

Transit – Bus Turnout (plan view)

A grade separated or whistle free crossing of the DMV&R Railroad tracks was considered. However, the costs (financial and environmental) are not justified for this low frequency rail crossing (under 5 trains per day). If train activity increases in the future, these options could be revisited.

Designs that would address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and sidewalk on the north side of the roadway

Design 2:
4-lane Divided with trail and sidewalk on either side of the roadway

How User Needs are Addressed by the Design Options:

Motorists:
Either a four-lane divided or five-lane roadway section would provide stable travel flow for future 2025 and 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	16,100	Stable travel flow / LOS B
2040:	17,600	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-As opportunity arises, there should be an effort to reduce or consolidate existing access points and future access should follow the guidelines established in the City of Bismarck Access Policy.
-The construction of “backage” roads to serve adjacent development areas should be employed when feasible.

Pedestrians / Bicyclists:
The sidewalk and trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

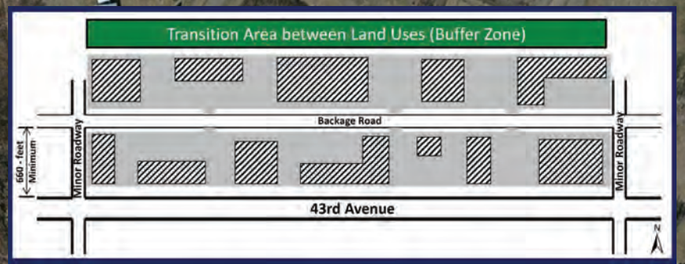
Transit users:
The sidewalk and trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area. The roadway design will incorporate transit accommodations such as bus turn-out lanes and transit shelters where feasible.

Figure 6-6

Corridor Concept: Segment 4 - 19th Street to 26th Street

Corridor Segment 5 - 26th Street to Centennial Road (1.00 mile)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder, steep grades.
Trails/Sidewalks: None
Transit Services: CAT Route C-2 (Westbound)
ROW: 115 to 155 feet



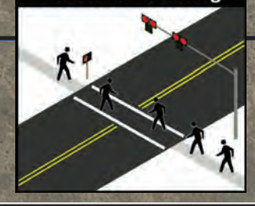
Backage Road Example: Development on both sides of service road.

Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200

POINTE LP
LA CORTE PL
26TH ST
HAY CREEK DR
HAY CREEK DR
ROUNDUP RD
SEGMENT 5
HILLSBORO DR
ROW: 120'
ROW: 115'
ROW: 115'
43RD AVE
Potential Backage Road System
Proposed Edgewater Trail
Future Nebraska Dr. Extension

POTENTIAL Roundabout

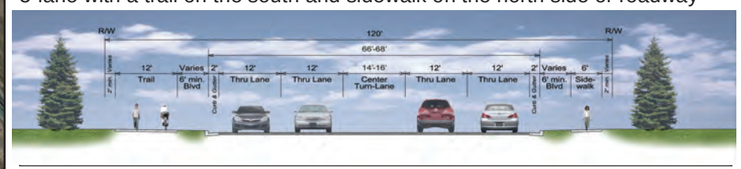
POTENTIAL HAWK Beacon Pedestrian Crossing



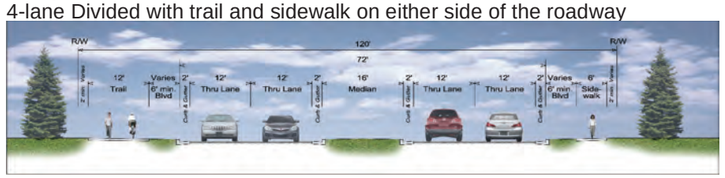
POTENTIAL Roundabout

Designs that would Address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and sidewalk on the north side or roadway



Design 2:
4-lane Divided with trail and sidewalk on either side of the roadway



How User Needs are Addressed by the Design Options:

Motorists:
Either a four-lane divided or five-lane roadway section would provide stable travel flow for future 2025 and 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	14,200	Stable travel flow / LOS B
2040:	15,300	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of “backage” roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The sidewalk and trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment. The network could also be linked with the proposed Edgewater Trail.

Transit users:
The sidewalk and trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area. The roadway design will incorporate transit accommodations such as bus turn-out lanes and transit shelters where feasible.

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43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

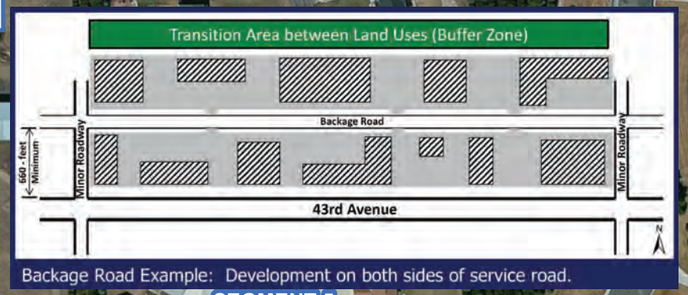
Figure 6-7

Corrdior Concept: Segment 5 - 26th Street to Centennial Road

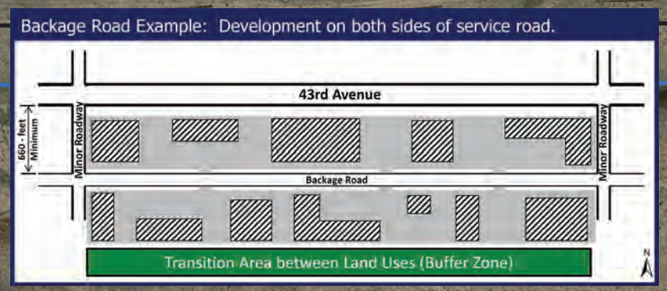
BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Corridor Segment 5 - 26th Street to Centennial Road (1.00 mile)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder.
Trails/Sidewalks: None
Transit Services: None
ROW: 115 to 155 feet

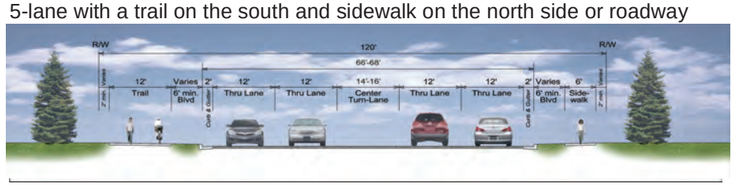


Backage Road Example: Development on both sides of service road.

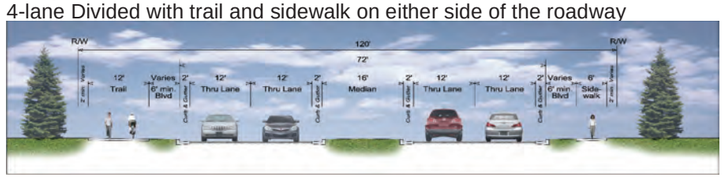


Designs that would Address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and sidewalk on the north side or roadway



Design 2:
4-lane Divided with trail and sidewalk on either side of the roadway



How User Needs are Addressed by the Design Options

Motorists:
Either a four-lane divided or five-lane roadway section would provide stable travel flow for future 2025 and 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	14,000	Stable travel flow / LOS B
2040:	16,400	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of "backage" roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment
.
Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

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43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-8

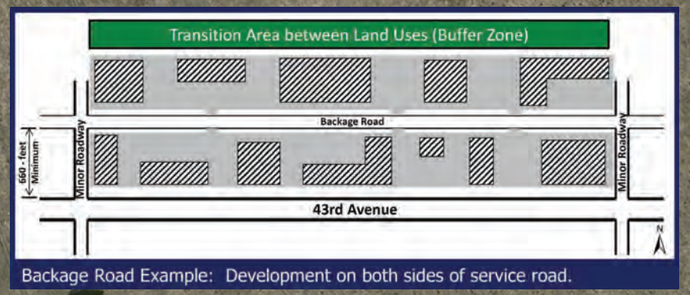
Corridor Concept: Segment 5 - 26th Street to Centennial Road

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Corridor Segment 6 - Centennial Road to Roosevelt Drive (0.50 miles)

EXISTING CHARACTERISTICS

Roadway: 2-lane rural roadway with ditches, no paved shoulder.
Trails/Sidewalks: None
Transit Services: None
ROW: 115 to 155 feet

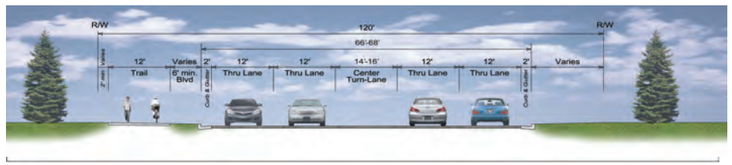


Backage Road Example: Development on both sides of service road.

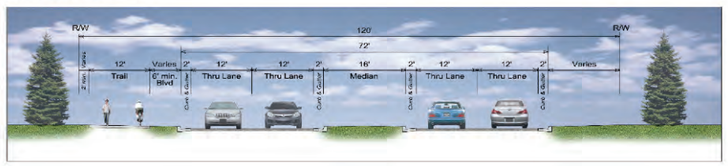
Backage Road Example: Development on both sides of service road.

Corridor Designs that would address the Existing and Future Travel Needs of Segment 6

Design 1 (shown on layout):
5-lane with a trail on the south and no sidewalk



Design 2:
4-lane Divided



How User Needs are Addressed by the Design Options:

Motorists:
Either a four-lane divided or five-lane roadway section would provide stable travel flow for future 2025 and 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	14,000	Stable travel flow / LOS B
2040:	16,400	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of “backage” roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

Path: K:\02081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout9_Recommended.mxd

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-9

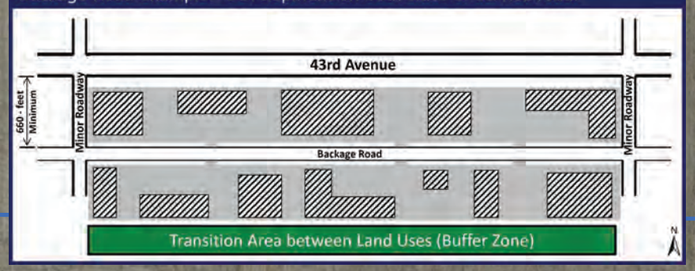
Corridor Concept: Segment 6 - Centennial Road to Roosevelt Drive

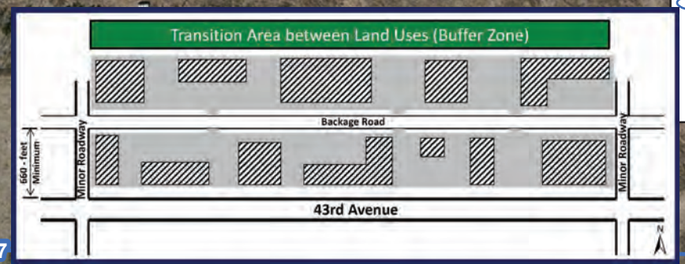
BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Corridor Segment 7a - Roosevelt Drive to 52nd Street (0.50 miles)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder.
Trails/Sidewalks: None
Transit Services: None
ROW: 66 feet

Backage Road Example: Development on both sides of service road.





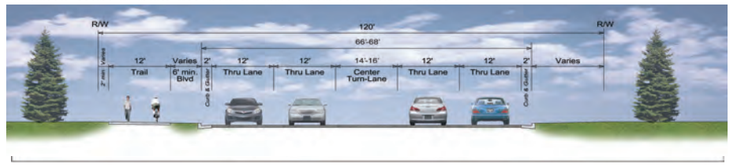
Backage Road Example: Development on both sides of service road.

SEGMENT 7

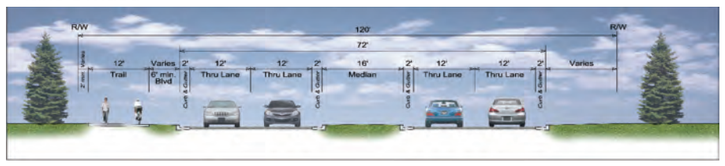
Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200

Designs that would address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and no sidewalk



Design 2:
4-lane Divided



How User Needs are Addressed by the Design Options:

Motorists:
A three-lane roadway section would provide stable travel flow for future 2025 traffic levels and a five-lane roadway section for future 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	12,200	Stable travel flow / LOS C
2040:	14,300	Stable travel flow / LOS B

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of “backage” roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

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43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-10

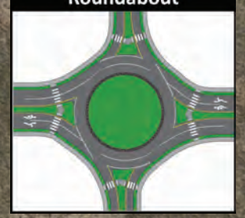
Corridor Concept: Segment 7A - Roosevelt Drive to 52nd Street

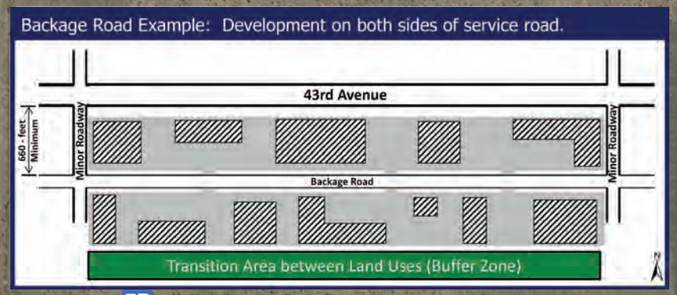
BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

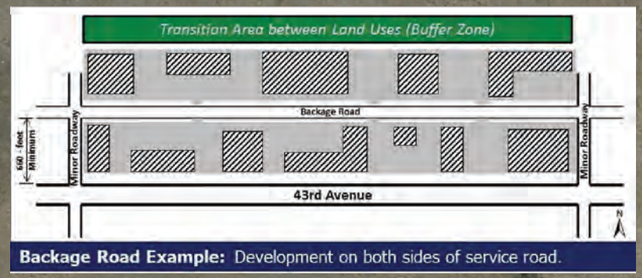
Corridor Segment 7b - 52nd Street to 66th Street (1.0 mile)

EXISTING CHARACTERISTICS
Roadway: 2-lane rural roadway with ditches, no paved shoulder. Pavement ends 500 feet of 52nd Street.
Trails/Sidewalks: None
Transit Services: None
ROW: 100 to 120 feet

POTENTIAL Roundabout







52ND ST

7A

7B

SEGMENT 7

Potential Backage Road System

Pavement currently ends East of 52nd Street

ROW: 66'

ROW: 120'

ROW: 120'

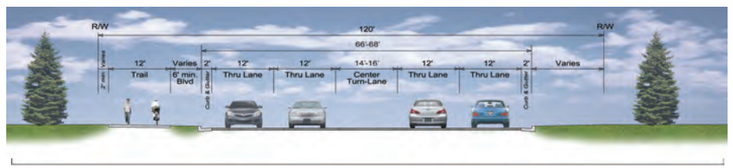
43RD AVE

Potential Backage Road System

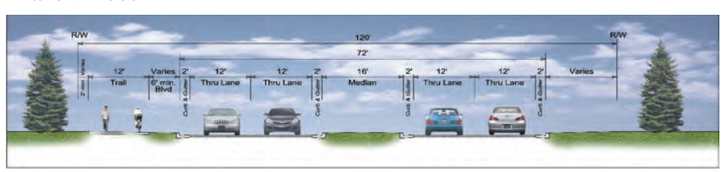
Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200

Designs that would address Future Travel Needs

Design 1 (shown on layout):
5-lane with a trail on the south and no sidewalk



Design 2:
4-lane Divided



How User Needs are Addressed by the Design Concepts:

Motorists:
A paved two-lane roadway section would provide stable travel flow for future 2025 traffic levels and a five-lane roadway section for future 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	6,700	Stable travel flow / LOS C (2-lane)
2040:	15,700	Stable travel flow / LOS B (4 or 5-lane)

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of "backage" roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-11

Corridor Concept: Segment 7B - 52nd Street to 66th Street

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

Path: K:\102081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout11_Recommended.mxd

Corridor Segment 7b - 52nd Street to 66th Street (1.0 mile)

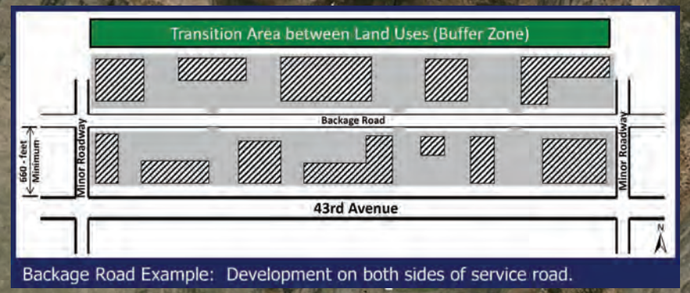
EXISTING CHARACTERISTICS

Roadway: 2-lane rural roadway with ditches, no paved shoulder. Pavement ends 500 feet of 52nd Street

Trails/Sidewalks: None

Transit Services: None

ROW: 100 to 120 feet



Backage Road Example: Development on both sides of service road.

Backage Road Example: Development on both sides of service road.

How User Needs are Addressed by the Design Options:

Motorists:
A paved two-lane roadway section would provide stable travel flow for future 2025 traffic levels and a five-lane roadway section for future 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	6,700	Stable travel flow / LOS C (2-lane)
2040:	15,700	Stable travel flow / LOS B (4 or 5-lane)

-Having two through lanes in each direction will ensure that at least one lane of travel is still available should a stopped or disabled vehicles be present.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of “backage” roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

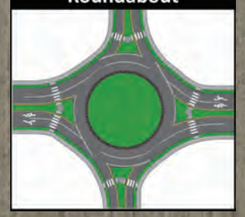
Figure 6-12

Corridor Concept: Segment 7B - 52nd Street to 66th Street

Corridor Segment 8- 66th Street to 80th Street (1.0 mile)

EXISTING CHARACTERISTICS
Roadway: 2-lane gravel roadway with ditches, no shoulders.
Trails/Sidewalks: None
Transit Services: None
ROW: 100 to 120 feet

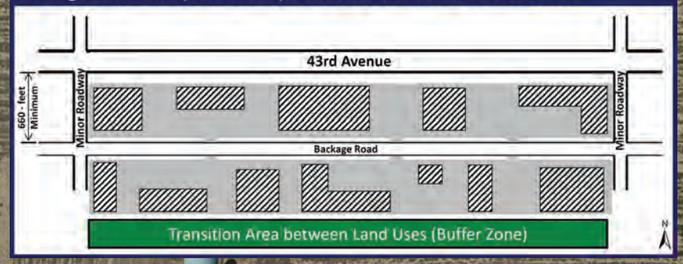
POTENTIAL Roundabout

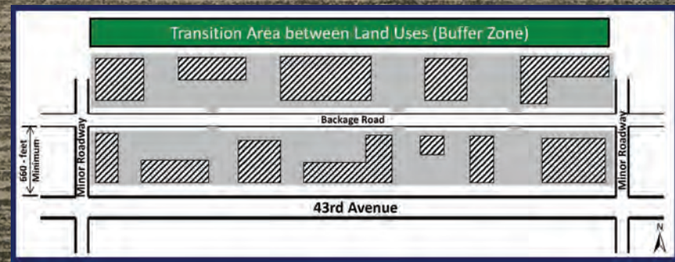


66th St
Future N-S Beltline

ROW: 120'

Backage Road Example: Development on both sides of service road.





Backage Road Example: Development on both sides of service road.

SEGMENT 8

Potential Backage Road System

43RD AVE

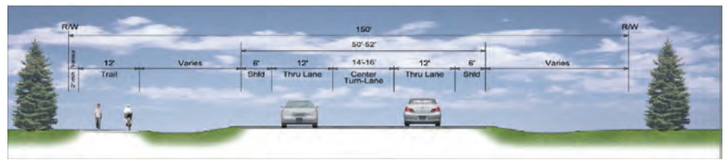
43RD AVE

Potential Backage Road System

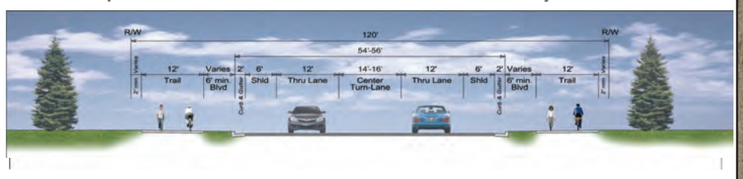
Legend
Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200

Designs that would address the Future Travel Needs

Design 1 (shown on layout):
3-lane rural section with ditches and a trail on the south



Design 2:
3-lanes with paved Shoulders and a Trail on both sides of the roadway.



How User Needs are Addressed by the Design Options:

Motorists:
A paved two-lane roadway section would provide stable travel flow for future 2025 traffic levels and a three-lane roadway section for future 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	4,000	Stable travel flow / LOS B (2-lane)
2040:	9,200	Stable travel flow / LOS C (3-lane)

-Paved shoulders will provide an area for stopped or disabled vehicles that doesn't block traffic.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of "backage" roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

Transit users:
The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

Note:
A 2-lane section would accommodate traffic levels until an interchange is built on I-94 at 66th Street (or if one were to be built at 80th Street).
Upon completion of an interchange, a 3-lane section would be required.

Path: K:\02081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout13_Recommended.mxd

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-13

Corridor Concept: Segment 8 - 66th Street to 80th Street

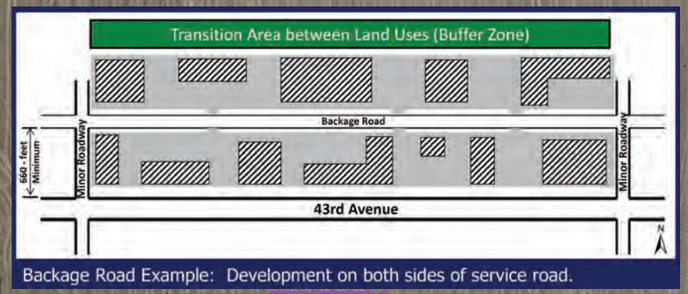
Corridor Segment 8- 66th Street to 80th Street (1.0 mile)

EXISTING CHARACTERISTICS

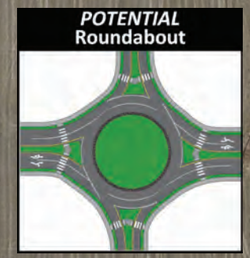
Roadway: 2-lane gravel roadway with ditches, no shoulders.
Trails/Sidewalks: None
Transit Services: None
ROW: 100 to 120 feet

Legend

Median
Road
Sidewalk
Trail
Existing Signal
Future Signal
Segment Limits
N
Feet
0 100 200



Backage Road Example: Development on both sides of service road.



80TH ST

Segment 8 Continued

SEGMENT 8

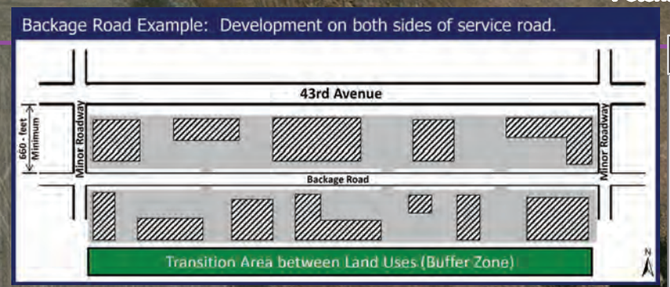
Future Highway Department Facility

Potential Backage Road System

43RD AVE

43RD AVE

Potential Backage Road System



How User Needs are Addressed by the Design Options:

Motorists:
A paved two-lane roadway section would provide stable travel flow for future 2025 traffic levels and a three-lane roadway section for future 2040 traffic levels as indicated below.

Year	Daily Traffic	Travel Condition / LOS
2025:	4,000	Stable travel flow / LOS B (2-lane)
2040:	9,200	Stable travel flow / LOS C (3-lane)

-Paved shoulders will provide an area for stopped or disabled vehicles that doesn't block traffic.
-Future access points should follow the guidelines established in the City of Bismarck Access Policy. This could entail the construction of "backage" roads to serve adjacent development areas.

Pedestrians / Bicyclists:
The trail separated from the roadway provides walkers and bicyclists a safe travel route through the segment.

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The trail will provide a safe area from which to embark and disembark a bus upon future transit service to the area.

Note:
A 2-lane section would accommodate traffic levels until an interchange is built on I-94 at 66th Street (or if one were to be built at 80th Street).
Upon completion of an interchange, a 3-lane section would be required.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, IGP, and the GIS User Community

Path: K:\02081-000\GIS\Maps\Report Maps\Layout Maps\Recommended Layouts\Layout14_Recommended.mxd

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Figure 6-14

Corridor Concept: Segment 8 - 66th Street to 80th Street

BISMARCK - MANDAN MPO | BURLEIGH COUNTY | CITY OF BISMARCK

43RD AVENUE CORRIDOR STUDY

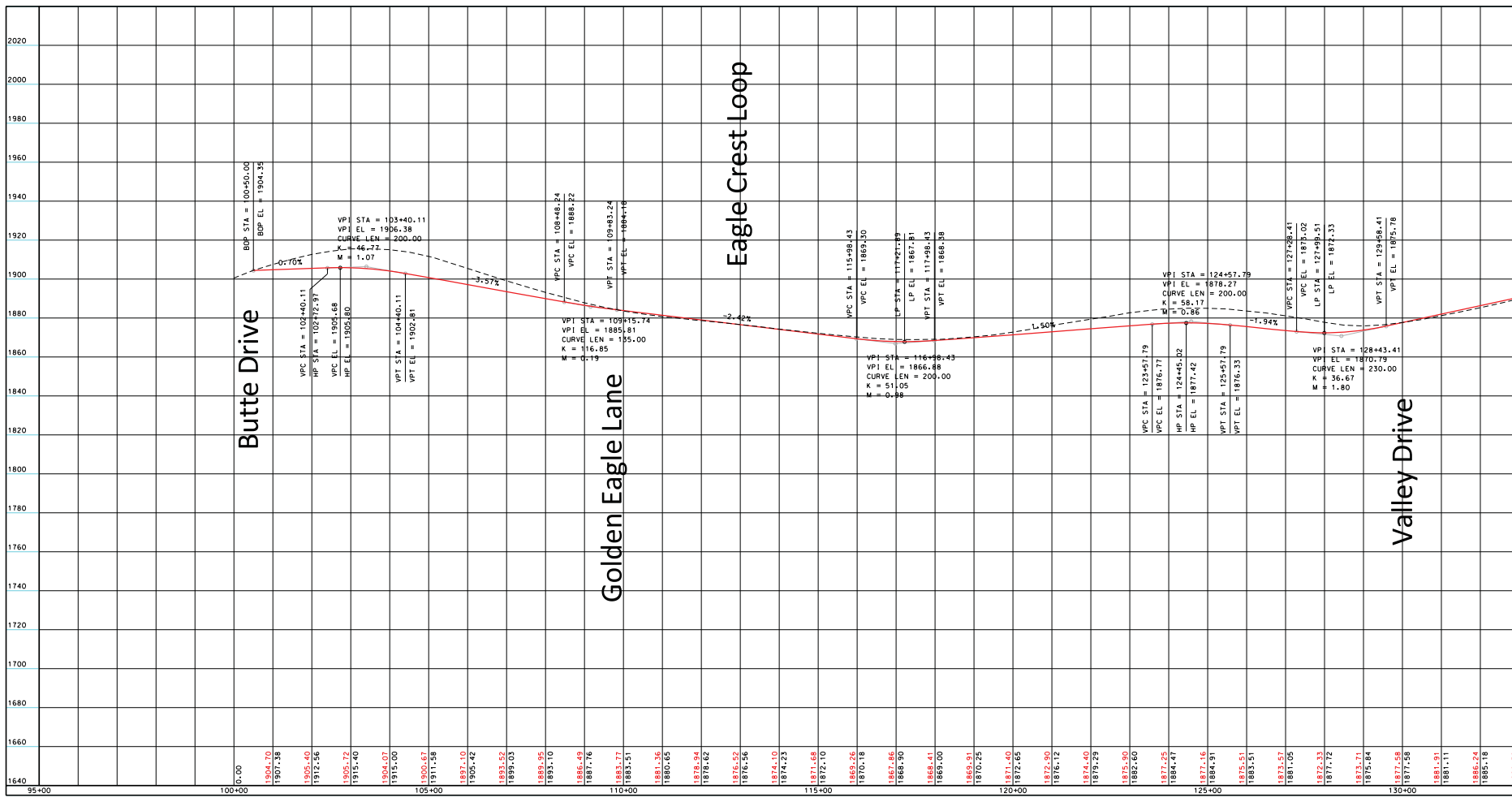
Where the City meets the Country

Construction Limits

NOTES:

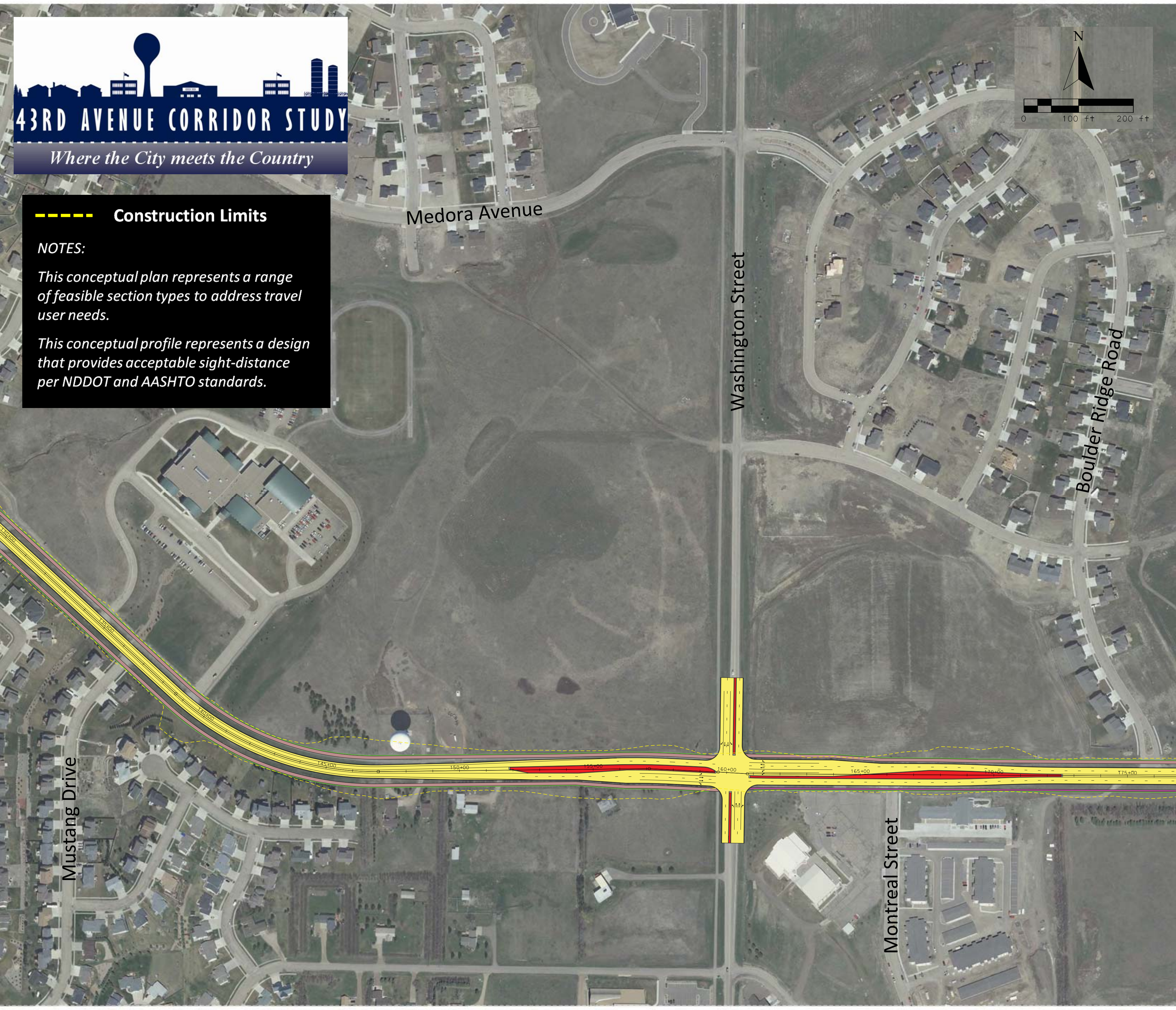
This conceptual plan represents a range of feasible section types to address travel user needs.

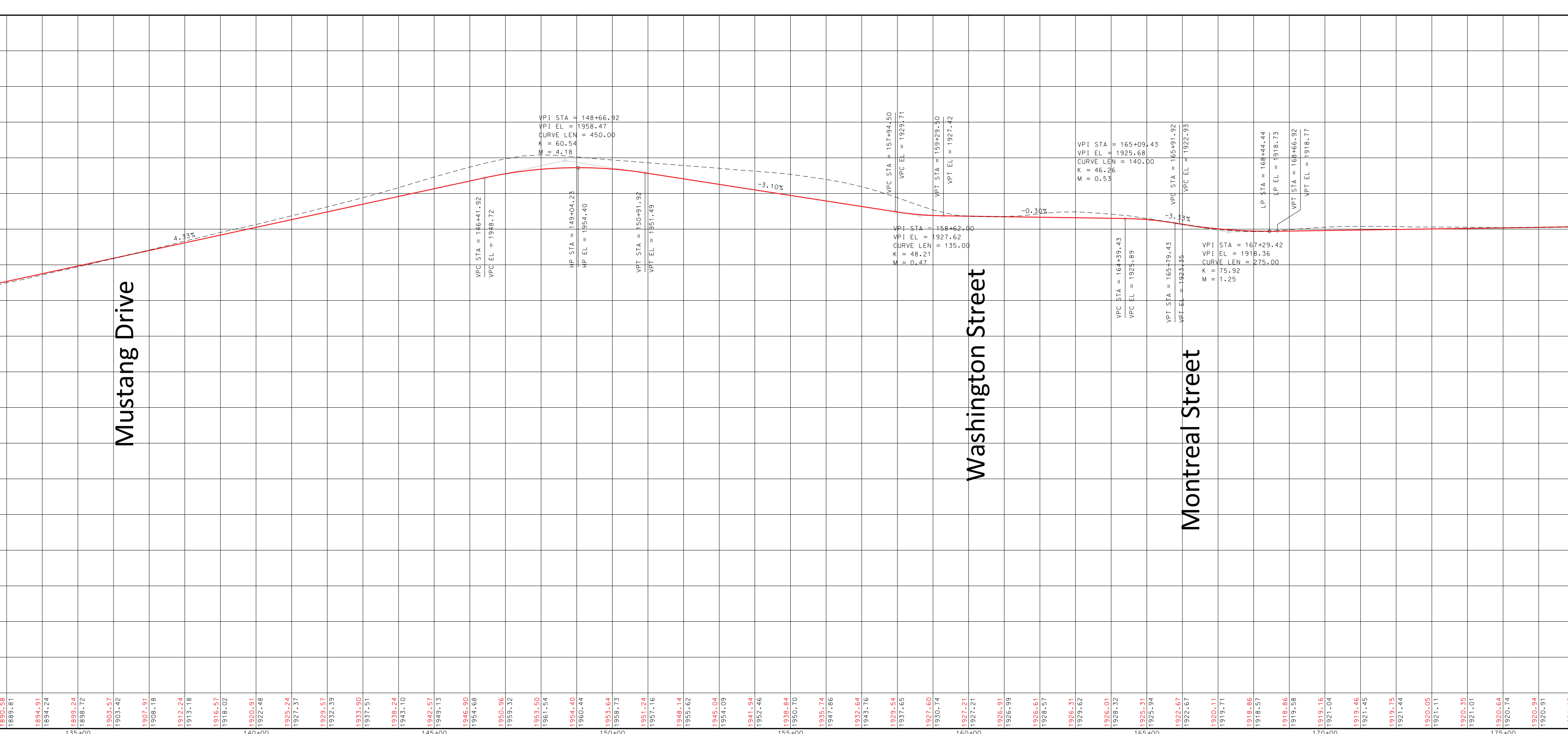
This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.



Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 1 of 9)
Conceptual Plan and Profile





Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 2 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

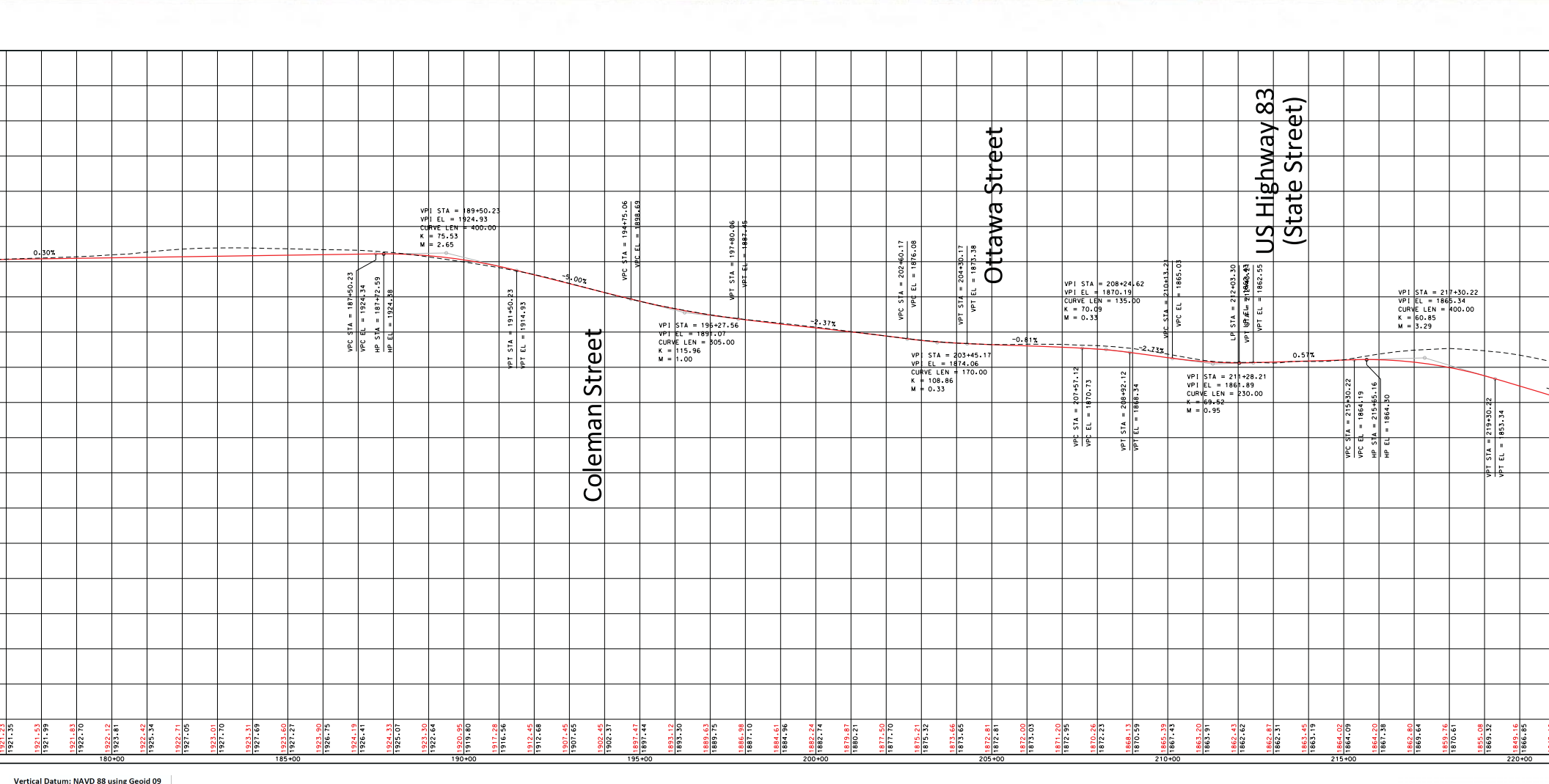
Where the City meets the Country

Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.



Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 3 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.

N

0 100 ft 200 ft

yline Blvd

19th Street

Pointe Loop

19th Street

Pointe Loop

VPI STA = 222+86.38
VPI EL = 1831.98
VPC STA = 224+56.38
VPT EL = 1824.33
VPI STA = 226+89.52
VPI EL = 1817.33
CURVE LEN = 140.00
K = 46.67
M = 0.52
-3.00%
VPI STA = 223+71.38
VPI EL = 1826.88
CURVE LEN = 170.00
K = 56.68
M = 0.64
VPC STA = 226+11.52
VPC EL = 1819.45
VPT STA = 227+59.52
VPT EL = 1813.13
-6.00%
VPC STA = 236+04.27
VPC EL = 1762.45
VPI STA = 237+59.27
VPI EL = 1753.15
CURVE LEN = 310.00
K = 80.30
M = 1.50
VPT STA = 239+14.27
VPT EL = 1749.83
-2.14%
VPC STA = 241+61.45
VPC EL = 1744.54
VPI STA = 242+36.45
VPI EL = 1742.94
CURVE LEN = 150.00
K = 95.78
M = 0.29
VPT STA = 243+11.45
VPT EL = 1742.51
-0.57%
VPC STA = 253+11.25
VPC EL = 1736.77
LP STA = 253+56.58
LP EL = 1736.64
VPI STA = 255+16.25
VPI EL = 1735.60
CURVE LEN = 410.00
K = 79.04
M = 2.66
VPT STA = 257+21.25
VPT EL = 1745.06
4.61%
VPC STA = 263+79.18
VPC EL = 1776.41

225+00 230+00 235+00 240+00 245+00 250+00 255+00 260+00

Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 4 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.

N

0 100 ft 200 ft

26th Street

Haycreek Drive

Hillsboro Dr

Bohe Drive

Prairie Pines Loop

VPI STA = 265+66.68
VPI EL = 1784.06
CURVE LEN = 375.00
K = 60.72
M = 2.90

HP STA = 266+59.31
HP EL = 1781.87

VPT STA = 267+44.18
VPT EL = 1781.13

-1.96%

VPC STA = 276+25.94
VPC EL = 1767.51

LP STA = 277+50.64
LP EL = 1766.54

VPT STA = 279+25.94
VPT EL = 1768.46

VPI STA = 277+75.94
VPI EL = 1765.17
CURVE LEN = 300.00
K = 79.85
M = 1.41

2.20%

VPC STA = 294+17.32
VPC EL = 1801.22

VPI STA = 294+92.32
VPI EL = 1802.87
CURVE LEN = 150.00
K = 65.59
M = 0.43

HP STA = 295+61.38
HP EL = 1802.80

VPT STA = 295+67.32
VPT EL = 1802.80

-0.09%

Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 5 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

N

0 100 ft 200 ft

Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.

Prairie Pines Loop

Centennial Road

Future 4-Lane

Roosevelt Drive

VPI STA = 313+11.20
VPI EL = 1801.22
CURVE LEN = 250.00
K = 72.03
M = 1.08

VPI STA = 317+02.36
VPI EL = 1814.44
CURVE LEN = 150.00
K = 52.00
M = 0.64

VPI STA = 320+66.24
VPI EL = 1816.25
CURVE LEN = 210.00
K = 66.69
M = 0.83

VPI STA = 329+00.00
VPI EL = 1846.63
CURVE LEN = 170.00
K = 80.18
M = 0.45

VPI STA = 342+70.00
VPI EL = 1867.52
CURVE LEN = 170.00
K = 100.47
M = 0.36

3.38%

0.50%

3.64%

1.52%

-0.17%

Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 6 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.

N

0 100 ft 200 ft

52nd Street

52nd Street

Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 7 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

N

0 100 ft 200 ft

Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.

66th Street

Connection to Future Interchange (I-94)

66th Street

Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 8 of 9)
Conceptual Plan and Profile

43RD AVENUE CORRIDOR STUDY

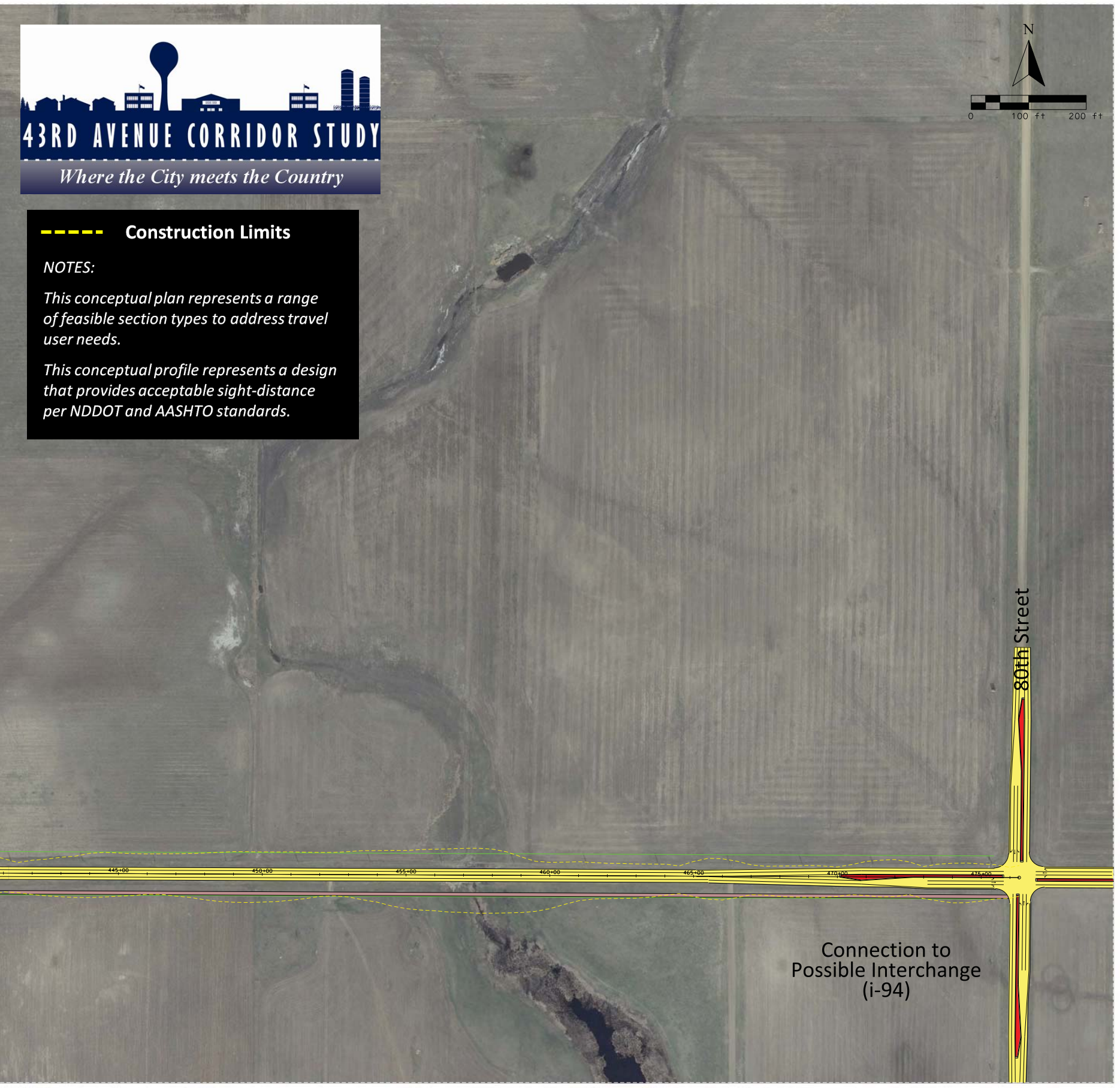
Where the City meets the Country

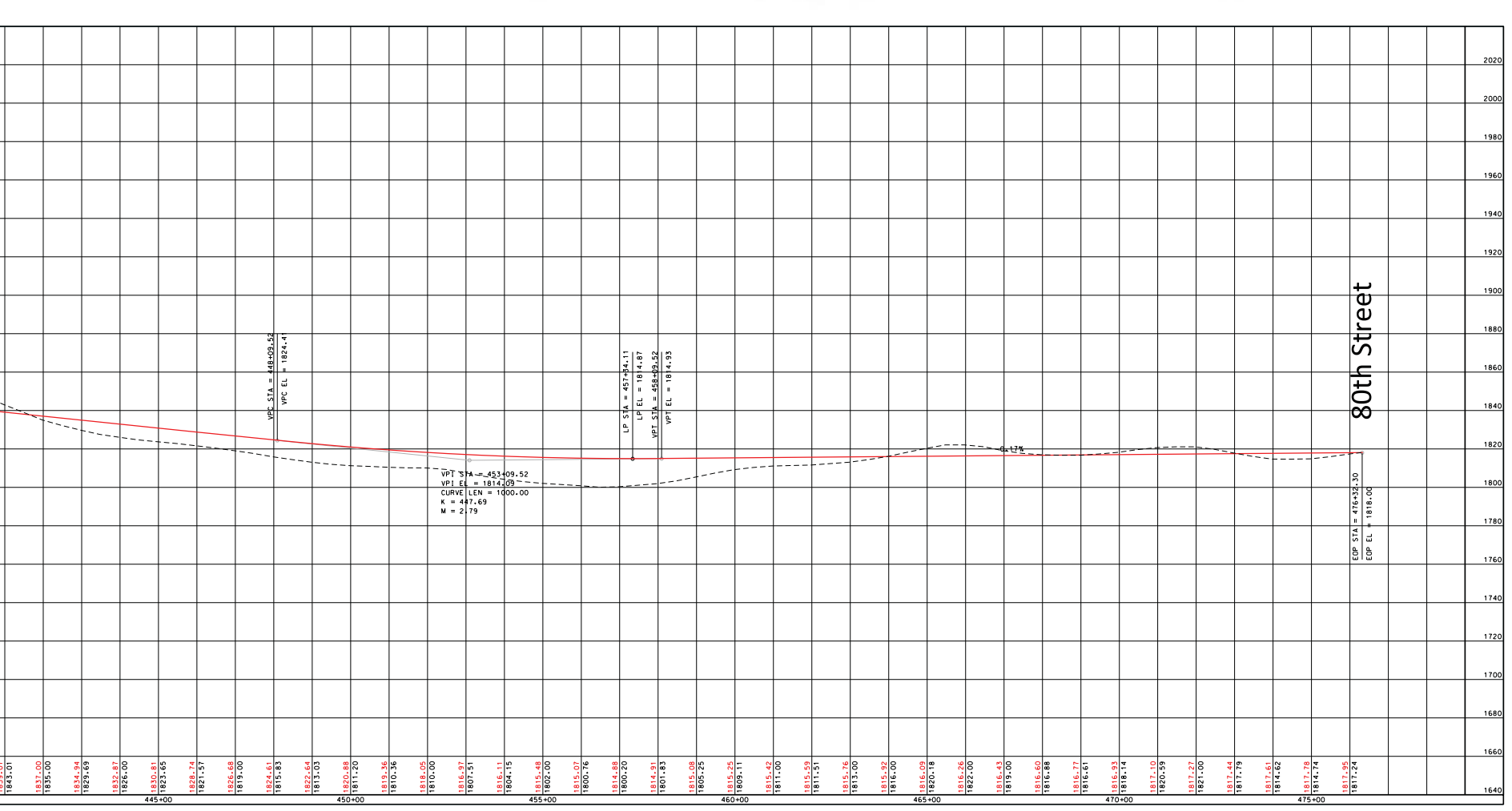
Construction Limits

NOTES:

This conceptual plan represents a range of feasible section types to address travel user needs.

This conceptual profile represents a design that provides acceptable sight-distance per NDDOT and AASHTO standards.





Vertical Datum: NAVD 88 using Geoid 09
Horizontal Datum: US State Plane 1983
North Dakota South (3302) Zone

Figure 6-15 (Sheet 9 of 9)
Conceptual Plan and Profile

Appendix A

Public Outreach Materials

Public Involvement

The public involvement process will be consistent with the Bismarck-Mandan MPO's Public Involvement Plan. As part of this projects public involvement program, extensive use of visual aids, including pictures, maps, diagrams, charts, visualizations, and flyover videos will be created and shared with the public.

During the approximately one-year project, three Open Houses will be held where the public will be able to view project documents and provide their input to the project team. The first Open House will be held early in the study process to introduce the project and obtain community input. The second Open House will be held during the project mid-point to present potential improvement concepts and the third Open House will be held near the end of the project to present the potential recommendations. At each Open House, we will record all concerns and suggestions, which will be addressed and included in the corridor study.

KEY MILESTONES

- Data Collection (Winter/Spring 2012)
- Development of Goals, Objectives, and Design Considerations (Winter/Spring 2012)
- Existing and Future Conditions Analysis (Spring 2012)
- Open House 1(Spring 2012)
- Development of Alternatives (Summer 2012)
- Alternatives Analysis (Summer - Winter 2012)
- Open House 2 (Winter 2012)
- Draft Report Preparation (Winter 2012/13)
- Open House 3 (Winter 2013)
- Final Report (Spring 2013)

Resident Name
Street Address
Bismarck, ND 58506

Bismarck-Mandan Metropolitan Planning Organization
221 N. 5th St.
PO Box 5503
Bismarck, ND 58506-5503

43rd Avenue Corridor Study
Where the City meets the Country

43rd Avenue Corridor

www.43rdAvenueCorridorStudy.com

NEWSLETTER 1 MARCH 2012

SPECIAL POINTS OF INTEREST:

- Visit the Project Website and Facebook page for additional information including reports, graphics, and videos.
- Your comments are very important to the Project Team. Submit your comments by mail, email, or by using the "Public Comment" link on the project webpage.

CONTACT INFORMATION:

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Transportation Planner
Bismarck-Mandan MPO
221 North 5th Street
Bismarck, ND 58506
(701) 355-1848
ssaunder@nd.gov

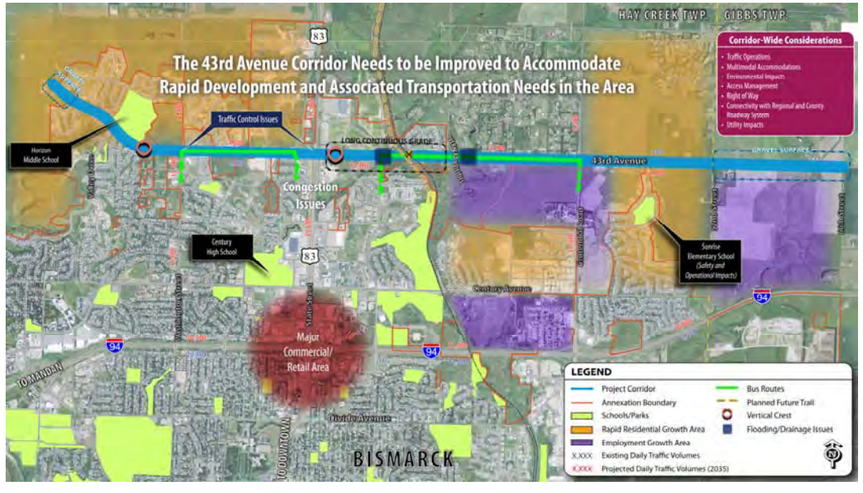
Jack Forslund, PTP
Transportation Planner
WSB & Associates, Inc
701 Xenia Avenue South
Minneapolis, MN 55416
(888) 541-4800
jforslund@wsbeng.com

You can also email questions and comments to the Project Team at:
43rdAveStudy@wsbeng.com

Traffic Increases Stressing the Transportation Network

In recent years, Bismarck and Burleigh County have seen incredible economic growth. In the last ten years, Burleigh County has added nearly 12,000 people, representing a 17 percent increase. More than half of this growth occurred in Bismarck or immediately adjacent areas. One area that has seen a tremendous amount of growth is the 43rd Avenue Corridor area. This rapid growth has presented challenges, particularly with respect to the transportation system. Within the six-mile study area extending from Butte Drive to 66th Street, 43rd Avenue is a rural roadway with relatively low traffic volumes. However, with the continued development in and around the corridor, traffic volumes are projected to be more than 12,000 vehicles per day by 2035. This traffic volume, which could be reached prior to 2035 depending on development, will require roadway expansion to maintain acceptable Levels of Service (LOS) or congestion levels. Roadway expansion, as well as expansion of other modes of transportation such as transit, bicycling, and walking, should result in a corridor that provides safe, efficient, multimodal travel that can accommodate future development. The graphic below documents some of the known transportation issues or considerations within the 43rd Avenue Corridor and general project area.

The end product from this study will be the development and identification of a set of recommended multimodal transportation improvements.



The above image illustrates some of the issues and considerations for the 43rd Avenue Corridor Study. Visit the website (www.43rdAvenueCorridorStudy.com) or the Facebook page (43rd Avenue Corridor Study) to view a larger image of this map as well as a corridor overview video.

Bismarck-Mandan Metropolitan Planning Organization | Bismarck, Capital City of North Dakota

Project Website and Facebook Page: The project website and the Facebook page will provide updates on the progress of the study. The website will include information such as: public involvement activities, newsletters, reports, maps and layouts, and project images and videos. The website will also provide a "public comment" link to provide individuals the opportunity to comment on the study or pose any questions or concerns to the project team. Provided to the right is a screenshot of the project website homepage, which also highlights how to access future newsletters. As the project progresses each subsequent newsletter will be added to the website, but will not be mailed out. Therefore, please remember to check the website to view new information including subsequent newsletters. If you do not have access to the project website and would like to receive future newsletters by mail, please contact the project team.

The general intent of this first newsletter is to introduce you to the project and to make you aware of the website and our Facebook page, which will enable you to keep up to date on the project as well as provide you a method to provide comments and to contact the project team.

We look forward to your participation in the study!

www.43rdAvenueCorridorStudy.com

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

43rd Avenue Corridor Study

Where the City Meets the Country

Find us on: facebook
43rd Avenue Corridor Study

Project Update

Click on Video / Images link to view Corridor Flyover Video.

- Home Page
- Project Background
- Schedule
- Public Involvement / Media Releases
- Newsletters
- Public Comment
- Reports / Documents
- Project Maps / Layouts
- Videos / Images

Newsletters

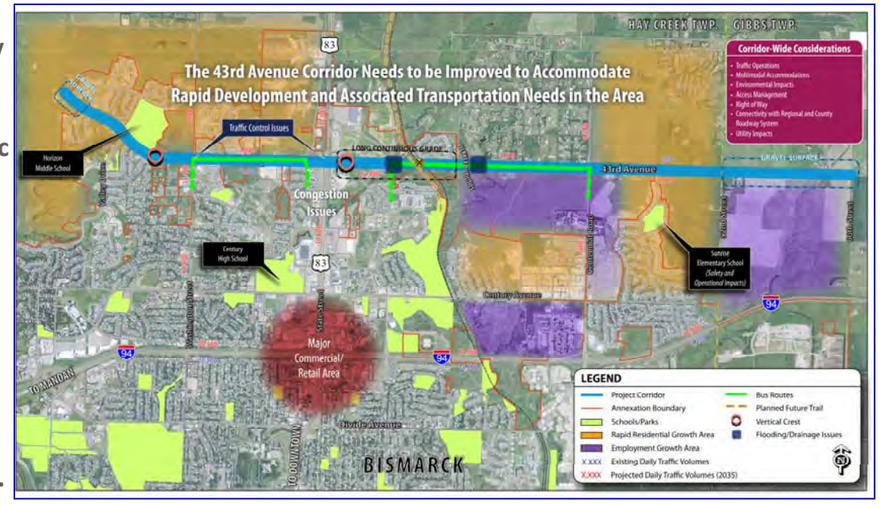
Newsletter 1 - March 2012

In recent years, the 43rd Avenue Corridor area has experienced tremendous growth, increasing the pressure on the transportation system. To address these challenges, the Bismarck-Mandan MPO together with Burleigh County and the City of Bismarck have teamed up to develop a set of recommended transportation improvements. The project partners are committed to the public involvement process and encourage you to participate throughout the project. Please feel free to contact us at any time.

This first newsletter, as well as future newsletters will be available to view or download via the project website by clicking on the Newsletters link on the left margin. Newsletters will also be available via the project's Facebook page.

Note the *Project Update* box on the upper left hand corner of the homepage. This update box will be visible when new information has been uploaded onto the website.

Corridor Issues and Considerations Map



Click on image to enlarge picture. You can also click on the "play" button to view a video showing existing and potential issues to be considered in the corridor study.

- *Click on video icon to play Corridor flyover video*

Public Involvement

The project partners, including the Bismarck-Mandan MPO, the City of Bismarck, and Burleigh County along with project participants including the North Dakota Department of Transportation (NDDOT), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA) are committed to the public involvement process.

On September 20, the project had its first Open House, which was held at Sunrise Elementary School. At this meeting, there were over 100 attendees who came to hear about the project progress to date and to provide input to the project partners on what they would like to see happen along the corridor. In Newsletter Issue No. 3, more information will be provided on this open house. In general, it was viewed by the project partners as a very positive event that provided for easy one-on-one communication with people interested in the project.

A second Open House has already been scheduled for Thursday, December 13th at the First Evangelical Free Church located on the western side of the study area at 205 43rd Avenue NE, near the intersection of Washington Street. At this meeting, more detailed improvement options will be presented and displayed for public review and comment.

43rd Avenue Corridor Study
Where the City Meets the Country

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You can also email questions and comments to the Project Team at: 43rdAveStudy@wsbeng.com

Bismarck-Mandan Metropolitan Planning Organization
221 N. 5th St.
PO Box 5503

Resident Name
Street Address
Bismarck, ND 58506

43rd Avenue Corridor Study
Where the City meets the Country

43rd Avenue Corridor

www.43rdAvenueCorridorStudy.com

NEWSLETTER 2 OCTOBER 2012

KEY MILESTONES

- **Data Collection**
  - completed -
- **Development of Vision Statement and Goals**
  - completed -
- **Existing and Future Conditions Analysis**
  - completed -
- **Open House 1**
  - Held September 20 at Sunrise Elementary School . See website and Facebook page for materials, presentation, and photos
- **Development of Alternatives**
  - in progress -
- **Alternatives Analysis**
  - in progress -
- **Newsletter 3**
  - November, 2012 -
- **Open House 2**
  - Scheduled for December 13, 2012 at First Evangelical Church (4:30 to 6:30) -
- **Draft Report Preparation**
  - Winter 2012/13 -
- **Open House 3**
  - Winter 2013 -
- **Final Report**
  - Winter 2013 -

Vision Statement and Goals Set Path for Corridor

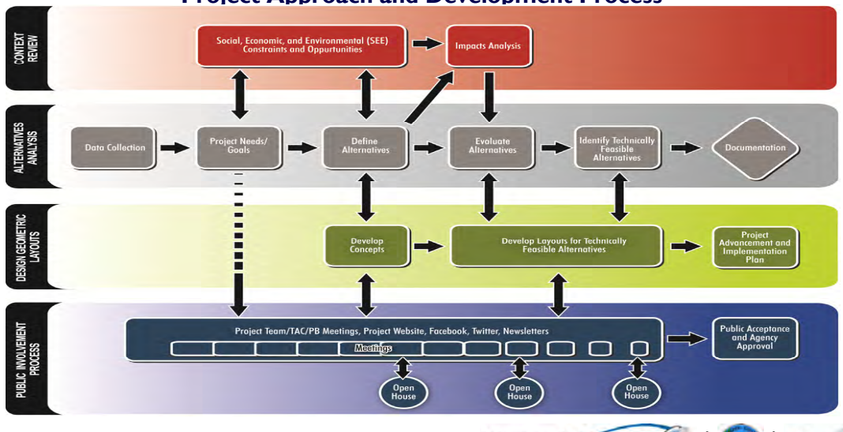
Through working with the project partners a Vision Statement and set of Goals were established for the 43rd Avenue Corridor. The Vision Statement sets forth a general statement of a desired condition and the goals provide additional focus on how to achieve the desired condition.

Vision Statement:
To promote the development of 43rd Avenue as a balanced, multiple mode transportation corridor that connects the city to the country by enhancing travel mobility and safety while supporting orderly and sustainable economic growth throughout the corridor.

Goals:
- ◊ Identify and support improvements for multiple modes of transportation to ensure a high level of mobility and accessibility throughout the 43rd Avenue corridor area.
- ◊ Identify appropriate improvements to increase travel safety for all users of the 43rd Avenue corridor area.
- ◊ Support transportation improvement projects that promote economic prosperity in the corridor.
- ◊ Develop a transportation system that promotes the use of alternative modes of transportation including bicycling, walking, and transit.
- ◊ Balance transportation improvements with potential impacts to the surrounding physical and social environment.
- ◊ Promote cooperation and coordination among jurisdictions in maintaining and developing the transportation infrastructure.

Upon establishment of the Vision Statement and Goals, the study follows a development process where four separate but interconnected components are completed to arrive at a solution that achieves public acceptance and agency approval. The figure below illustrates this process.

Project Approach and Development Process



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Project **Purpose and Need** is a technical term used to provides a basis for developing and evaluating alternatives. A technically sound Purpose and Need is required for many projects in order to obtain funding.

- **PURPOSE** is a broad statement of the projects transportation objectives.
- **NEED** is a detailed explanation of conditions that need to be remedied.

Both the purpose and the need are developed from community input as well as technical analysis.

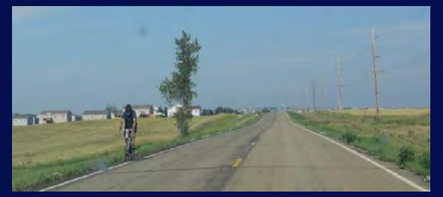
PROJECT PURPOSE:

43rd Avenue is a Principal Arterial roadway that serves as an increasingly important east-west route through northern Bismarck. Improving safety and mobility for all modes of transportation is a long term function of the Corridor.

EXISTING PROJECT NEEDS

Inadequate roadway shoulders needed for emergency stopping space, etc.

Inadequate sight-distance and higher than average crash rate.



Inadequate bicycle and pedestrian accommodations.

Deteriorated roadway pavement.

FUTURE CONDITIONS AND NEEDS

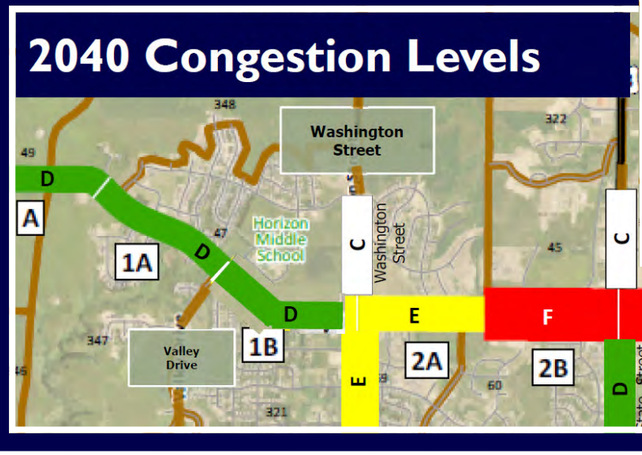
Between 2012 and 2040 the 43rd Avenue Corridor is projected to add 30,000 residents and 23,000 jobs. To accommodate this growth, it will be necessary to improve roadway capacity as well as other modes of transportation, including bicycling, walking, and transit.

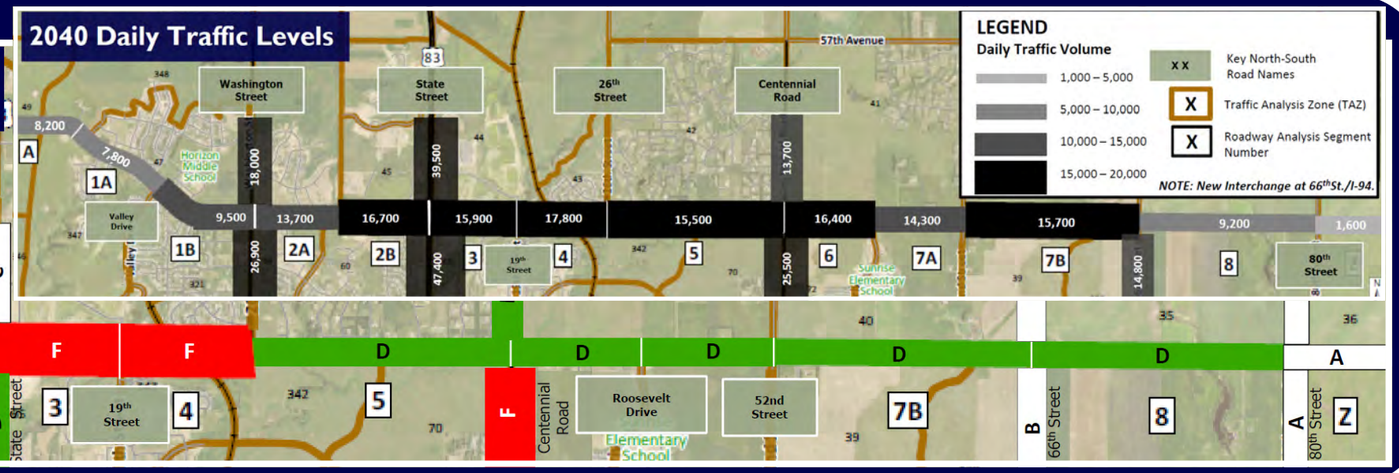
PROJECTED PROJECT NEED: TRAFFIC CONGESTION

Future traffic projections indicate that travel on 43rd Avenue and the major intersecting north-south will double or triple over existing levels. Using the Planning Level of Service (LOS) method of determining roadway capacity needs, it was determined that the majority of the Corridor will operate at unacceptable levels of service. Where LOS A represents free-flow travel conditions and LOS F represents forced-flow or severe congestion, 43rd Avenue will go from uncongested conditions (LOS A - C), to an LOS in 2040 where no segment of the corridor will operate better than LOS D. The images below present the projected daily traffic (inset) and corresponding LOS or congestion level in the corridor without major transportation improvements.

2040 TRAFFIC CONDITIONS (without capacity

Congestion Index		
Congestion Level	LOS	Traffic Flow
Minimal/None	A	Free Flow
	B	Stable Flow
	C	Stable Flow
Low	D	Restricted Flow
Moderate	E	Unstable Flow
High	F	Forced Flow





Public Involvement / Open House / Social Media

The project partners, including the Bismarck-Mandan MPO, the City of Bismarck, and Burleigh County along with project participants including the North Dakota Department of Transportation (NDDOT), the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA) are committed to the public involvement process.

OPEN HOUSE:

On Thursday, December 13 the second Open House will occur from 4:30 to 6:30 in the lobby of the First Evangelical Free Church located at 205 43rd Avenue NE on the western side of the corridor. At this meeting, more detailed improvement options, including access management measures will be presented and displayed for public review and comment.

WEBSITE / FACEBOOK

We encourage you to continue to use the project website and Facebook page to access information on the study and to interact with project staff. The project website address is: www.43rdavenuecorridorstudy.com.

43rd Avenue Corridor Study
Where the City Meets the Country
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NEWSLETTER 3

CONTACT INFORMATION:

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Bismarck-Mandan
METROPOLITAN PLANNING ORGANIZATION
221 N. 5th St.
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NEWSLETTER 3
43RD AVENUE CORRIDOR STUDY
Where the City meets the Country
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GUEST:
Open House No. 2

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

43rd Avenue Corridor

www.43rdAvenueCorridorStudy.com

NEWSLETTER 3 NOVEMBER 2012

KEY MILESTONES

- **Data Collection**
  - completed -
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  - Winter 2012/13 -
- **Open House 3**
  - Winter 2013 -
- **Final Report**
  - Winter 2013 -

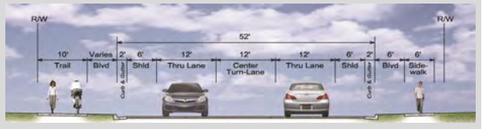
Transportation Conditions Displayed at Open House

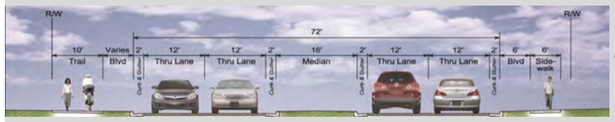
On September 20, an Open House was held at Sunrise Elementary School on the eastern side of the corridor. Over 100 people attended this event where the goal of the meeting was to provide information on existing and projected 2040 transportation conditions within the 43rd Avenue Corridor. Future traffic projections indicate that trips on 43rd Avenue and the major intersecting north-south roadway will double or triple over existing levels.

At the outset of the meeting (4:30 p.m.) a 20 minute overview presentation was delivered to the attendees. In addition to providing an overview of the project, the presentation delivered a message about how important the public is for determining the future characteristics of the corridor. At the conclusion of the presentation the audience was encouraged to visit with the project personnel to discuss their ideas and concerns.

On hand at the meeting were seventeen information boards on display around the room as well as a 15-foot layout of the corridor that was laid out across tables in the middle of the room. Presented on this layout were three potential roadway designs along the corridor that would address the project's purpose and need related to improving travel mobility and safety. These designs, are presented below:

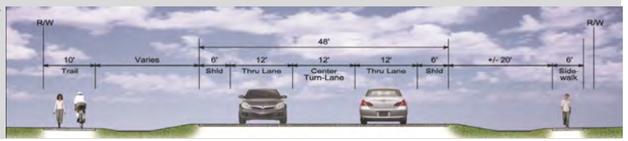
One Potential Design for segment between Butte Drive and Washington Street





One Potential Design for segment between Washington Street and 66th Street

One Potential Design for segment between 66th Street and 80th Street



at: 43rdAvenueCorridorStudy.com.

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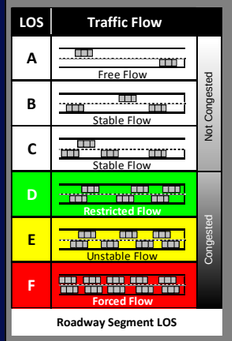
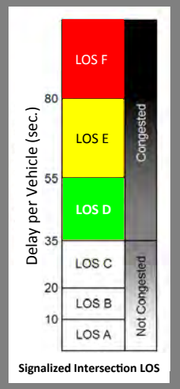
2040 CONGESTION or LEVEL OF SERVICE (LOS)



ROADWAY SEGMENT LOS

Where LOS A represents free-flow travel conditions and LOS F represents forced-flow or severe congestion, 43rd Avenue **WITHOUT roadway segment improvements** will go from present uncongested conditions (LOS B) to conditions in 2040 where no roadway segment of the corridor will operate better than LOS D (restricted traffic flow) **WITH the potential improvement options identified on the first page of the newsletter**, all roadway segments within the corridor will operate at a LOS C (stable travel flow) or better.



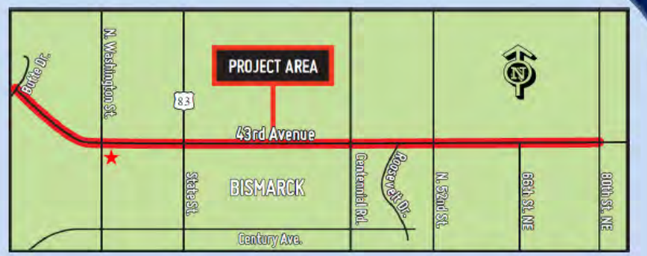
INTERSECTION LOS

In addition to roadway segment LOS, intersections were also analyzed. Displayed on the image below are the projected Levels of Service for five major intersections within the corridor. Through geometric improvements such as the addition of turning lanes, all but one of twelve signalized intersections within the corridor will function at LOS C (delay of less than 35 seconds per vehicle) during the p.m. peak hour. The intersection of US 83 and 43rd Avenue, which will process very high traffic volumes, may need to be grade-separated (interchange) in order to achieve an LOS better than D during the p.m. peak-hour.

43RD AVENUE CORRIDOR STUDY

Where the City meets the Country

Bismarck-Mandan Metropolitan Planning Organization



OPEN HOUSE No. 2

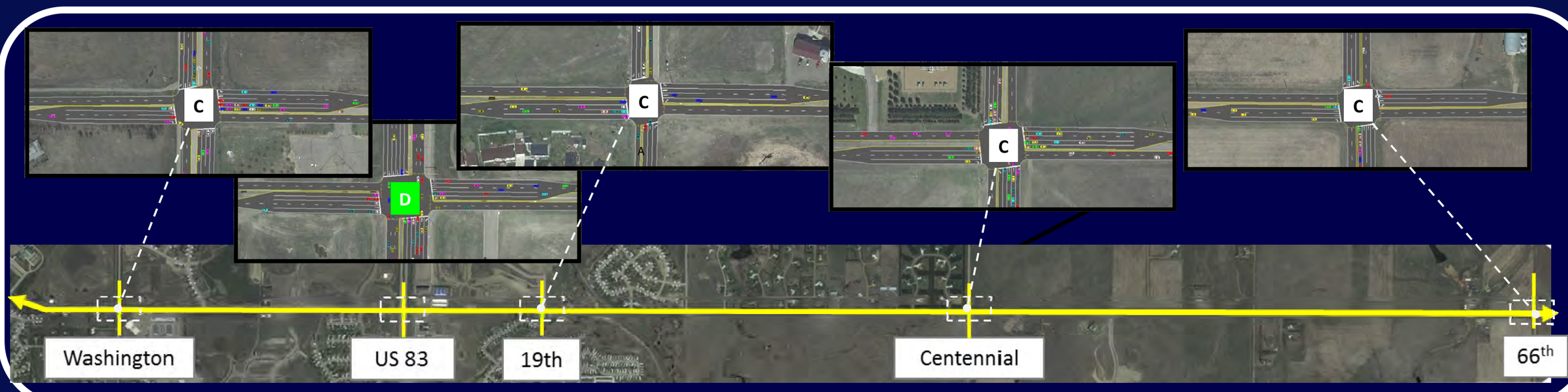
You are invited to the second Open House for the 43rd Avenue Corridor Study. The purpose of the study is to identify and develop recommended transportation improvements representing a range of travel modes (driving, walking, bicycling, transit, etc.) for implementation within the seven mile Corridor.

All public information can be viewed on the project website at: www.43rdavenuecorridorstudy.com or the Facebook page, which can be accessed from the webpage.

Date:
Thursday,
December 13, 2012
4:30 p.m. to 6:30 p.m.

Location:
First Evangelical Free Church (lobby)
205 43rd Avenue NE
Bismarck, ND 58503

If you are unable to attend or have specific questions about the project, please contact Jack Forslund at (888) 541-4800, jforslund@wsbeng.com or Steve Saunders at (701) 355-1848, ssaunder@nd.gov.



Summary

The intent of this newsletter is two-fold: First, it is to inform you of the upcoming Open House, and second, it is to provide some insight prior to the meeting. Items that were addressed in this newsletter included the purpose of the study, corridor traffic forecasts, potential improvements, and how much right-of-way is necessary to accommodate the potential improvements. We hope that by providing this information, you will be further encouraged to attend the March 7, Open House to be held at Sunrise Elementary School located south of 43rd Avenue at 3800 Nickerson Avenue. The Open House begins at 4:30 with a brief presentation followed by a question and answer period. We hope to see you on March 7th!

43rd Avenue Corridor Study
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Metropolitan Planning Organization

221 N. 5th St.
PO Box 5503

Resident Name
Street Address
Bismarck, ND 58506

43rd Avenue Corridor

www.43rdAvenueCorridorStudy.com

FEBRUARY 2013

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

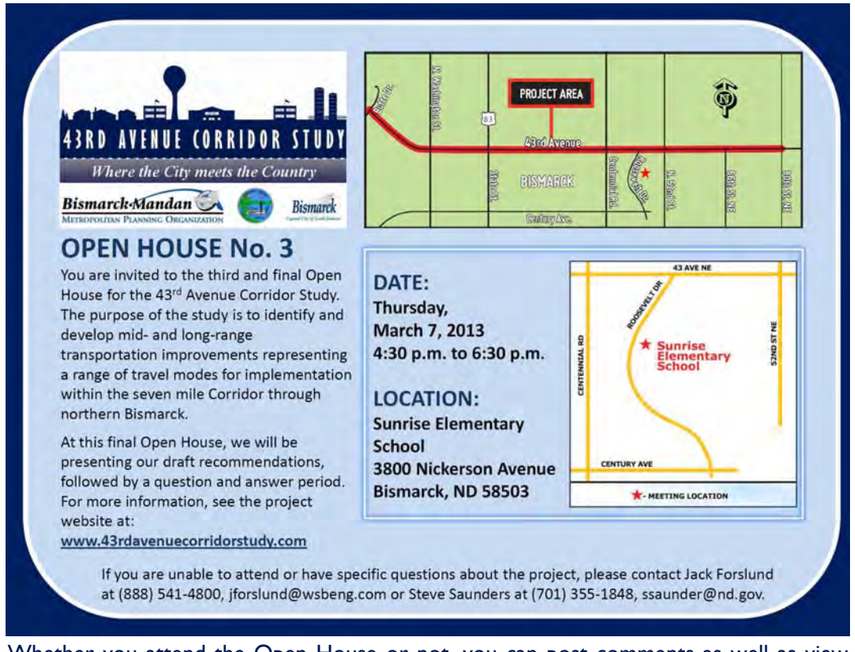
KEY MILESTONES

- **Existing Conditions Analysis** - Completed
- **Future Conditions Analysis (2025 and 2040)** - Completed -
- **Open House No. 1** - Held September 20 at Sunrise Elementary School . See website and Facebook page for materials, presentation, and photos
- **Development and Evaluation of Alternatives** - Completed -
- **Open House No. 2** - Held December 13, 2012 at First Evangelical Free Church on the western side of the corridor. See website/ Facebook for information.
- **Refinement of Corridor Design Alternatives** - Nearly Complete -
- **OPEN HOUSE No. 3** - **THURSDAY, MARCH 7 AT SUNRISE ELEMENTARY SCHOOL (4:30 to 6:30)**
- **DRAFT REPORT** - Being Prepared.
- **FINAL REPORT** - March, 2013

Open House No. 3: Thursday, March 7, 2013

On Thursday, March 7, 2013, from 4:30 to 6:30 p.m. the third and final Open House will be held at Sunrise Elementary School (3800 Nickerson Avenue, Bismarck). At this Open House the public will be able to review project materials including the various transportation improvements considered for implementation within the Corridor.

At the beginning of the Open House, which starts at 4:30 p.m., there will be a brief presentation followed by a question and answer period. After this, the public will be able to discuss the project in an informal manner with staff and officials from the MPO, Burleigh County, the City of Bismarck, NDDOT, and the project consultant. Furthermore, the public will have the opportunity to submit written and/or verbal comments.



Whether you attend the Open House or not, you can post comments as well as view information on the project website at www.43rdavenuecorridorstudy.com, which also has a link to a Facebook page for the study.

WHAT IS THE PURPOSE OF THIS STUDY?

Recognizing the rapid growth of the area, the Bismarck-Mandan Metropolitan Planning Organization (MPO), the City of Bismarck, and Burleigh County initiated this study to identify and evaluate alternatives for improving the existing and future (2025 and 2040) traffic flow along 43rd Avenue. The results of this study will include the establishment of a corridor design vision that the project partners will work to implement with some measures being incorporated shortly after the project completion, but with the majority of the improvements occurring over the next 5, 10, 15, 20, or 25 years. The timing of the improvements ultimately depends on when they are needed more so than on a specific year.

WHY ARE THE YEARS 2025 and 2040 USED?

The land-use scenarios used to develop the traffic forecasts for the study reference the years 2025 and 2040. The Bismarck region may grow faster or slower than what is projected in these forecasts. The area may hit the 2040 population and employment numbers by the year 2023, or any other year in the future. The key is to plan for this growth well before it occurs, and for transportation planning the standard is to plan a minimum of 20 years into the future to allow time for project development, which entails procurement of funding, the production of environmental documentation needed for various approvals and permits, and of course final design. With that said, the population and employment values for 2040 and 2025 were determined based on recent and projected growth trends. Using this information, traffic projections were developed for 43rd Avenue and adjacent roadways, which were used to identify potential improvements or projects to accommodate future travel needs as well as approximately when they would be needed. For example, when traffic on 43rd Avenue reaches 11,000 vehicles a day a notable level of congestion will exist unless the roadway is expanded to accommodate a center-turn lane. And, when the traffic increases from 11,000 to 17,000 vehicles per day, it is time to expand the roadway to either 5-lanes (with center-turn lane) or a 4-lane divided highway.

DO THE IMPROVEMENTS DEPEND ONLY ON POPULATION AND EMPLOYMENT GROWTH?

While population and employment growth certainly drive transportation needs or improvements, the reverse is also true. One example of this is the construction of an interchange to provide access to the interstate system, which often attracts development to nearby areas. South of the 43rd Avenue Corridor area on I-94, there are two potential new interchange locations with one at 66th Street and another at 80th Street. Like interchanges, it can also be expected that the improvement of 43rd Avenue would also attract a certain amount of development. It is for that reason that one of the recommended improvement strategies is to incorporate property access roads, also referred to as frontage or backage roads to the corridor. These roadways, which would parallel 43rd Avenue would accommodate development on the adjacent property while minimizing travel disruption on 43rd Avenue. As an FYI, a study of I-94 and its existing and future interchanges is underway by the MPO, information on that study can be found at: www.bis-mani94study.com

WHAT ABOUT THE IMPROVEMENTS FOR BICYLISTS, WALKERS?

Bicyclists, walkers, and transit users are also important to accommodate, particularly considering there will soon be three schools located within the corridor. Ultimately it is planned that through the entire corridor there would be either a sidewalk or a multi-use trail provided, with the provision of both (a sidewalk one side and a trail on the other side) where feasible. The trails would be tied in with the existing facilities as well as new or planned trails, such as those near the new Legacy High School being developed planned by the Bismarck Parks and Recreation Department. With respect to schools, the Bismarck School District is continuously assessing potential measures to improve pedestrian and bicycle access to their schools.

WILL THE FUTURE RECONSTRUCTION INCLUDE MEASURES TO ACCOMMODATE TRANSIT?

Yes, the plan is to identify and ultimately implement design features that will better accommodate transit upon service expansion within the corridor. Depending on transit usage, design features of the roadway could include turn-outs that allow buses to exit the travel lane into a bus bay for transit stops. Currently in Bismarck there is a bus turn-out lane located near the Arrowhead Plaza on 3rd Street. Bus turn-outs are beneficial as they offer a more relaxed area for passenger loading and unloading, and they also improve mobility and safety for motorists as they do not change lanes to go around a stopped bus. The provision of these and other transit improvements or accommodations will be assessed by Bis-Man Transit in conjunction with other agencies as time progresses.

WILL THE ROADWAY BE WITHIN THE EXISTING RIGHT-OF-WAY? IF NOT, HOW WILL ADDITIONAL LAND BE ACQUIRED?

A reconstructed 43rd Avenue would be located within a right-of-way (ROW) of 120 feet in the more developed areas and 150 feet through more rural areas. Within the ROW would be all the roadway, boulevards, trails/sidewalks, clear zones, lighting, and landscaping. Currently within the corridor, the publically owned right-of-way ranges from 66 feet to 150 feet, with nearly 94 percent (6.65 miles) of the corridor having at least 100 feet of ROW. In areas where additional ROW or property easements are needed, the roadway owner (City of Bismarck or Burleigh County) would work with the property owner to achieve a mutually agreeable solution. With that said, it is important to bear in mind that while a 120 or 150-foot corridor is desired, it may not always be feasible. When this is the case, there can often be design modifications to allow the roadway and associated attributes such as shoulders, boulevard, trails, etc., to fit within a narrower corridor.

PUBLIC INFORMATION MEETING 43RD AVENUE TRANSPORTATION CORRIDOR STUDY

In March of 2012 the Bismarck-Mandan MPO along with the City of Bismarck and Burleigh County initiated a transportation study to determine short, mid, and long-term improvements to the rapidly growing 43rd Avenue Corridor, which is generally defined as extending from Butte Drive on the west to 80th Street on the east. Over the past year, a range of potential transportation improvements representing various modes of travel have been identified and evaluated based on how they will address the existing and future transportation needs within the corridor.

On **Thursday, March 7, 2013, from 4:30 to 6:30 p.m. the third and final Open Houses will be held at Sunrise Elementary School (3800 Nickerson Avenue, Bismarck).** At this Open House the public will be able to review project materials including the various transportation improvements considered for implementation within the Corridor.

At the beginning of the Open House, which starts at 4:30 p.m., there will be a brief presentation followed by a question and answer period. After this, the public will be able to discuss the project in an informal manner with staff and officials from the MPO, Burleigh County, the City of Bismarck, NDDOT, and the project consultant.

Furthermore, the public will have the opportunity to submit written and/or verbal comments. For more information, please feel free to contact Jack Forslund at1-888-541-4800 (email: jforslund@wsbeng.com) or Steve Saunders at 701-355-1848 (email: ssaunder@nd.gov) Whether you attend the Open House or not, you can post comments as well as view information on the project website at www.43rdavenuecorridorstudy.com, which also has a link to a Facebook page for the study.

Date: March 7, 2013
4:30 p.m. to 6:30 p.m.

Sunrise Elementary School
380 Nickerson Avenue
Bismarck ND

Bismarck-Mandan Metropolitan Planning Organization

Bismarck

43rd Avenue Corridor Study
Where the City meets the Country

43rd Avenue Corridor Study

MAY 2013

PUBLIC INVOLVEMENT

Over the course of the there were three open houses that allowed the project team to exchange information with the public. All three of the events were well attended, attracting from 50 to over 100 people. Click on the "Open Houses" tab on the webpage for more information.

Open House No. 1
September 20, 2012
Sunrise Elementary School

Open House No. 2
December 13, 2012
First Evangelical Free Church

Open House No. 3
March 7, 2013
Sunrise Elementary School

Final Plan / Report Adopted

The Final Report for the 43rd Avenue Corridor Study was adopted by the City of Bismarck and Burleigh County in April 2013 and is now available via the project website. If you are unable to download the document, you can contact the Bismarck-Mandan Metropolitan Planning Organization (MPO) at 701-355-1840 for a CD of the report. The report represents the culmination of a 14-month process to identify a range of improvements encompassing several modes of transportation to accommodate future travel needs within the 7.1 mile corridor extending from Butte Drive on the west to 80th Street on the east.

Study Outcome

The outcome of the study is the identification of an array of alternatives encompassing multiple modes of transportation (walking, bicycling, transit, and driving) that will address travel needs within the corridor through the year 2040.

Details that were developed for each of the feasible alternatives included sidewalk and trail placement, transit accommodations, roadway geometry (including plan and profile), access management measures, and general or planning-level cost-estimates. Environmental considerations were also identified.

Next Steps

With the completion of this document, the next steps in the improvement process will be preliminary design layout and environmental documentation. This would then be followed by final design and construction provided funding is obtained.

Bismarck-Mandan Metropolitan Planning Organization | Bismarck Capital City of North Dakota

43rd Avenue Corridor Study

Acknowledgements

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Bismarck – Mandan MPO Policy Board
Chairman John Warford, Mayor of Bismarck
Vice Chairman Arlyn Van Beek, Mayor of Mandan
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Doug Schonert, Burleigh County Commissioner
Andy Zachmeier, Morton County Commissioner

Bismarck City Commission
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Commissioner Josh Askvig
Commissioner Parrell Grossman
Commissioner Mike Seminary
Commissioner Brenda Smith

Burleigh County Commission
Chairman Jerry Woodcox
Vice Chairman Jim Peluso
Commissioner Mark Armstrong
Commissioner Brian Bitner
Commissioner Doug Schonert

Appendix A- Public Outreach Materials *(cont'd)*

Open House Summaries

Open House No. 1 Overview

September 20, 2012
4:30 to 6:30 p.m.
Sunrise Elementary School

Advertising:

- Meeting advertised in the Bismarck Tribune (hard copy and online), Bismarck Public Schools Employee Newsletter. Other methods employed to advertise the event included:

    - Notice publicized by Bismarck Public School District in employee newsletter as well as on information board in front of the administration offices on Washington Street
    - 1,500 direct-mail postcards were sent to Corridor area residents and property owners.
    - Advertised on Project website and Facebook page.
    - Posting of signs adjacent to major roadways on the day of the event to capture some pass-by trips.
    - The Bismarck Tribune ran an article about the meeting prior to the event.

- Attendance / Sign-in:
    - The Open House was very well attended. Often times, long-range plans do not generate a high level of interest with the public. At this open house, the attendance was over 100 people with most arriving within the first 10 minutes of the start time. At the front of the room there was table where a sign-in sheet was provided as well as comment cards that could either be filled out at the meeting or mailed/faxed to the project team.

    - In addition to the project sign-in sheet, there was also a NDDOT sign-in sheet to obtain demographic information. This sign-in sheet was optional and it was pointed out to the attendees that NDDOT was only asking them to provide information with which they were comfortable. In general, the information obtained from the demographic survey was regarding age, gender, and ethnicity.

- Staff members representing the MPO, City of Bismarck, Burleigh County, NDDOT, and the project consultant (WSB & Associates, Inc.) were on hand to visit and answer questions on behalf of the attendees

- An assortment of cookies and beverages were provided at the meeting.

Presentation

At the outset of the meeting (4:30 p.m.) a 20 minute overview presentation was delivered to the attendees. In addition to providing an overview of the project, the presentation delivered a message about how important the public is for determining the future characteristics of the corridor.

As such, it was emphasized that the project team and agency representatives were on hand to listen the concerns and suggestions on behalf of the public. At the conclusion of the presentation the audience was encouraged to visit with the project personnel to discuss their ideas and concerns.

On hand at the meeting were seventeen information boards on display around the room as well as a 15-foot layout of the corridor that was laid out across tables in the middle of the room.

Display Boards

- Seventeen display boards were set-up around the room containing information about study, including:
    1. Project Background, Vision and Goals
    2. Project Approach and Development Process
    3. Purpose of 1st Open House
    4. Issues Map - Preliminary
    5. Growth of Corridor: 1997 – 2011
    6. General Corridor Conditions
    7. Existing Access Locations
    8. Crash History
    9. Existing Traffic Conditions
    10. Corridor Population Projection: 2010 to 2040
    11. Corridor Employment Projection: 2010 to 2040
    12. Existing and Projected 2040 Traffic Conditions

13. Project Purpose and Need
14. Typical Roadway Sections
15. Potential Application of Typical Section (s) within the Corridor
16. Information Sources
17. Schedule and Next Steps

Displayed on two tables in the middle of the room was a 15-foot layout of the corridor showing a one potential design for the corridor was on display. The public was invited to write their concerns/suggestions directly on the map. In general, not a lot of comments were written on the map. Comments included identification of sight-line issues, whether noise walls would be needed, access to proposed park property, requests for better lighting specifically at intersections, potential right-of-way impacts, and even cattle-crossing locations in Gibb Township.

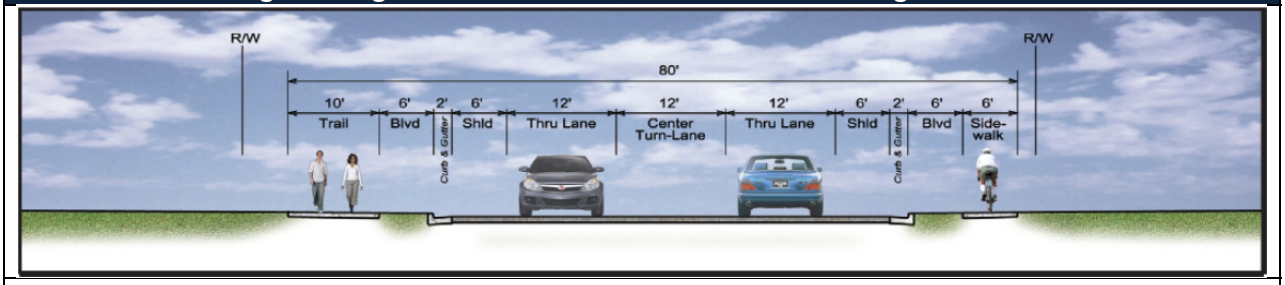
Specific inquiries were made regarding proposed developments near the intersection of Highway 83 and 43rd Avenue. Concerns were expressed with regard to property access at these sites. Since the Public Meeting, WSB has received site plans for the Energy Vista development proposed for the northwest corner of this intersection. At the meeting, they and other property owners were told that the project team is interested in working with them to make both their specific developments work as well as for making the overall corridor work for the near, mid-, and long-term.

Another topic was regarding flooding in the area of Point Loop and 43rd Avenue. Several residents spoke of poor drainage in the area resulting in their yards being flooded. This was noted and relayed to the project partners.

Generally, the dialogue was friendly and respectful. All received comments were noted and will be considered as the project proceeds.

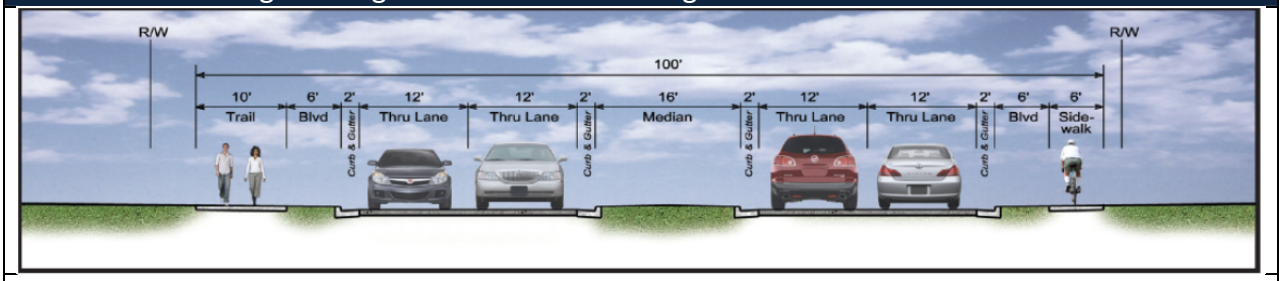
The layout that was shown included the typical sections displayed below.

One Potential Design for segment between Butte Drive and Washington Street



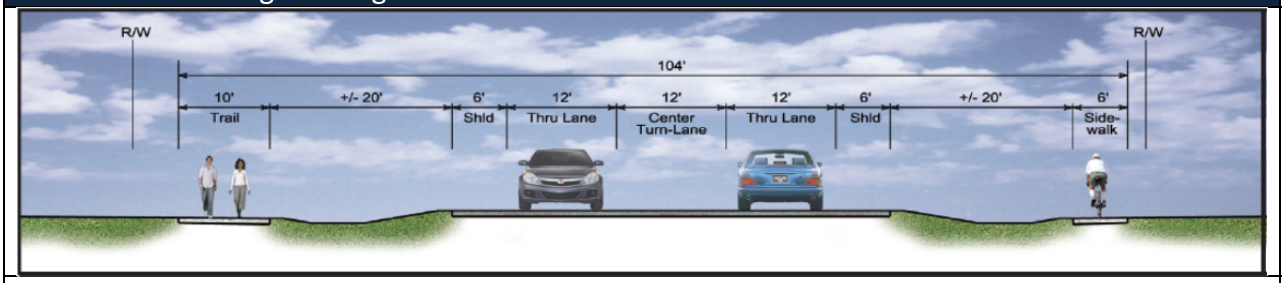
Section: **3-lane with Shoulder (Center-turn lane with Curb and Gutter) plus Trail and Sidewalk**

One Potential Design for segment between Washington Street and 66th Street



Section: **4-lane divided with Shoulder plus Trail and Sidewalk**

One Potential Design for segment between 66th Street and 80th Street



Section: **3-lane with Shoulder (Center-turn lane with ditches)**

Conclusion:

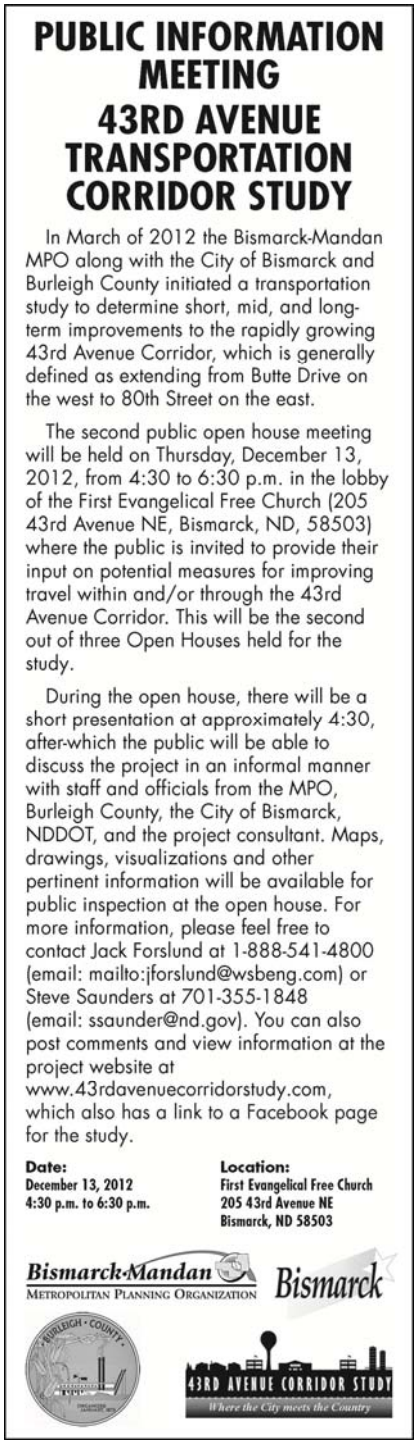
The first Open House for the 43rd Avenue Corridor Study was successful in that it generated good discussions and in general, most people were very positive on the notion of improving the corridor.

Open House No. 2:

The next Open House will be on Thursday, December 13th at the First Evangelical Free Church located on the western side of the Corridor. It was pointed out by Steve Saunders that while the Sunrise Elementary School was a great location and facility, it would be good to get additional geographic coverage by moving it to the western portion of the study area. Upon doing field visits to several potential sites, it was determined that First Evangelical Free Church met our needs the best for the next meeting due to its location on the corridor and its availability.

Open House No. 2 Summary and Overview

December 13, 2012
4:30 to 6:30 p.m.
First Evangelical Free Church



PUBLIC INFORMATION MEETING

43RD AVENUE TRANSPORTATION CORRIDOR STUDY

In March of 2012 the Bismarck-Mandan MPO along with the City of Bismarck and Burleigh County initiated a transportation study to determine short, mid, and long-term improvements to the rapidly growing 43rd Avenue Corridor, which is generally defined as extending from Butte Drive on the west to 80th Street on the east.

The second public open house meeting will be held on Thursday, December 13, 2012, from 4:30 to 6:30 p.m. in the lobby of the First Evangelical Free Church (205 43rd Avenue NE, Bismarck, ND, 58503) where the public is invited to provide their input on potential measures for improving travel within and/or through the 43rd Avenue Corridor. This will be the second out of three Open Houses held for the study.

During the open house, there will be a short presentation at approximately 4:30, after-which the public will be able to discuss the project in an informal manner with staff and officials from the MPO, Burleigh County, the City of Bismarck, NDDOT, and the project consultant. Maps, drawings, visualizations and other pertinent information will be available for public inspection at the open house. For more information, please feel free to contact Jack Forslund at 1-888-541-4800 (email: mailto:jforslund@wsbeng.com) or Steve Saunders at 701-355-1848 (email: ssaunder@nd.gov). You can also post comments and view information at the project website at www.43rdavenuecorridorstudy.com, which also has a link to a Facebook page for the study.

Date:
December 13, 2012
4:30 p.m. to 6:30 p.m.

Location:
First Evangelical Free Church
205 43rd Avenue NE
Bismarck, ND 58503

Bismarck-Mandan Metropolitan Planning Organization
Bismarck
Burleigh County
43rd Avenue Corridor Study
Where the City meets the Country

Meeting Overview

Advertising

- The meeting was advertised in the Bismarck Tribune (hard copy and online). Other methods employed to advertise the event included:
    - Over 1,500 direct-mail newsletters were sent to corridor area residents and property owners.
    - Advertised on Project website and Facebook page.
    - Advertised on Church's information board at the corner of 43rd Avenue and Washington Street

Attendance / Sign-in

The Open House was very well attended. At this open house, the attendance was over 70 people with most arriving within the first 15 minutes of the start time. At the front of the room there was a table where a sign-in sheet was provided as well as comment cards that could either be filled out at the meeting or mailed/faxed to the project team.

Staff members representing the MPO, City of Bismarck, Burleigh County, NDDOT, and the project consultant (WSB & Associates, Inc.) were on hand to visit and answer questions on behalf of the attendees

Presentation

At the outset of the meeting (4:30 p.m.) a 20 minute overview presentation was delivered to the attendees. In addition to providing an overview of the project, the presentation delivered a message about how important the public is for determining the future characteristics of the corridor.

It was emphasized that the project team and agency representatives were on hand to listen the concerns and suggestions on behalf of the public. At the conclusion of the presentation the audience was encouraged to visit with the project personnel to discuss their ideas and concerns.

Display Boards

- Thirteen display boards were set-up around the room containing information about study, including:
    1. Project Location, Vision, and Goals
    2. Purpose of 2nd Open House
    3. Population and Employment Growth
    4. Existing and Projected 2040 Traffic Conditions
    5. Project Purpose and Need
    6. Design Considerations
    7. Typical Sections
    8. Guidelines and Benefits of Planned Roadway Access
    9. Preliminary Layout (plan view)
    10. Existing and Proposed Grades (profile view)
    11. Potential Roadway Section Applications
    12. Information Sources (Website, Facebook, Newsletters)
    13. Schedule and Next Steps

Displayed on the tables in the middle of the room was a 15-foot layout of the corridor showing the existing access assessment and future access guidelines to help determine where future access should be located based on the City's access guidelines. It was emphasized in both the material on display as well as the presentation that this is a long-term plan and that access management measures would occur only as the opportunity arises such as a change in property ownership, property development, or roadway reconstruction.

Questions and comments received during the Open House are listed below along with a general response. These questions and answers or responses will be posted to both the webpage and the Facebook page for the project.

Frequently Asked Questions:

- **Question: When will this be built?**
  - General Response: This is considered a long-term construction project. Currently it is not programmed nor funded for construction. However, it is generally anticipated that the entire corridor will be reconstructed prior to 2040, with individual segments constructed as opportunity or need arises. If you recall, this process is similar to the Century Avenue reconstruction where individual segments have been rebuilt based on need and opportunity over a period of many years.

- **Question: How will the roadway construction be paid for?**
  - General Response: It has not yet been determined how to pay for the reconstruction of 43rd Avenue. Options include Local (City/County), State, and Federal Funding. One potential federal source of funding is a grant through the Surface Transportation Program (STP). This is a grant awarded to projects using a competitive process that compares projects against one another. Typically, the funding awarded through this process will pay for 80 percent of construction with the local agency(s) paying the remaining 20 percent, as well as all costs for water and sanitary infrastructure. The 43rd Avenue Corridor Study Project should increase the chances of obtaining STP funding should this route be chosen. In addition to public funding, private funding through developer agreements can also be used to finance construction.

- **Question: I have a driveway on Ash Coulee Drive with neighbors on either side of me. How can you get rid of my driveway?**
  - General Response: It is recognized that not all private drives can be removed, particularly when there is no other access to the property or where it would be very difficult and/or disruptive to provide alternative access to the property. In general, driveways would be removed upon property redevelopment or if there is a reasonable and feasible can be provided. In the short-term, there are no plans to eliminate any existing private drives. In the long-term, the objective is have access spacing that is consistent with traffic engineering accepted guidelines such as those contained in the City of Bismarck's Access Management Policy, which was adopted in 2005. These guidelines incorporate considerable research and analysis that was conducted to determine appropriate access spacing for a range of roadway types and their specific functions.

- **<u>Question:</u> It is difficult for children to cross Ash Coulee Drive to get to Horizon Middle School. Can something be done about that?**
    - <u>General Response</u>: There are marked cross-walks on Ash Coulee Drive where drivers are required by law to yield to pedestrians. However, this does not always occur. The school district was takes safety very seriously and when this was brought to their attention they responded that they will conduct a field visit to observe the student and all pedestrian crossings before and after school. They will then assess the situation to determine what measures might be considered to improve the situation.

- **<u>Question:</u> Will additional access be provided to Horizon Middle School for the developing areas north of 43rd Avenue? Wouldn't that alleviate the congestion in front of the school on Ash Coulee Drive?**
    - <u>General Response:</u> Yes, additional access to the school via other roadways would alleviate congestion at the Ash Coulee Drive entrance/exit. Upon contacting the school district, we confirmed that the plan is to provide an access road from the school northward to intersect with Durango Avenue upon that roadway completing its final extension to the school property line. This connection should provide considerable relief to Ash Coulee as it will also provide a connection to the growing residential areas north of the school.

- **<u>Question</u>: Regarding transit service in the area, specifically route D-2 that travels up Washington Street to 43rd Avenue; could this route be modified to serve Horizon School and the area along Ash Coulee Drive? Also, could a bus shelter be installed near the intersection of Washington Street and 43rd Avenue?**
    - <u>General Response – Service to Horizon:</u> Regarding Route D-2 or any fixed routes of Bis-Man Transit, it is difficult to modify one route as it would disrupt the timing that has been worked out to allow buses from several routes to meet simultaneously at a common location (I.e., Gateway Mall) allowing for riders to transfer to other routes if necessary. Bis-Man Transit is not adverse to making changes to the route system, however, the changes must be based on demand (ridership potential), and they should not be cost-prohibitive. At the present time there is not compelling information that shows that the modification of Route D-2 to serve Horizon Middle School via Ash Coulee Drive will result in sufficient ridership to justify the cost. However, they are always reviewing their system to determine if changes such as the route structure should modified. As the area continues to grow they expect their geographic service area to increase. At present they are reviewing the five-year transit study entitled Mobility 2017

(completed in 2011) to assess potential improvements though the year 2017. Upon determination of any route modifications within their system, they will conduct the appropriate public outreach efforts, which will include a Public Hearing, which will allow for public input and comment. In discussions with the school district, they indicated that they are very supportive of Bis-Man Transit and would work with them if at some point it is decided that improved transit service is warranted at Horizon or any of their school facilities.

General Response – Transit Shelter at Washington Street/43rd Avenue: On the question of whether a bus shelter could be installed near the intersection of Washington Street and 43rd Avenue, the answer is that we would not recommend it at this particular time as both the east side of Washington Street and the south side of 43rd Avenue lack pedestrian facilities, or more specifically sidewalks. Because Route D-2 operates as a one-way route traveling northbound on Washington Street and then eastbound on 43rd Avenue, riders embark and disembark on the side of the roads without a sidewalk or trail for riders to access a bus shelter. Good transit design dictates that you should provide safe and appropriate pedestrian access (I.e., sidewalks) to transit shelters. Upon reconstruction of 43rd Avenue pedestrian facilities including sidewalks and/or multi-use trails will be provided. At this time, provided there is sufficient demand or transit usage at this location, a transit shelter could be provided.

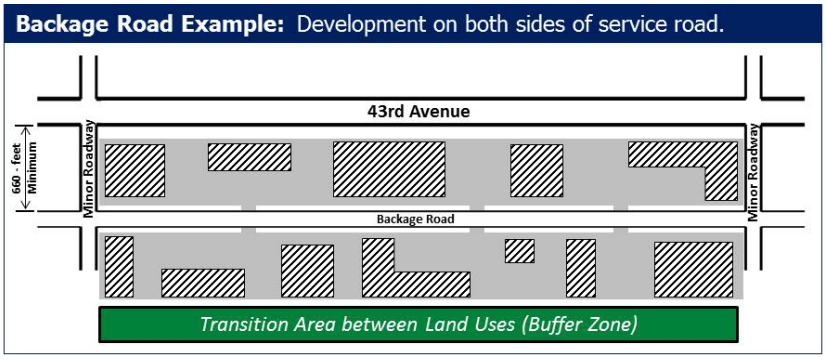
- **Question: When will the new traffic signal be installed at Washington Street and 43rd Avenue?**
    - General Response: The traffic signal is anticipated to be operational by February, 2013.

- **Question: My property sits lower than the roadway bed making access to it difficult to develop. The roadway profile on display at the open house shows the road being lowered, but it still won't match up with my property**.
    - General Response: The roadway profile shown at the open house reflects the reconstruction of the roadway using a design speed of 45 mph. The design speed, which is not the same as the posted speed-limit, establishes both the horizontal alignment (curves) of a road and the vertical alignment (topography, hilliness) of a roadway. In the case of vertical alignment, which is also known as the roadway profile, the roadway is smoothed out to provide a safe design that allows for adequate sight-distance for motorists. For this study, we are doing

conceptual design to establish the general characteristics of the roadways profile. Prior to construction, more detailed design will occur that will establish the exact profile of the roadway through-out the entire corridor. For this, it is likely that the design-speed will vary along the corridor's length depending on numerous factors including existing topography and adjacent land-use. Until this time, the City will work individually with property owners as they pursue development opportunities for their land.

- **Question: I have land near the intersection of US 83 and 43rd Avenue that is served by a private driveway that I want to develop but it looks like it doesn't fit the access standards? What can I do?**
  - General Response: When a property only has access via a private drive, the City would not eliminate access unless a reasonable alternative access point can be provided to the property. In cases where the driveway serves an existing development that driveway would likely remain unless an agreement is reached with the property owner. For new developments, modification to the existing driveway may occur based on trip generation, adjacent roadway traffic levels, and travel safety.

- **Question: The aerial map displayed on the tables on the middle of the room showed areas of private land adjacent to 43rd Avenue identified as being future locations of frontage or backage roads. How can you put these in if you don't own the land? And what is the benefit to the landowner?**
  - General Response: Displayed on the tables was essentially a "conceptual plan" for improving the operation and safety of the roadway as the area develops and as the roadway is reconstructed. Indicated on this plan were areas where the development of a frontage or backage road may be appropriate based on existing and projected land use. Generally, only undeveloped areas were identified as being locations where this system should be strongly considered. These roads would be somewhat similar to 14th Street east of US 83 between Calgary and Century Avenues (backage road), or 12th Street west of State Street south of Capitol Avenue (frontage road). Regarding the potential benefits to property owners, a frontage/backage road adjacent to a major roadway provides good visibility and access, which is important for many businesses. And it also can aid in the subdivision of larger tracks of land into smaller development parcels. Typically,



backage roads are viewed more favorably as they allow for development on both sides of the road, rather than a frontage road that only provides for development on the side of the road away from the major roadway.

- **Question: Will some of my property be needed to accommodate the reconstructed roadway?**
  - General Response: It is unlikely that any additional property will be required for the roadway. In general, the existing roadway sits in the middle of a 120 to 135 foot wide swath of land that is publicly owned. The widest design (4-lane divided roadway with trail and sidewalk) that is under consideration is approximately 100 feet. However, at major intersections as well as to accommodate a transit bus-turnout lane, this 100' may be exceeded. Still, it is anticipated that everything could be accommodated within the existing right-of-way.

- **Question: Would noise-walls be constructed?**
  - General Response: That depends on several factors, primarily the source of funding. If using Federal money for construction a noise analysis is conducted to determine the impact on adjacent property. If it is determined that the projected noise levels due to increased traffic volumes will exceed acceptable levels an analysis is required to determine if noise-walls would bring the levels within acceptable limits, and if so, that they are cost-effective. If they are determined to be cost-effective, each affected property owner or resident then gets to vote on whether they want noise-walls, where the simple majority determines the decision.

- **Question: I live near the railroad tracks. Will there be a grade-separated crossing on 43rd Avenue? And if not, what about a whistle-free zone?**
  - General Response: A grade-separated crossing of the DMV&R railroad tracks on 43rd Avenue has been considered as part of the alternatives evaluation process. Generally, it was concluded that a separated crossing would be difficult and expensive as it would require a bridge and approach distance of substantial length (minimum distance of 400 feet on either side of the bridge structure) in order to achieve the required minimum clearance of 23-feet between the tracks and the bridge. Also considered was whether this would be a strong candidate for a whistle-free crossing. In analyzing potential costs versus benefits it was determined that considering there are fewer than 3 trains per day that cross 43rd Avenue, it would not justify the cost, which may be upwards of $500,000 to install the necessary infrastructure. Currently, the City of Bismarck is in the process of establishing three whistle-free crossings on the BSNF railroad tracks through downtown, which averages approximately 30 trains per day. When comparing these two locations, it becomes apparent that the cost may not be justified for the DMV&R crossing of 43rd Avenue, which has less than 10 percent

of the train traffic on the BNSF line. However, if the train traffic increases to this same level, it may justify the expense.

- **<u>Question:</u> What impact will the new high school proposed for the area south of 43rd Avenue between 26th Street and Centennial Road have on corridor traffic?**
    - <u>General Response</u>: The new high school will be located on a 66-acre site just west of the existing KOA campground and is proposed to be approximately 200,000 square-feet, accommodate up to 1,600 students, and upon full occupancy it would generate up to 900 trips during the morning and afternoon school start and end times.[1] Access to and from the north will be provided through the northward extension of Nebraska Avenue to 43rd Avenue where it will intersect as a T-intersection with traffic on Nebraska Avenue being stop-sign controlled while traffic on 43rd Avenue would be free-flowing. Nebraska Drive is not planned to extend beyond 43rd Avenue nor south of Century Avenue, and as such it will not function as a primary north-south route. The key north-south routes serving this general area will continue to be Centennial Road to the east, US-83 on the west and to a lesser extent, 19th Street to the west.

      Upon reconstruction of 43rd Avenue and depending on the development pattern of the area, there is a possibility that this intersection could become signalized in the future. Typically, a traffic signal is not installed unless it meets at least one of eight different signal warrants. Most of these are dependent upon traffic volumes for the intersecting streets, but there are warrants based on pedestrian crossings, as well as travel safety. At present, traffic levels on 43rd Avenue near the proposed high school are approximately 3,000 vehicles per day. In 2025, it is projected to increase to approximately 8,500, with Nebraska Drive (at the northern end) averaging approximately 2,000 vehicles per day. Based on these numbers alone, it would be expected that the intersection would remain un-signalized. However, if pedestrian crossings or travel safety become a problem, a signalized intersection should be considered.

- **<u>Question:</u> When will the interchange at 66th Street be constructed and how does that impact the roadway?**
    - <u>General Response:</u> A new interchange, whether it is located at 66th Street or 80th Street, is not assumed until year 2025 at the earliest. In making traffic projections, the 2040 forecasts reflect the presence of the interchange at 66th Street, the chosen location for the beltway. The 2040 land-use and development density reflects the presence of the interchange and includes a higher density of development for the eastern segments of 43rd Avenue (near 66th Street). The

[1] Projected vehicle trips were determined using Institute of Transportation Engineers (ITE) generation rates as well as local information provided by the Bismarck School District. In general, the number of estimated trips (900) is on the high side for a school with 1,600 students.

2025 traffic projections do not include the interchange or the associated development that would come with it.

- **<u>Comment:</u> It would be nice if more chairs were provided at the Open House and it was difficult to hear the presentation.**
    - <u>Response:</u> At the next Open House we will provide more seating and will also use an audio or public address system to make it easier to hear the presentation, similar to the first Open House.

- **<u>Comment:</u> Could you allow for a public question and answer period?**
    - <u>Response:</u> Yes, we can. The reason that we emphasize our approach of answering questions people may have in a one-on-one or group setting away from the microphone or podium is we have found that we are able to interact with more people at a meeting, which is very important as many people are not comfortable with asking their questions in front of others. However, we do recognize the interest in this request and will conduct a Q and A session at the next Open House. Our preference is to do the brief presentation followed by a 15-minute Q and A, which will then be followed by the less formal one-on-one discussions between staff and attendees. Our hope is that people will stay after the Q and A so that we can spend more time with people and their particular questions/comments.

Conclusion

Generally, the dialogue was friendly and respectful. All received comments were noted and will be considered as the project proceeds.

The second Open House for the 43rd Avenue Corridor Study was successful in that it generated good discussions and in general, most people were in favor of the proposed roadway sections and multiple-mode accommodations the study is striving to achieve.

<u>Open House No. 3</u>
The next Open House will likely be in February of 2013.

This document summarizes the activities of the second Open House and also contains questions or comments that were raised along with the response or answer from the Project Team

Open House No. 3 Summary and Overview

March 7, 2013
4:30 to 6:30 p.m.
Sunrise Elementary School

Advertising

- The meeting was advertised in the Bismarck Tribune on Wednesday, February 20 with a 2" x 12" listing (shown on to the right). Other methods employed to advertise the event included:
  - Over 1,300 direct-mail newsletters were sent to corridor area residents and property owners.
  - Advertised on Project website and Facebook page.
  - The Bismarck Tribune ran an article about the meeting on the day of the event.

Street upgrades to be discussed

Possible improvements to 43rd Avenue through the year 2040 will be discussed at the final public comment meeting at 4:30 p.m. today at the Sunrise Elementary School. The 43rd Avenue Corridor Study focuses on the 7.1-mile road stretching from Butte Drive to 80th Street, said Jack Forslund, transportation planner for WSB Associates.

According to Forslund, traffic on the rural two-lane rural route could increase from the 5,000 vehicles per day now to 20,000 per day by 2040.

Near 66th Street, it is still a gravel road. Parts of the road is steep on the sides, he said. There are no paved shoulders to the road.

Forslund said the aim of the study is to make the road more user-friendly for motorists, pedestrians and bicycle riders.

He said the corridor study will cover options on widening parts of the road to four or five lanes, adding turning lanes, building possible multi-use walking paths, making road shoulders safer, improving drainage and possibly creating a bus stop there.

Forslund said how much is done depends on population growth, development, use of the road, what the city and county needs are and available funding. Turn lanes could be added to 43rd Avenue within five years or sooner, he said.

For more information, visit www.43rdavenuecorridorstudy.com

— *LeAnn Eckroth*

PUBLIC INFORMATION MEETING 43RD AVENUE TRANSPORTATION CORRIDOR STUDY

In March of 2012 the Bismarck-Mandan MPO along with the City of Bismarck and Burleigh County initiated a transportation study to determine short, mid, and long-term improvements to the rapidly growing 43rd Avenue Corridor, which is generally defined as extending from Butte Drive on the west to 80th Street on the east. Over the past year, a range of potential transportation improvements representing various modes of travel have been identified and evaluated based on how they will address the existing and future transportation needs within the corridor.

On **Thursday, March 7, 2013, from 4:30 to 6:30 p.m. the third and final Open Houses will be held at Sunrise Elementary School (3800 Nickerson Avenue, Bismarck).** At this Open House the public will be able to review project materials including the various transportation improvements considered for implementation within the Corridor.

At the beginning of the Open House, which starts at 4:30 p.m., there will be a brief presentation followed by a question and answer period. After this, the public will be able to discuss the project in an informal manner with staff and officials from the MPO, Burleigh County, the City of Bismarck, NDDOT, and the project consultant.

Furthermore, the public will have the opportunity to submit written and/or verbal comments. For more information, please feel free to contact Jack Forslund at1-888-541-4800 (email: jforslund@wsbeng.com) or Steve Saunders at 701-355-1848 (email: ssaunder@nd.gov) Whether you attend the Open House or not, you can post comments as well as view information on the project website at www.43rdavenuecorridorstudy.com, which also has a link to a Facebook page for the study.

Date: March 7, 2013
4:30 p.m. to 6:30 p.m.

Sunrise Elementary School
380 Nickerson Avenue
Bismarck ND

Bismarck-Mandan Metropolitan Planning Organization

Bismarck

43RD AVENUE CORRIDOR STUDY
Where the City meets the Country

Attendance / Sign-in
The Open House was well attended with approximately 50 people in attendance. At the front of the room there was a table where a sign-in sheet was provided as well as comment cards that could either be filled out at the meeting or mailed/faxed to the project team.

Staff members representing the MPO, the City of Bismarck, and the project consultant (WSB & Associates, Inc.) were in attendance to present information and interact with the public. Also in attendance was an employee of the Bismarck School District to address any specific questions regarding the existing or proposed schools within the corridor.

Presentation
At approximately 4:45 p.m., a brief presentation on the project with an emphasis on the material displayed at this open house was provided. After the presentation, the floor was opened up for people to either provide comments or ask questions.

Questions and/or comments received during the public comment period and the corresponding answer include the following:

Question/Comment: When, and/or how, will this be built?

General Answer/Response: At the present time there is no funding allotted towards reconstruction of the corridor. It is envisioned that the conclusion of this study will provide the basis for soliciting federal funding for the project. If federal funding is obtained, which could involve a period of 2 to 3 years, the project will then go through a formal environmental and design process that typically takes 2 to 3 years. Therefore, for the total reconstruction of the corridor the earliest it would likely happen would be six years or around 2019.

For spot improvements such as the provision of turn-lanes or the addition of a traffic signal, are much less expensive and could be completed using local funding without federal review. These improvements could occur much sooner.

Question/Comment: How would it be built, what would be improved first?

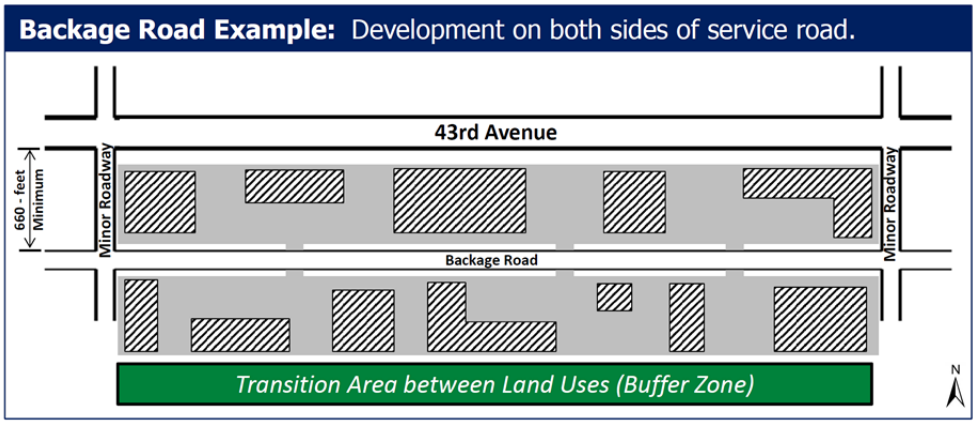
General Answer/Response: The staging of the improvements would most likely be based on need. In areas where there is a clear deficiency that would likely be one of the first segments

reconstructed. As with the reconstruction of Century Avenue, the reconstruction of the 43rd Avenue Corridor would likely occur over a period of several years.

Question/Comment: There is a large development proposed for the area near the new high school, or south of 43rd Avenue and between 26th Street and Centennial Road. The development calls for more than 1,500 multi-family housing units plus some commercial development. Do your traffic projects account for this development?

General Answer/Response: The traffic projections developed using the model do incorporate an assumed future population and employment level for this area representing an increase of 2,000 more people and 800 new jobs with most of this occurring by 2025. This growth, along with growth within the entire Bismarck-Mandan area is represented in the model. The resulting projected traffic level on the segment of 43rd Avenue between 26th Street and Centennial Road is 14,200 in 2025. While this traffic projection may be what could be expected with the proposed development, it is strongly encouraged that a traffic impact analysis is completed for this specific development to determine the impacts on 43rd Avenue as well as the roadways generally within the area of this development.

The traffic impact report should identify all assumptions used for the analysis including the number of trips (a.m. and p.m. peak plus daily trips) and their distribution and assignment to the roadway network. A detailed traffic analysis of this type should be required of all larger developments within the corridor so as to identify the impacts and appropriate improvement measures.



With this or any other development, access management practices outlined for this area including the provision of new access along this segment no closer than one-quarter mile apart. Also, the provision of service or backage roads to accommodate development while maintaining the one-quarter mile access spacing. These backage roads would provide visibility to the development from 43rd Avenue but access to the development(s) would not be provided directly from 43rd Avenue.

Question/Comment: There were questions regarding the right-of-way shown on the layouts. Specifically the questions were related to areas where the proposed right-of-way encroached on private property.

General Answer/Response: Generally, the entire corridor has a minimum of 100-feet of right-of-way that could accommodate the displayed layout. Areas where more than 100 feet may be required are at major intersections. Shown on the layout is a very preliminary alignment for the roadway. Upon final design issues such as right-of-way area addressed. Usually these issues are resolved either through engineering or tweaking the alignment or through a mutual agreeable agreement with the landowner regarding right-of-way.

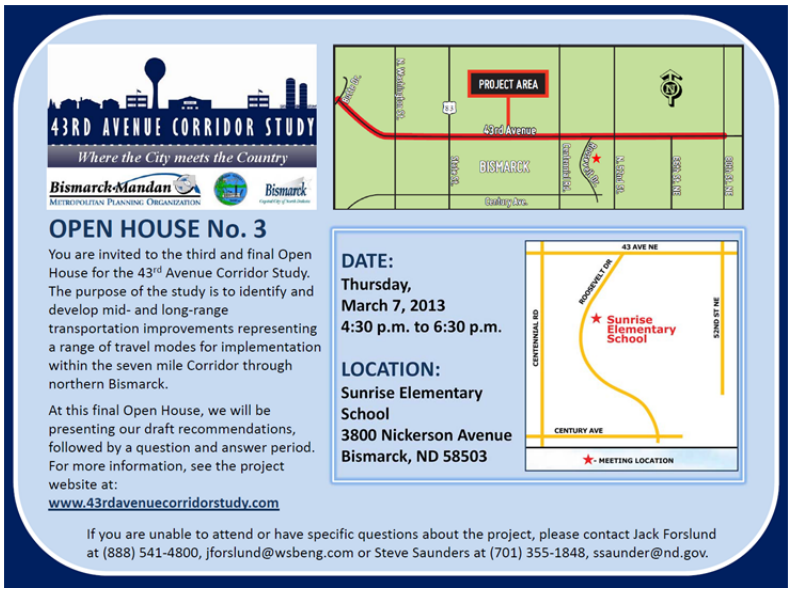
At the conclusion of the question and answer session, the audience was encouraged to visit with the project personnel to discuss their ideas and concerns.

Display Boards

Eight display boards were set-up around the room containing information about study, including:

- Evaluation Considerations / Purpose and Need
- Existing and Forecasted Daily Traffic and Congestion
- Population and Employment Growth / Corridor Segments (6 Boards)
  - Existing Characteristics
  - Needs by User Type
  - How Needs are Addressed

Displayed on the tables in the middle of the room as well as on the walls were figures displaying a preliminary recommended design to accommodate the existing and/or future needs of motorists, pedestrians and bicyclists, and transit users within the travel corridor. The figures identified needs by corridor segment or sub-segment and offered potential designs at major intersections to reflect year 2025 and 2040 traffic levels. The figures also showed concept typical sections of the roadway displaying information such as trails, sidewalks, lane widths, shoulder, curb, ditches, and bus turnouts.



Conclusion

The third Open House for the 43rd Avenue Corridor Study was successful in that it generated good discussions and allowed those in attendance to ask questions either through the question or answer session or afterwards in a one-on-one setting.

Appendix B

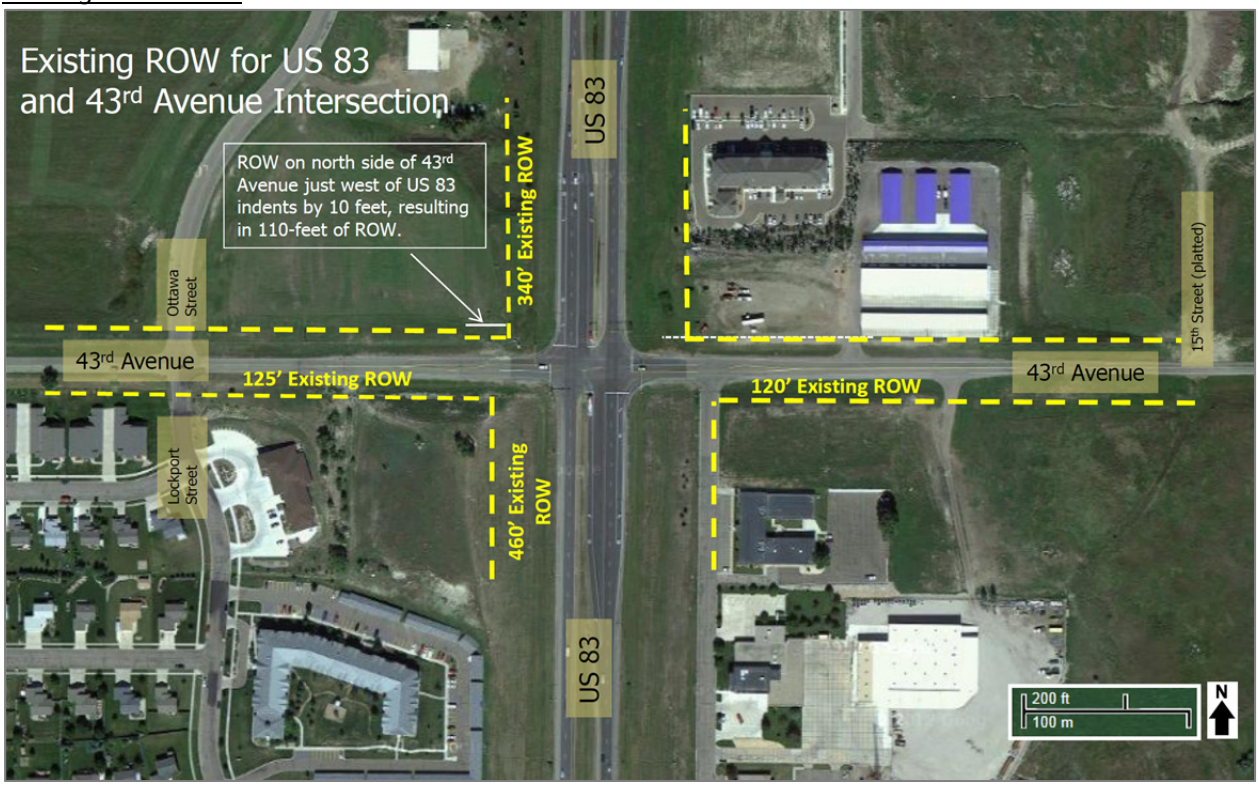
Footprints of Different Interchange Types

Footprints of Different Interchange Types Placed Over the US 83 / 43rd Avenue Intersection
For application to the intersection of US 83 and 43rd Avenue, four interchange designs were reviewed in terms of their footprint or general right-of-way requirements. The four interchange designs that were explored include:

- Standard Diamond Interchange
- Tight Diamond Interchange (TDI)
- Single Point Urban Interchange (SPUI)
- Diverging Diamond Interchange (DDI)

An existing example of each of these interchange types was superimposed over the existing aerial image of the US 83 and 43rd Avenue intersection. Shown on the aerial image are the existing right-of-way (ROW) limits, which for 43rd Avenue are 125 feet west of US 43, and 120 feet east of US 43. For US 83, the existing ROW is 340 feet north and 460 feet south of 43rd Avenue, respectively. The image below presents the existing configuration of the interchange as well as the ROW limits.

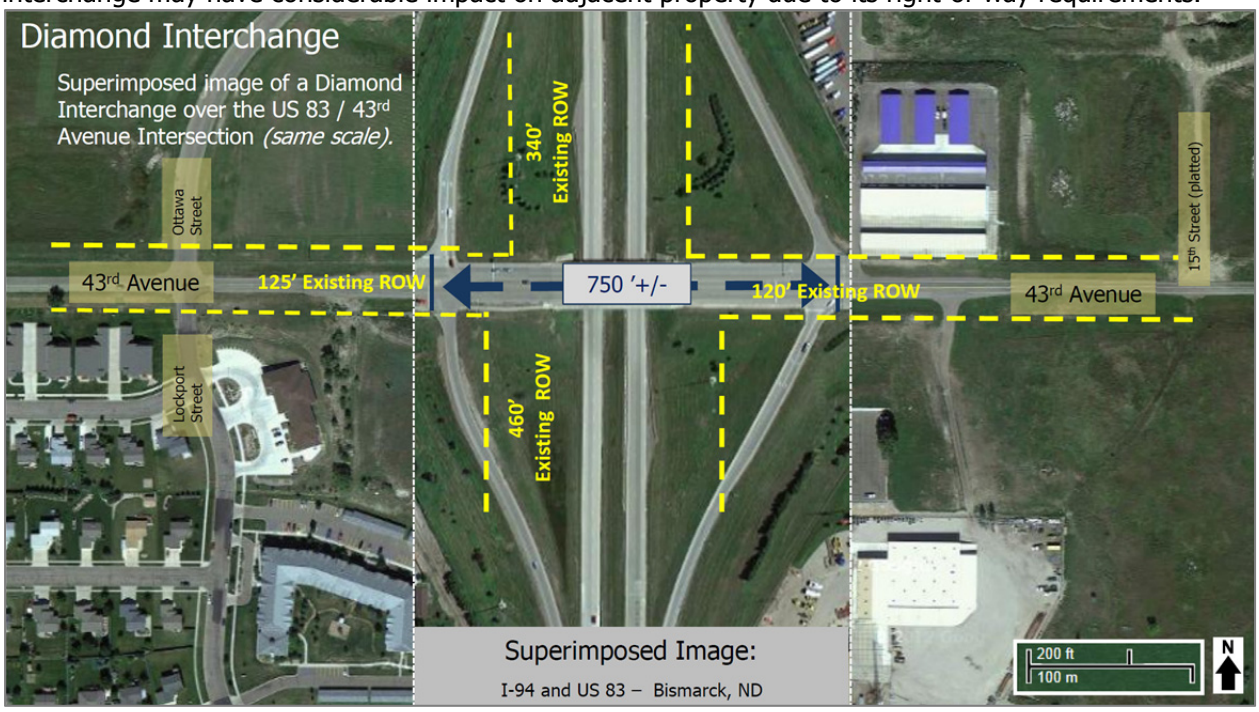
Existing Intersection



Presented in the following pages are similar graphics for each of the interchange types to visualize the approximate footprint each would require if implemented at this intersection. The actual interchanges that were superimposed over the aerial image were chosen as they represent typical designs associated with their respective interchange types. To get a sense of scale, the approximate width for each of the interchanges is identified. This width is generally measured from the outer extents of each interchange. For example, the measurement for the diamond interchange would be from southbound ramps to the northbound ramps. Finally, the interchanges used in this exercise should not be viewed as an actual design for the US 83 and 43rd Avenue intersection.

Standard Diamond Interchange

Provided on the following image is the existing US 83 / I-94 interchange (rotated clockwise 90 degrees) superimposed the US 83 / 43rd Avenue intersection. As shown on this image, the standard diamond interchange may have considerable impact on adjacent property due to its right-of-way requirements.

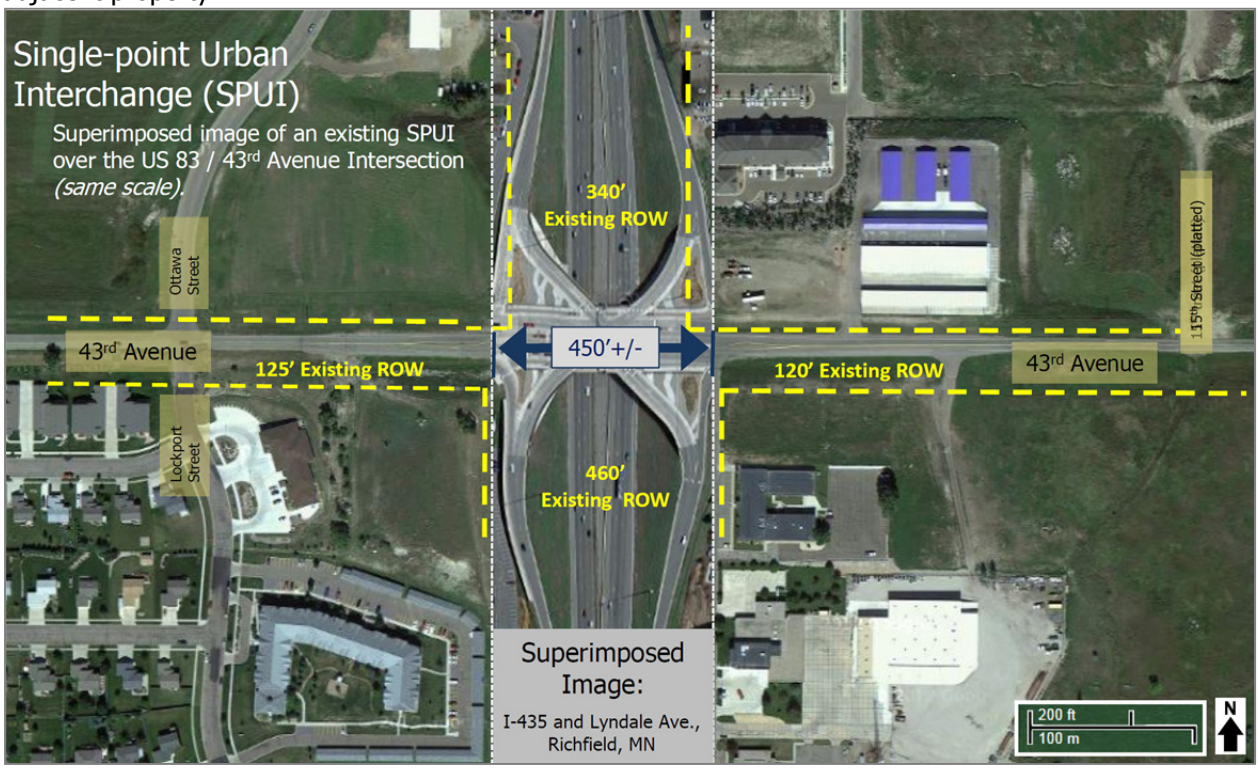


Tight Diamond Interchange (TDI)

A TDI operates as two closely spaced signalized intersections (at the ramp junctures) that are managed together as one signal. The image below shows how a TDI may impact adjacent property.

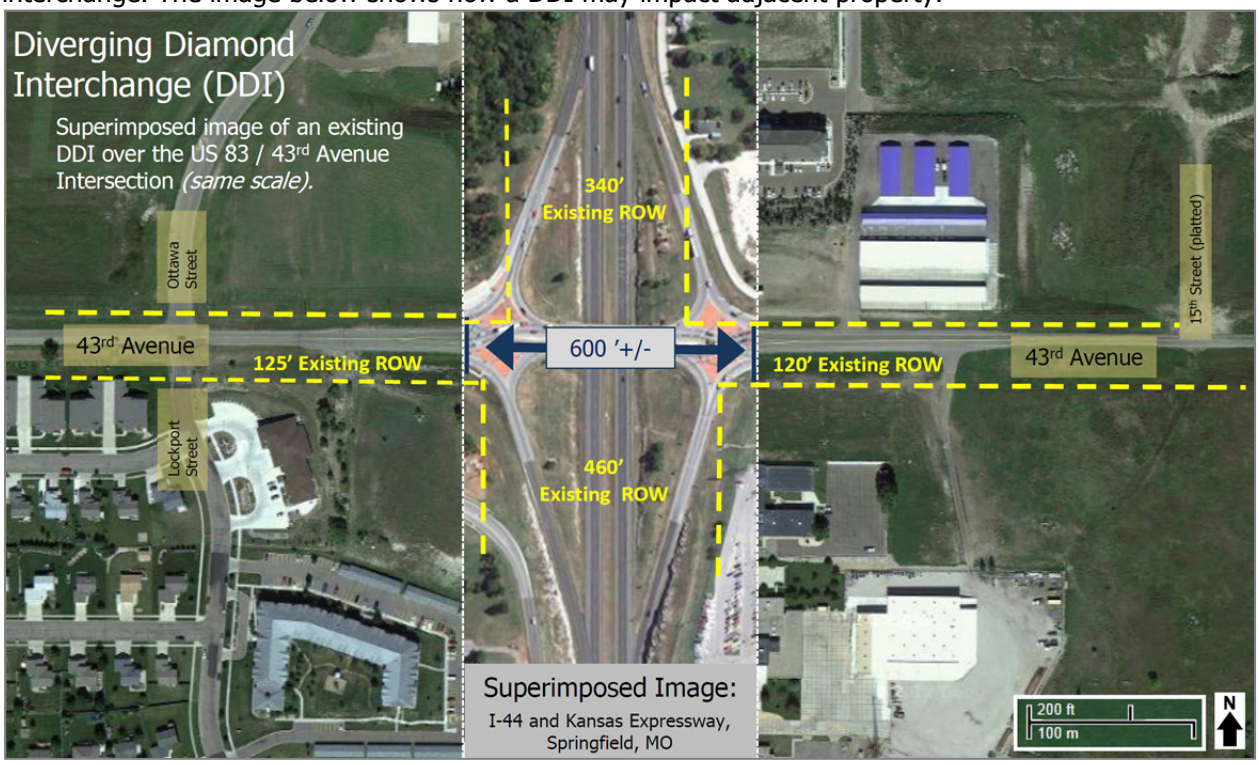
Single Point Urban Interchange (SPUI)

A SPUI operates as one signalized intersection. The image below shows how a SPUI may impact adjacent property.



Diverging Diamond Interchange (DDI)

In a diverging diamond interchange, the traffic is placed on the opposite side or the roadway at the interchange. The image below shows how a DDI may impact adjacent property.



Appendix C

Existing Land Use and Right-of-Way Mapbook

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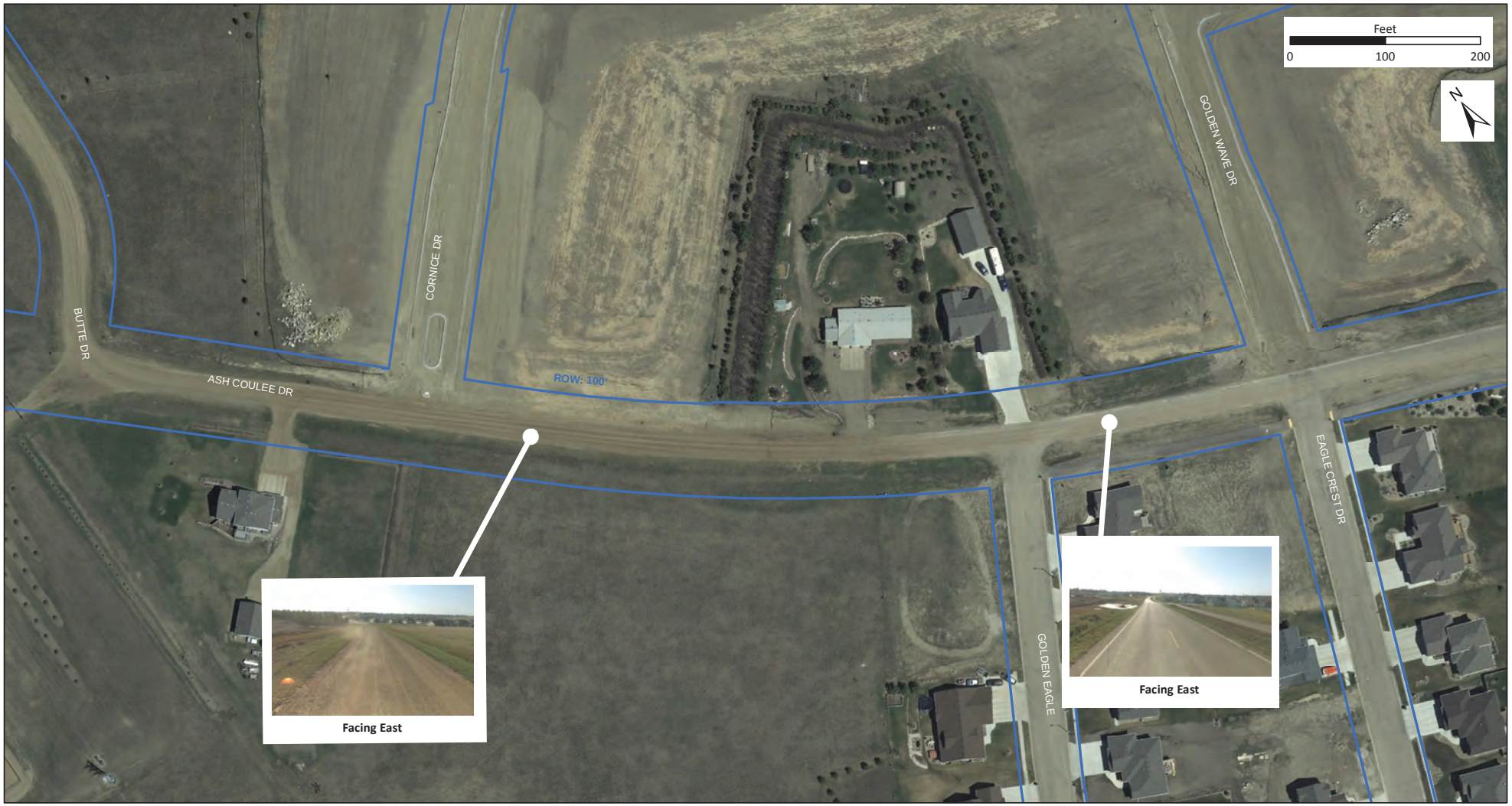

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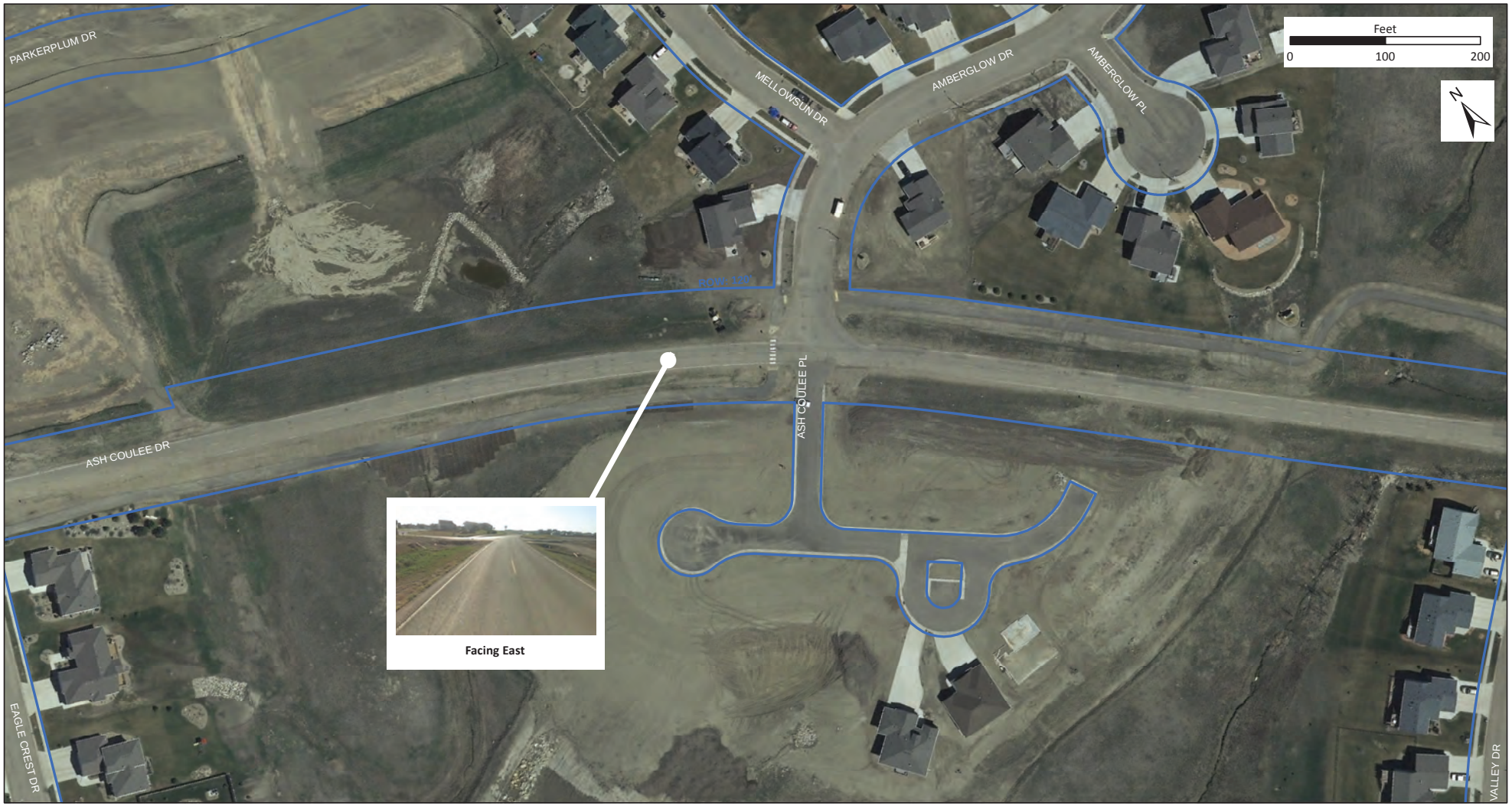

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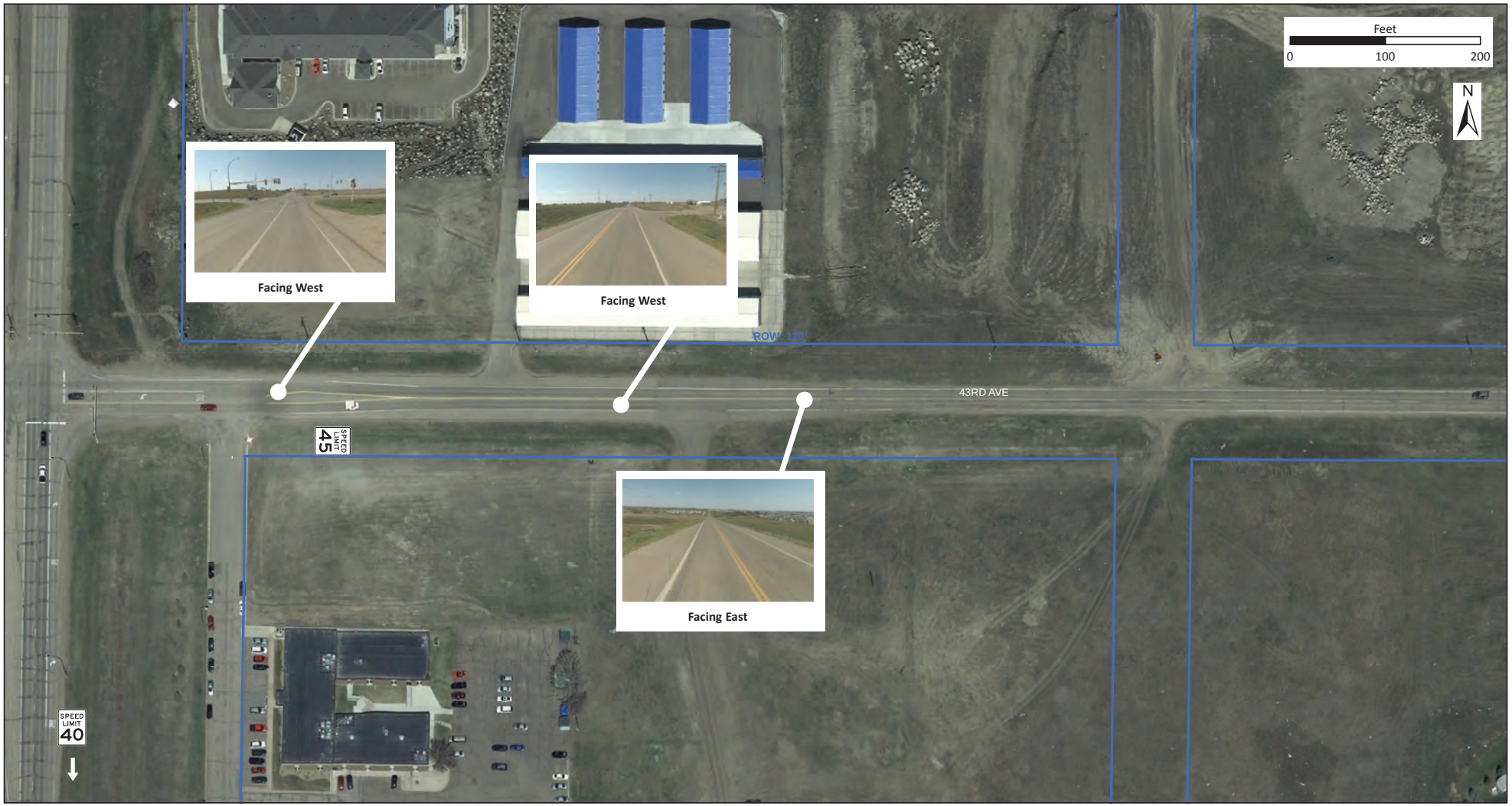

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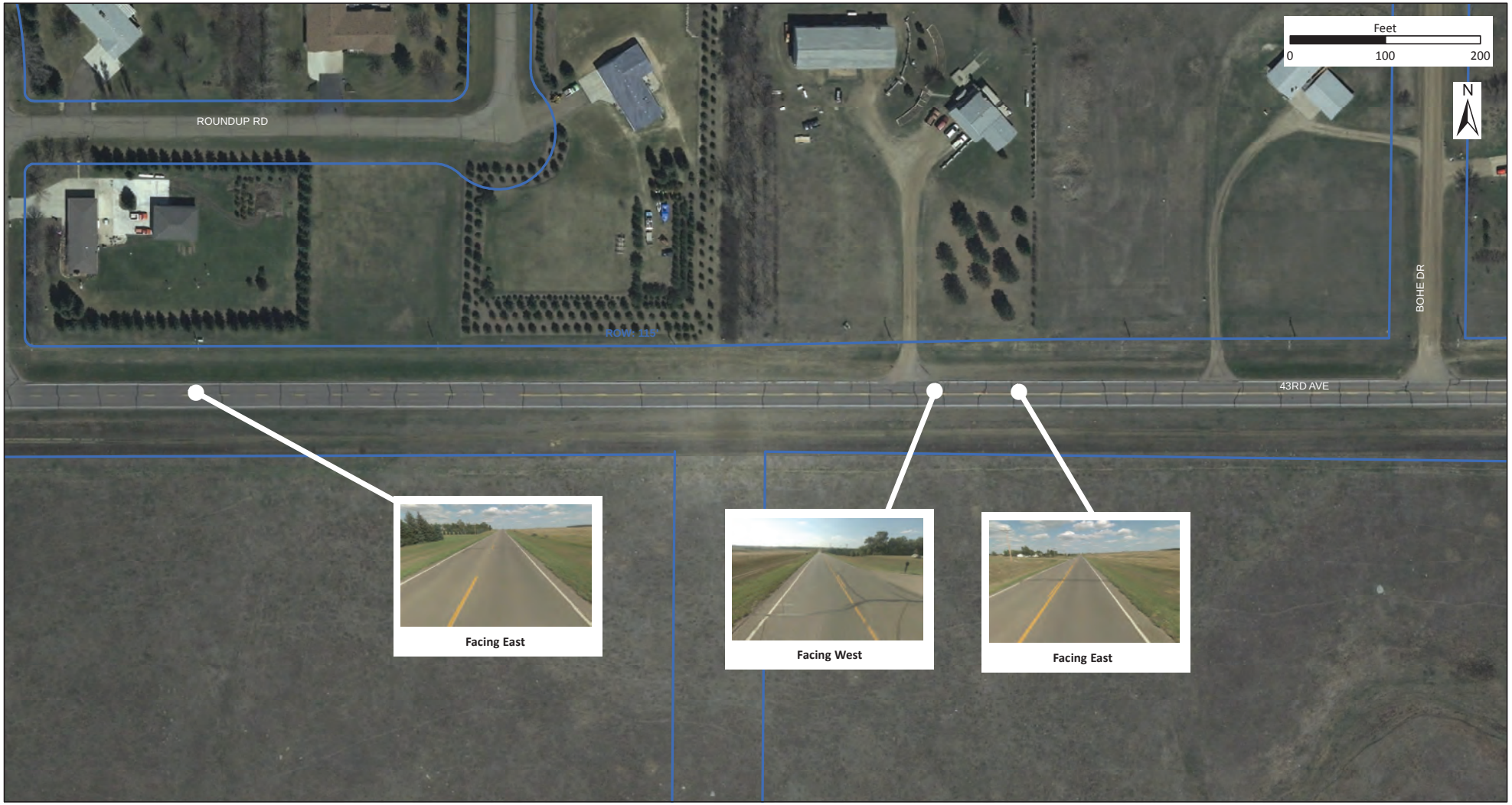

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