

US HIGHWAY 83 ALTERNATIVE STUDY



BISMARCK - BURLEIGH COUNTY, NORTH DAKOTA

Prepared for: **Bismarck-Mandan Metropolitan Planning Organization**
Written By: **SRF Consulting Group, Inc.**



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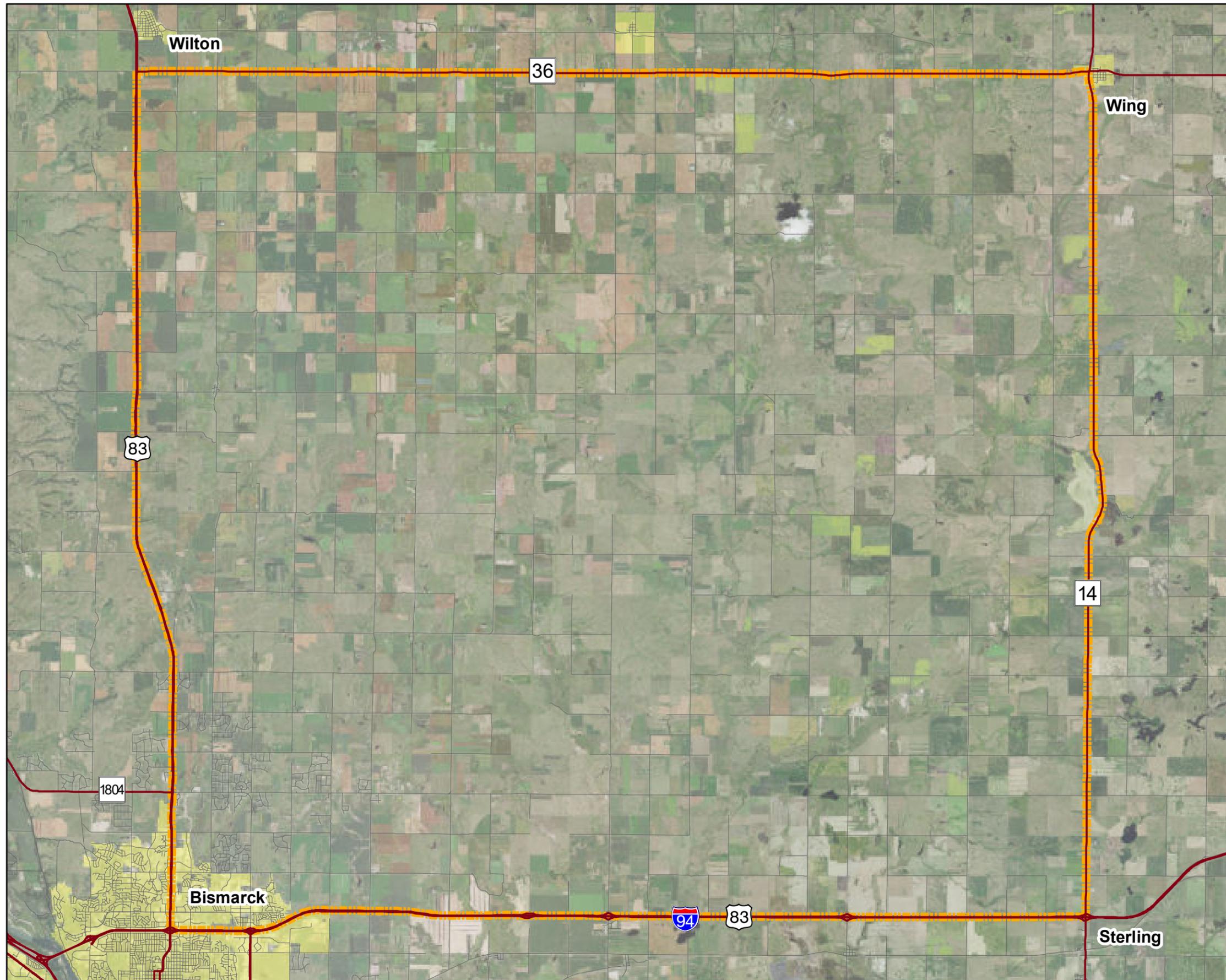
Introduction

Study Area

The US Highway 83 corridor provides an important north-south connection within Bismarck, Burleigh County, North Dakota, and beyond. Maintaining the short- and long-term viability of the US Highway 83 corridor is critical to the success of the region. Therefore, the Bismarck-Mandan Metropolitan Planning Organization (MPO) directed the US Highway 83 Alternative Study in cooperation with the City of Bismarck, Burleigh County, and the North Dakota Department of Transportation (NDDOT). The primary goals of the study are to:

- 1) Identify, evaluate, and develop viable highway alternatives along US Highway 83 north of Bismarck to best serve existing and future stakeholders within the region.
- 2) Analyze potential new routes for regional traffic and identify operational improvements for the current US Highway 83/State Street corridor.
- 3) Analyze anticipated outcomes of US Highway 83 realignment on Bismarck, Burleigh County, and NDDOT.
- 4) Determine if other infrastructure improvements near the State Street corridor could help alleviate congestion on current US Highway 83/State Street corridor.

The study area is generally bounded by US Highway 83 to the west, Interstate 94 (I-94) to the south, ND Highway 36 to the north, and ND Highway 14 to the east. The study area encompasses approximately 500-square miles, although areas outside of these general boundaries have also been considered for overall roadway connectivity purposes. The study area is illustrated in Figure 1.



Hwy 83

Alternatives Study

-  US Hwy 83 Study Alternative Boundary
-  State/Federal Highways
-  City and County Roadway System
-  City Boundary

Figure 1
Study Area

Bismarck-Mandan Metropolitan Planning Organization
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Major Tasks Overview

The key study outcome is identification of viable highway alternatives along US Highway 83 north of Bismarck to best serve existing and future stakeholders within the region, while also analyzing potential new routes for regional traffic. The Study evaluated existing and future transportation recommendations, including:

- Lane configurations
- Access management
- Safety
- Alternative corridor alignments
- Potential land use impacts, opportunities, and economic ramifications
- Intersection control needs along US 83 and connections points to I-94
- Freight needs/benefits

The US Highway 83 Corridor Study began in November 2017 as a cooperative effort between the Bismarck-Mandan MPO, the City of Bismarck, Burleigh County, and the NDDOT. SRF Consulting Group, Inc. (SRF) was retained to assist with technical analysis, public input, and final documentation of the corridor study along with its partners, Apex Engineering Group and AECOM.

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

- Assessment of existing and future conditions
- Analysis of existing and future traffic conditions
- Identification of existing and future issues along the existing US Highway 83 corridor and potential off-alignment routes for an alternative (including economic impacts, if any)
- Development of planning-level corridor improvement alternatives
- Evaluation of the planning-level alternatives, including cost estimates
- Identification of alternatives to carry forward for future consideration
- Development of an implementation plan
- Solicitation of public input throughout the study

Stakeholder Engagement Process

The Bismarck-Mandan MPO and study partners, along with the consultant team, recognized that public participation was critical for the success of the US Highway 83 Alternative Study. During the initial stages of the study, the consultant team coordinated with the study partners to outline a framework of engagement that would guide the study team's efforts and overall process. The purpose of this effort was to clearly articulate the goals, objectives, and strategies for public participation; to identify key stakeholders and define the roles of decision-making and advisory bodies; to identify available communication methods; and to set a schedule for conducting the public participation activities. This was an outline at the outset with the understanding that it would need to be modified and adjusted as the study progressed to react to input received and the flow of analysis outcomes.

One of the chief focuses of the study was conducting meaningful engagement by seeking input from a variety of members of the public. It was important that the study identify the needs of multiple stakeholders, including business owners and residents, as well as local and regional users that rely on Highway 83 for transportation.

Project Management Team (PMT)

A project management team (PMT) was utilized to ensure consistent coordination amongst the study partners (the Bismarck-Mandan MPO, the City of Bismarck, Burleigh County, and the NDDOT). Biweekly meetings were held with various members of the PMT on an as needed basis, with the Bismarck-Mandan MPO present on all calls. These meetings were mostly task status check-in meetings; the meetings expanded to broader discussion when needed regarding certain technical components.

Steering Review Committee (SRC)

The SRC was composed of technical staff from the Bismarck-Mandan MPO, the City of Bismarck, Burleigh County, the NDDOT, ATAC, and freight community representatives (Jobbers Warehouse and Magnum Transportation). The SRC met four (4) times during the study process to provide input and help guide the study process. Members of the SRC are listed in the acknowledgments section above.

Goals and Strategies

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

- Create an inclusive public participation process
- Understand the needs and concerns of stakeholders and the public regarding potential alternative alignments of US Highway 83 and the needs of current State Street
- Solicit input regarding issues and needs, plus preferences for the US Highway 83 corridor
- Present information clearly and concisely to reflect the study goals
- Demonstrate how public input influences alternative alignment decisions and system recommendations
- Ensure transparent decision-making
- Build consensus and acceptance for a set of potential solutions that address future system needs

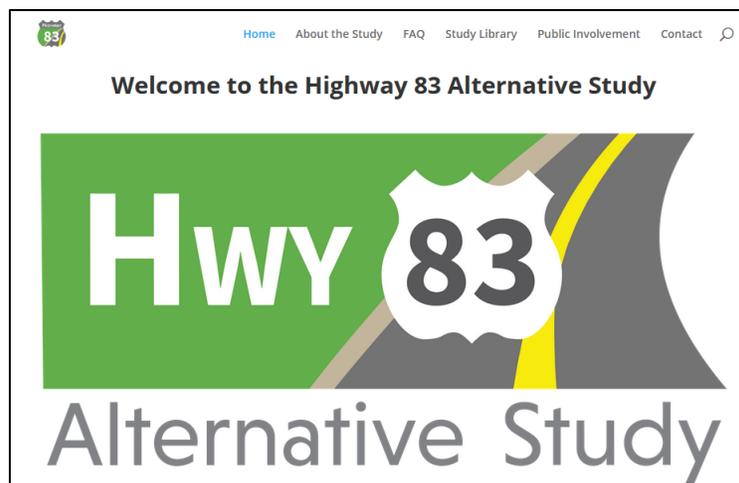
Outreach Tools

To meet the goals outlined above, the study team used a variety of methods to conduct inclusive outreach with the hope of building credibility, educating the community, and developing support for the US Highway 83 Alternative Study. A summary of the goal and purpose of each of the outreach activities is summarized below.

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

Study Website

A study-specific website (<http://www.hwy83altstudy.com/>) was established to inform the public about the background and purpose, study schedule, opportunities for public participation and to serve as a repository for study information materials. The website also provided an additional tool for agency staff, stakeholders, and the community to keep up with key milestones of the study as it progressed. Throughout the study, there were approximately 46,000 visits to the website.



Focused Listening Session Meetings

Targeted small group meetings were held during the study with interested business and freight stakeholders. These targeted meetings allowed the study team to have open dialogue with business representatives in proximity to the current US Highway 83 corridor and freight representatives that have an interest in the movement of trucks through the area. These meetings were an opportunity to have a more focused and intimate setting compared to an open house with the public present. This is not meant to be exclusive for the sake of misguiding the public, but rather an alternative to full public forum where dedicated time on business and freight issues are not typically discussed. It was important to have dialogue with these specific stakeholders to build relationships, gain insight, help identify preliminary issues and concerns, and foster active support for the study. Approximately 20 people participated in the listening session meetings, which were held with the following groups:

- Jobbers Warehouse
- Magnum Logistics
- CrossCountry Freight Solutions
- Cornerstone Bank
- Ace Hardware
- Northside Market
- American Bank Center
- Chamber and Bismarck-Mandan Development Association
- Aspen Group
- Various Commercial Land Owners

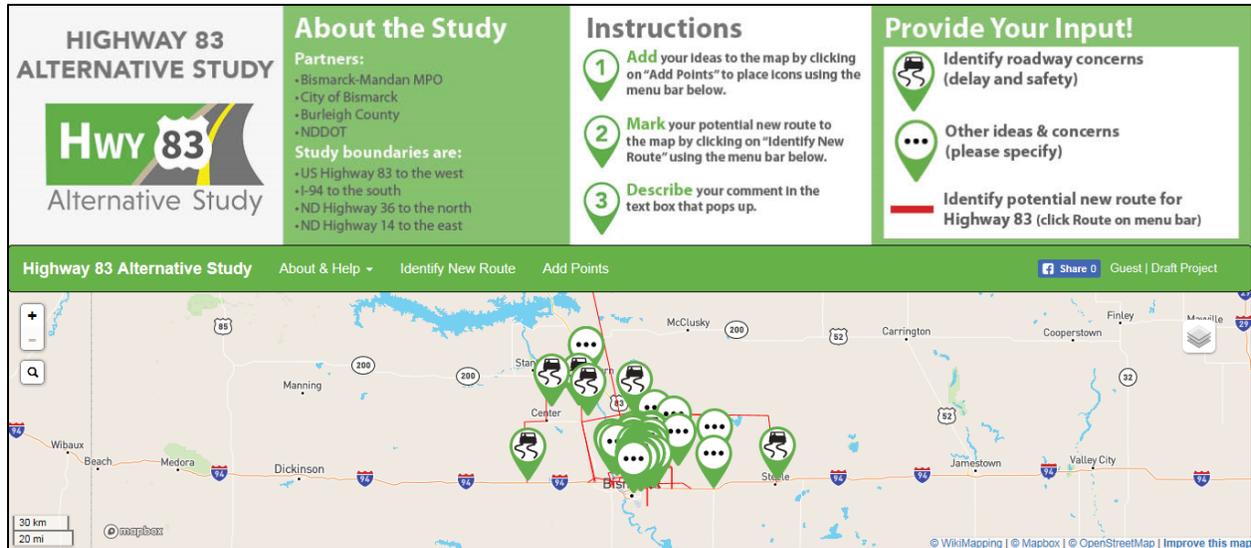
A summary from the listening session meetings is available in **Appendix A**.

Open Houses

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

The first public open house was held early in the study process. The purpose of the open house was to introduce the study to the community, identify issues and needs, gather information, and request feedback as part of the public participation process. Various display boards and maps were presented to help facilitate discussion among attendees. Results from the initial data collection and analysis were also shared and helped inform the understanding of existing conditions. Approximately 50-60 people attended the first public open house.

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



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

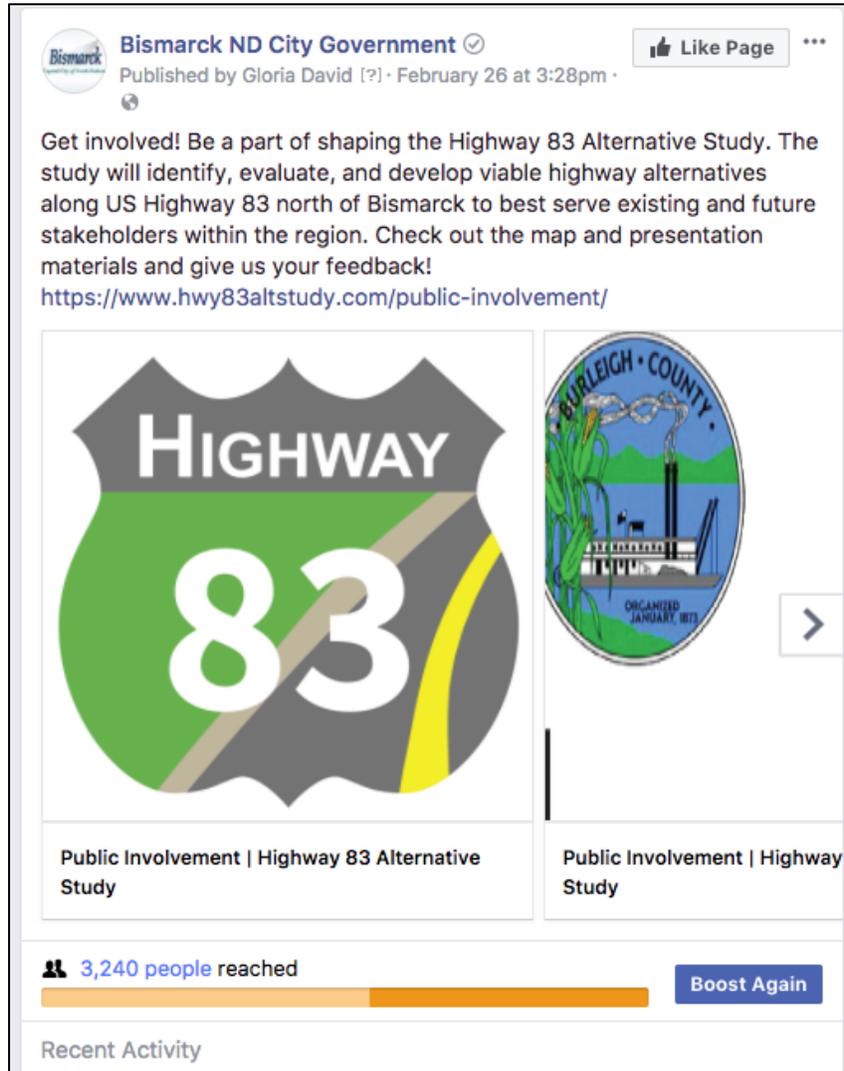
The second public open house was held to share future traffic conditions, economic development/market analysis, potential concept alignment alternatives off from current US Highway 83 alignment, preliminary alignment evaluation, and gather feedback from the public. A “dot voting” exercise was used to gauge the community’s response to the range of alignment alternatives presented and understand their preferences. Approximately 50 people attended the second public open house.

The third public open house was held toward the end of the study to present the draft corridor and intersection concept recommendations for each segment and gather feedback from the public prior to the study concluding. The study concept recommendations are further discussed in later sections in this document. Approximately 90-100 people attended the third public open house.

The fourth public open house was held to present the final study recommendations, gather feedback from the public, and outline next steps after completion. The study recommendations and outcomes are discussed in later sections in this document. Approximately 60 people attended the fourth, and final, public open house.

Social Media

Facebook social media was used to promote the study's open houses, WikiMap, and direct users to the study website for additional information. Communicating through this media provided an additional opportunity for stakeholders and the public to stay engaged with the study and provide their input as part of the process.



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

A google voice account was also used to provide the public another outlet for sharing information with the study team. The dedicated phone number ((701) 595-0526) could be called and a voice to text message left that was reviewed by the study team in lieu of receiving a written comment form.

Traditional Media Outreach

The Bismarck-Mandan MPO and the study team coordinated meeting notices, media advisories/press releases, and other relevant information with local media outlets. Press releases are included in **Appendix A**.

Table 1 – Stakeholder Engagement Timeline

Date	Meeting/Event
11/20/2017	Study Review Committee (SRC) Meeting #1
1/24/2018	Focused Listening Session Meetings #1
1/25/2018	Study Review Committee (SRC) Meeting #2
2/20/2018	Open House #1
5/3/2018	Study Review Committee (SRC) Meeting #3
6/27/2018	Focused Listening Session Meetings #2
6/28/2018	Study Review Committee (SRC) Meeting #4
7/17/2018	Open House #2
9/28/2018	NDDOT Management Meeting #1
11/7/2018	Project Management Team (PMT) Meeting
11/13/2018	Project Management Team (PMT) Meeting
1/4/2019	Project Management Team (PMT) Meeting
1/28/2019	Project Management Team (PMT) Meeting
2/6/2019	Project Management Team (PMT) Meeting
2/11/2019	Open House #3
3/15/2019	Project Management Team (PMT) Meeting
4/10/2019	NDDOT Management Meeting #2
5/22/2019	Open House #4

Existing and Future Conditions

The Existing and Future Conditions chapter is a comprehensive analysis of the existing and forecasted conditions along the US Highway 83 corridor within the study area and a planning-level review of current conditions within the 500-square mile area of influence. The assessment draws upon data collected within the study area, review of existing planning documents, public engagement meetings, and technical analysis of existing and future traffic data. The following is a discussion of this assessment.

Existing Conditions

Roadway Characteristics

US Highway 83 is currently classified as a principal arterial and is on the NDDOT Primary Regional System, which crosses the entire United States between Canada and Mexico. Within the study area, US Highway 83 generally travels north-south north of I-94 and runs concurrently with I-94 between State Street and ND Highway 14 (i.e. Sterling). At the I-94 and US Highway 83/ND Highway 14 interchange, US Highway 83 continues south of I-94. In general, US Highway 83 is a four-lane divided rural expressway north of Calgary Avenue, while there are additional travel lanes between Calgary Avenue and I-94 within the urban section. The posted speed limit along US Highway 83 ranges from 40 miles per hour (mph) near I-94 to 70 mph north of ND Highway 1804/71st Avenue.

Traffic Volumes

Historical average daily traffic volumes were provided by the NDDOT along US Highway 83. This information, illustrated in Figure 2, indicates that since the 1990's area daily traffic volumes have grown approximately 3.5 to 4.0 percent annually. This is good perspective to have as we project future traffic volumes and consider future use of the corridor.

Existing average daily traffic (ADT) volumes (total and heavy commercial vehicles only) from years 2016 and/or 2017 were also provided by the NDDOT. Given the relatively recent nature of these volumes (i.e. less than 2-years old), supplemental traffic data was not collected as part of the study process. A summary of the existing average and heavy commercial daily traffic volumes within the study area are shown in Figure 3; it indicates that average daily traffic volumes along US Highway 83 range from approximately 10,000 to 43,000 vehicles per day (vpd). Note that the traffic volumes provided in Figure 3 focus on the portion of the study area closest to Bismarck along both US Highway 83 and Centennial Road and their corresponding cross-streets.

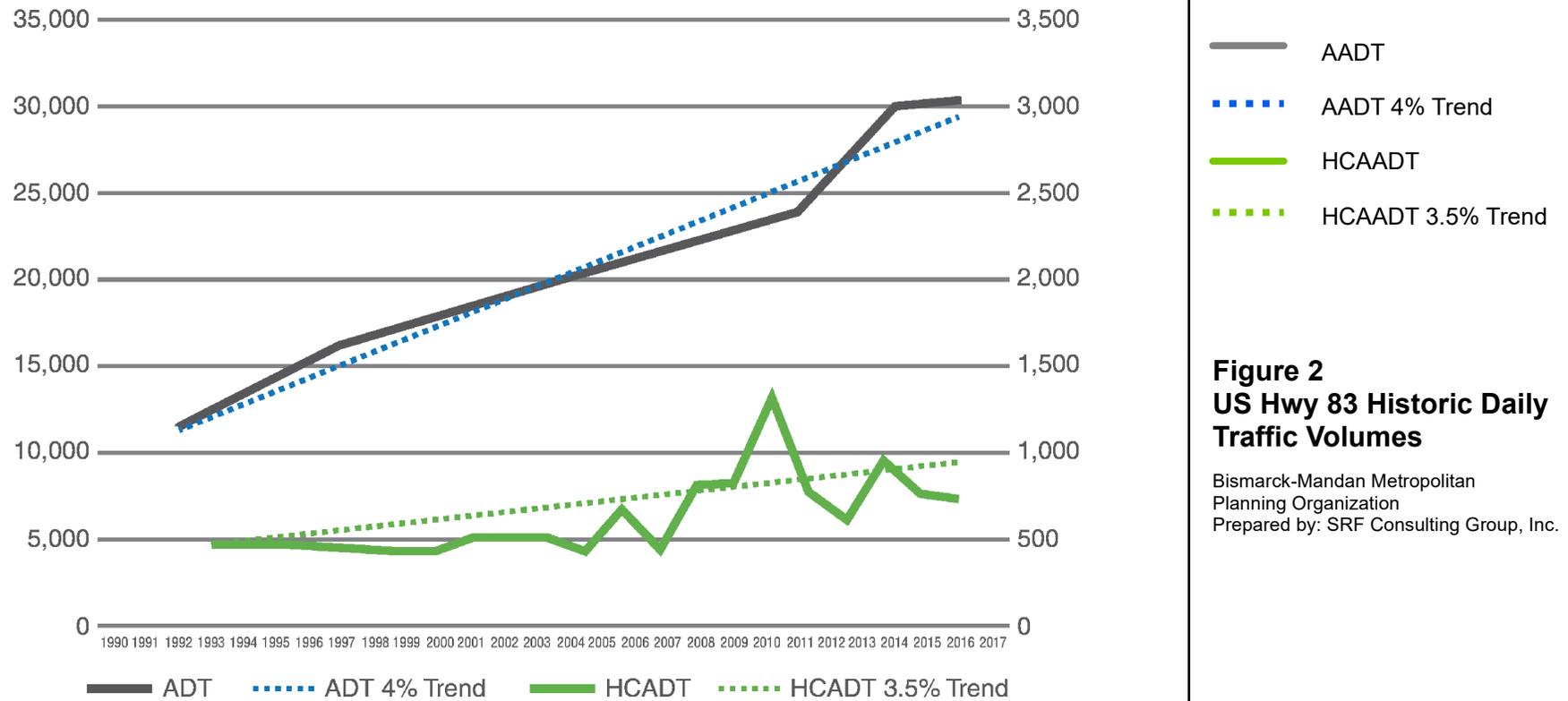


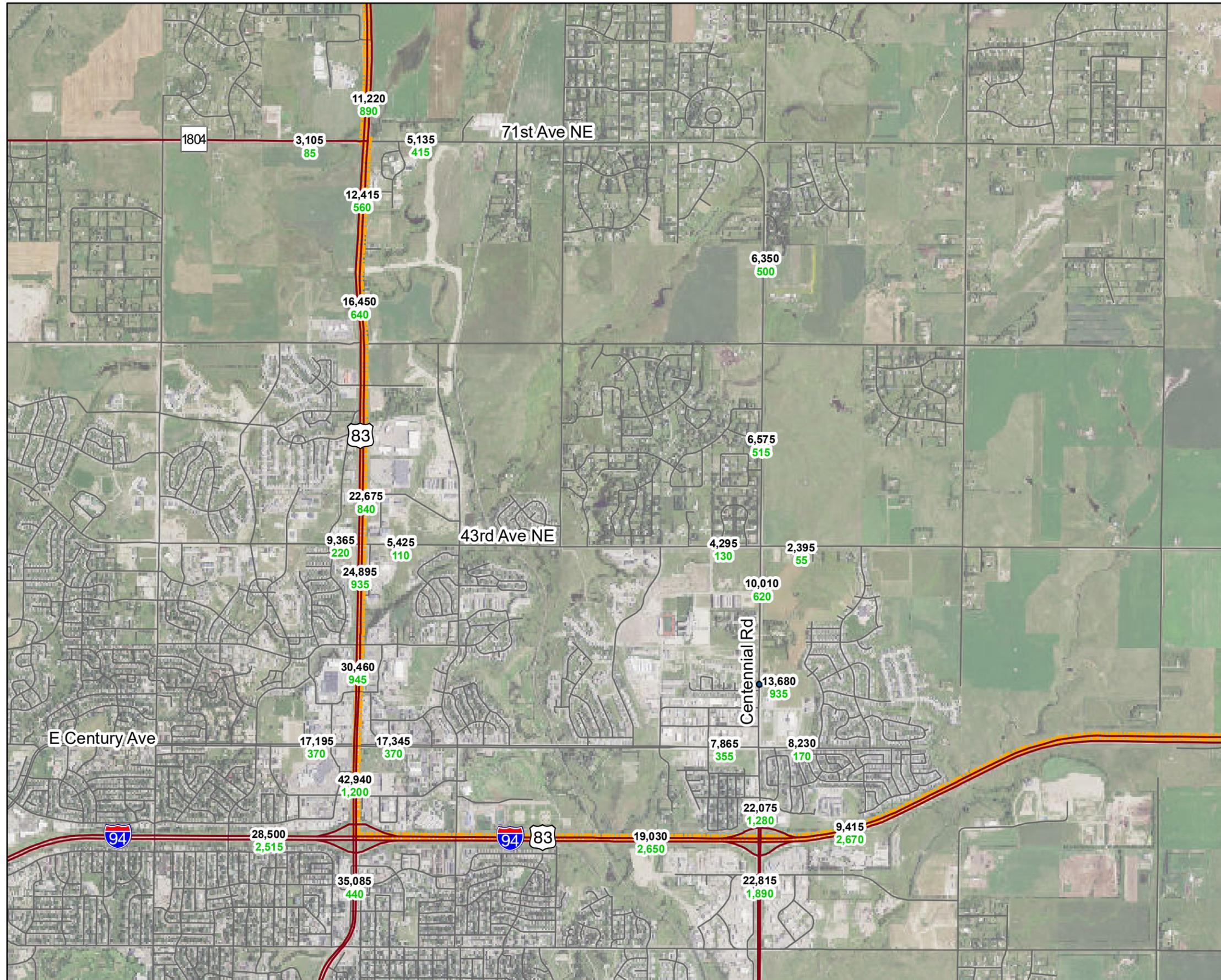
Figure 2
US Hwy 83 Historic Daily
Traffic Volumes

Bismarck-Mandan Metropolitan
 Planning Organization
 Prepared by: SRF Consulting Group, Inc.



Hwy 83

Alternative Study



- US Hwy 83 Alternative Study Boundary
- State/Federal Highways
- City and County Roadway System
- xxxx** 2016-2017 Average Daily Traffic Volume
- xxxxx** 2016-2017 Heavy Commercial Average Daily Traffic Volume

Figure 3
Existing Average Daily Traffic Volumes

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



In addition to the daily traffic volumes, intersection turning movement counts were provided by the NDDOT at several locations along US Highway 83, including 71st Avenue N, Skyline Boulevard, 43rd Avenue, Calgary Avenue, Weiss Avenue/Harvest Lane, Century Avenue, Interstate Avenue, the I-94 North and South Ramps, and Divide Avenue. Additional intersection data was also provided along Centennial Road to understand area travel patterns and magnitude that may be influenced by an alternative US Highway 83. Detailed intersection turning movement counts utilized as part of the study are included in the **Appendix B**.

Based on the traffic data collected, hourly traffic volumes were reviewed along the US Highway 83 corridor to understand general patterns. Based on this information, approximately two-thirds of the traffic is heading southbound on US Highway 83 during the a.m. peak hour. During the p.m. peak hour, approximately 60 percent of the traffic is heading northbound on US Highway 83. These travel patterns influence intersection capacity along the study corridor. See Figure 4 for a graphical representation.

Travel Patterns

Vehicular travel patterns were reviewed along US Highway 83, as well as Centennial Road to understand the number of motorists that could potentially utilize an alternative US Highway 83 alignment generally located to the north and east of Bismarck. The specific location of a potential alternative alignment is discussed later in this document. However, the following area travel patterns were identified using varying inputs from the study partners. The *Bismarck-Mandan Regional Travel Demand Model* was used to understand origins and destinations of trips traveling throughout the study area. This model incorporates zonal based origin/destination trip tables to assist in understanding trip generation and attraction for a given study area (Airsage cell phone data). Further, current intersection turning movement count data was reviewed to identify travel patterns that are occurring today; past studies in the area were reviewed as well to understand previous context. The following information provides an overview of the key area travel patterns, which are illustrated in Figure 5.

- 1) 33 percent of all vehicles (and 36 percent of heavy commercial vehicles) from US Highway 83 (north of 71st Avenue) are destined to areas south of I-94.
- 2) 16 percent of all vehicles (and 29 percent of heavy commercial vehicles) from US Highway 83 (north of 71st Avenue) are destined to I-94 (east or west).
- 3) 63 percent of all westbound I-94 vehicles (and 63 percent of heavy commercial vehicles) exiting at Centennial Road or US Highway 83 are destined to the south of I-94.
- 4) 5 percent of all westbound I-94 trips (and 15 percent of heavy commercial vehicles) exiting at Centennial Road or US Highway 83 are destined to US Highway 83 north of 71st Avenue.

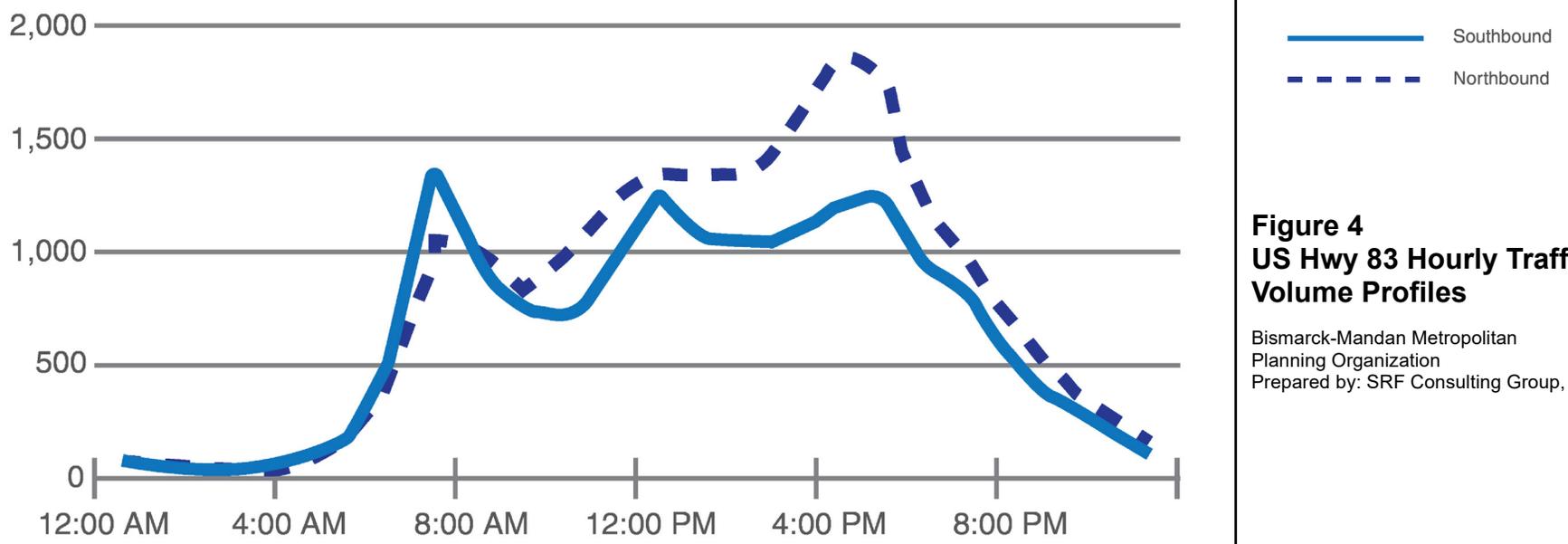
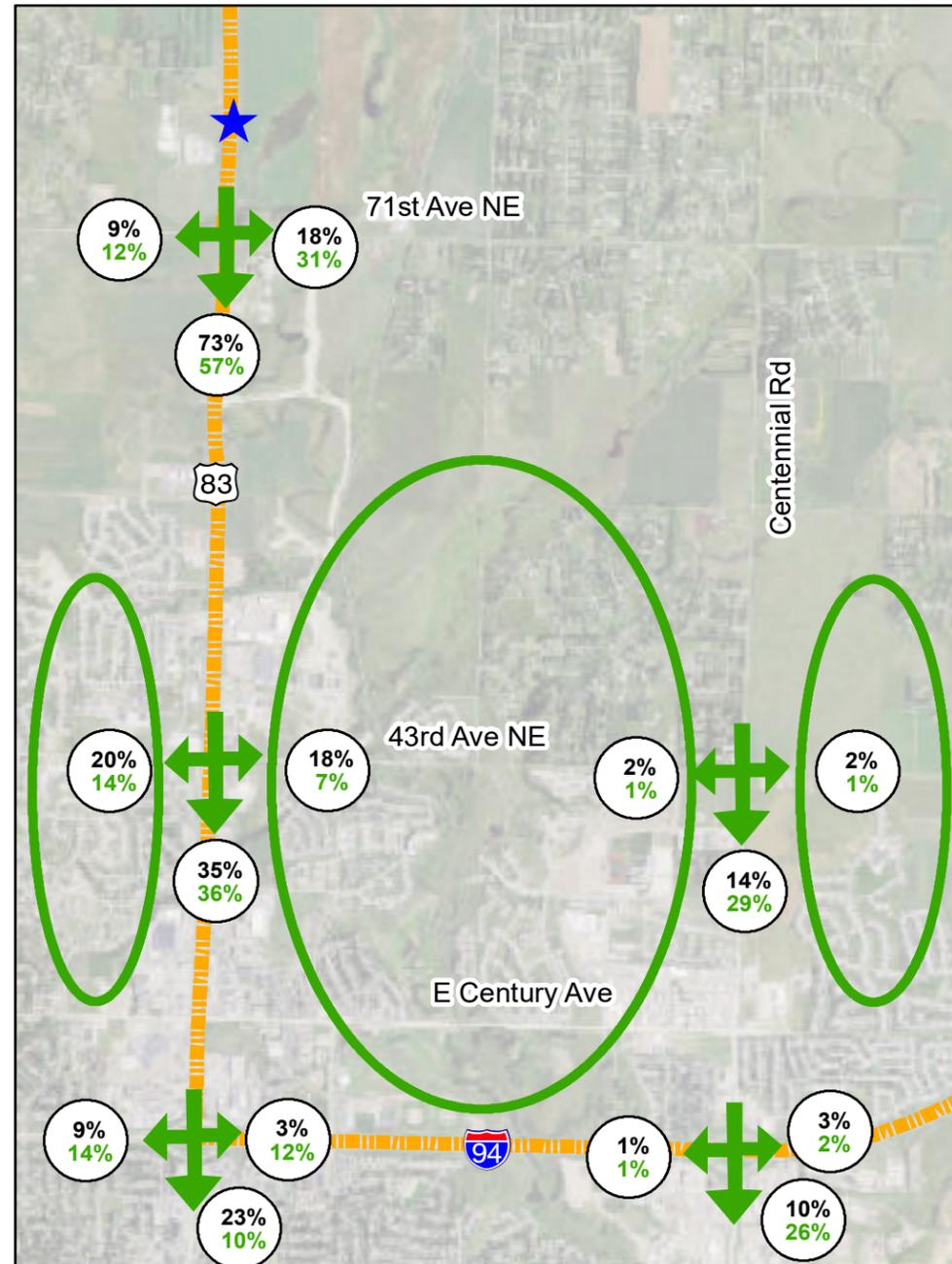
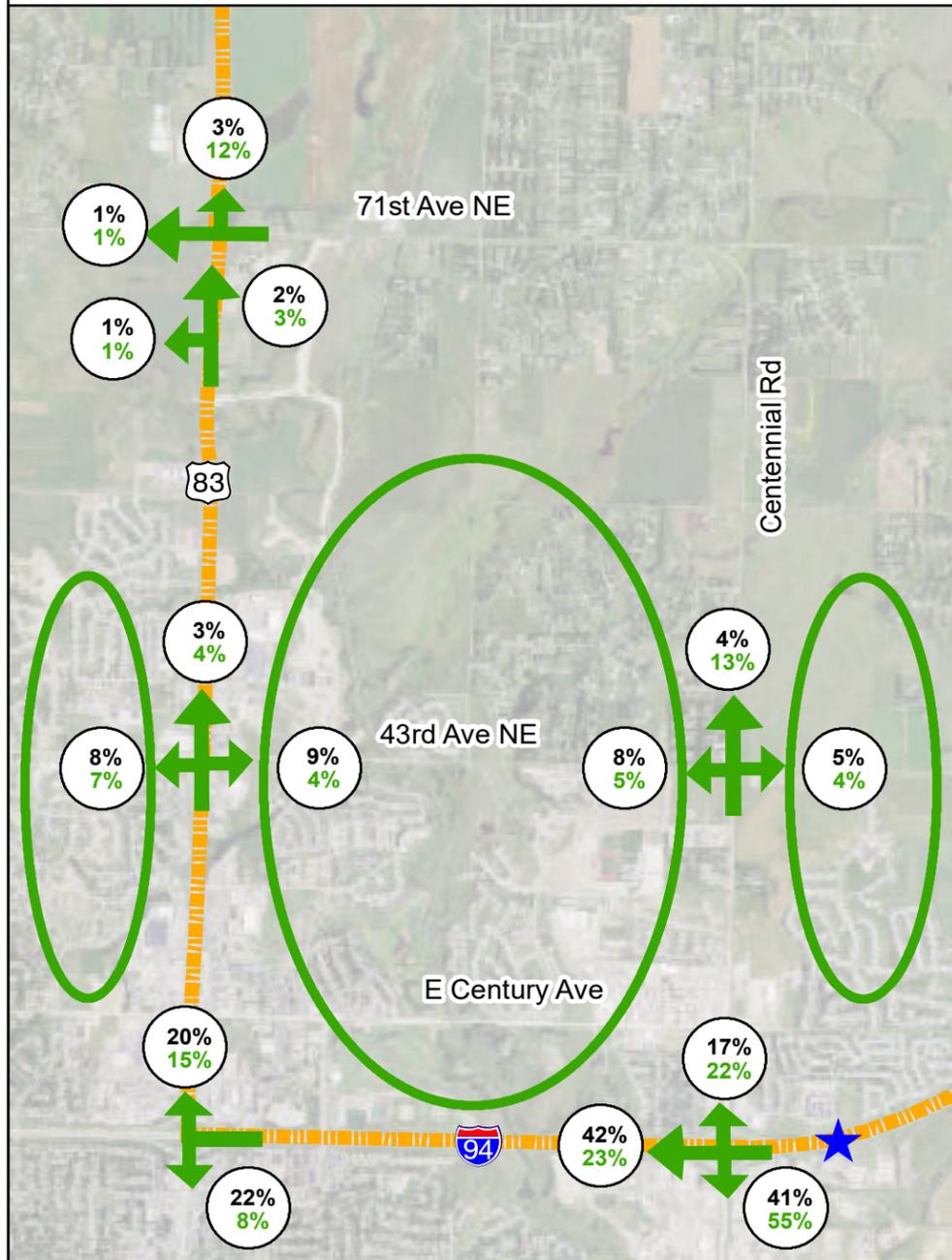


Figure 4
US Hwy 83 Hourly Traffic
Volume Profiles
Bismarck-Mandan Metropolitan
Planning Organization
Prepared by: SRF Consulting Group, Inc.



Westbound I-94 Vehicles
 (Referenced East of Centennial Rd on I-94;
 Exiting at Centennial Rd and US Hwy 83 only)

Southbound US Highway 83 Vehicles
 (Referenced North of 71st Ave NE on US Hwy 83)



- ▬ US Hwy 83 Alternative Study Boundary
- xx% All Vehicles
○ xx% Heavy Commercial Vehicles
- ★ Travel Pattern Reference Point

Figure 5
Travel Patterns

Bismarck-Mandan Metropolitan Planning Organization
 Prepared by: SRF Consulting Group, Inc.



Intersection Capacity Analysis

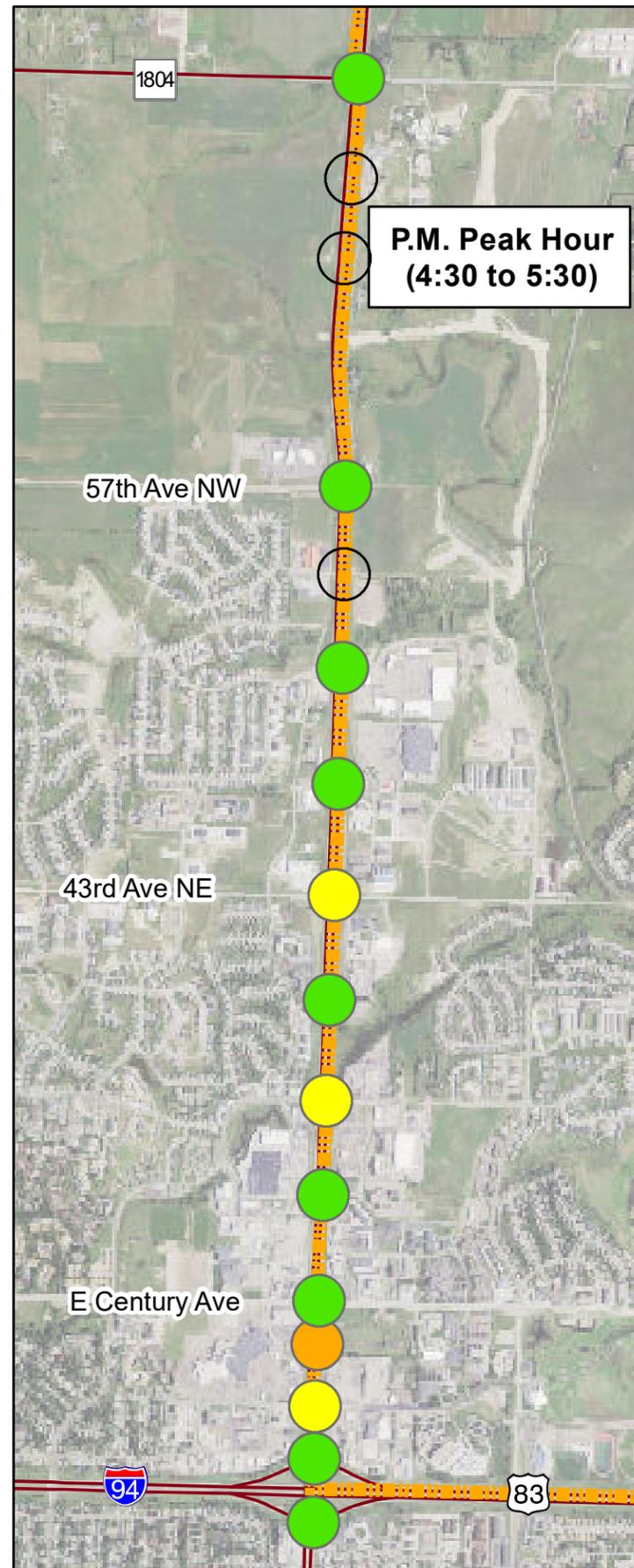
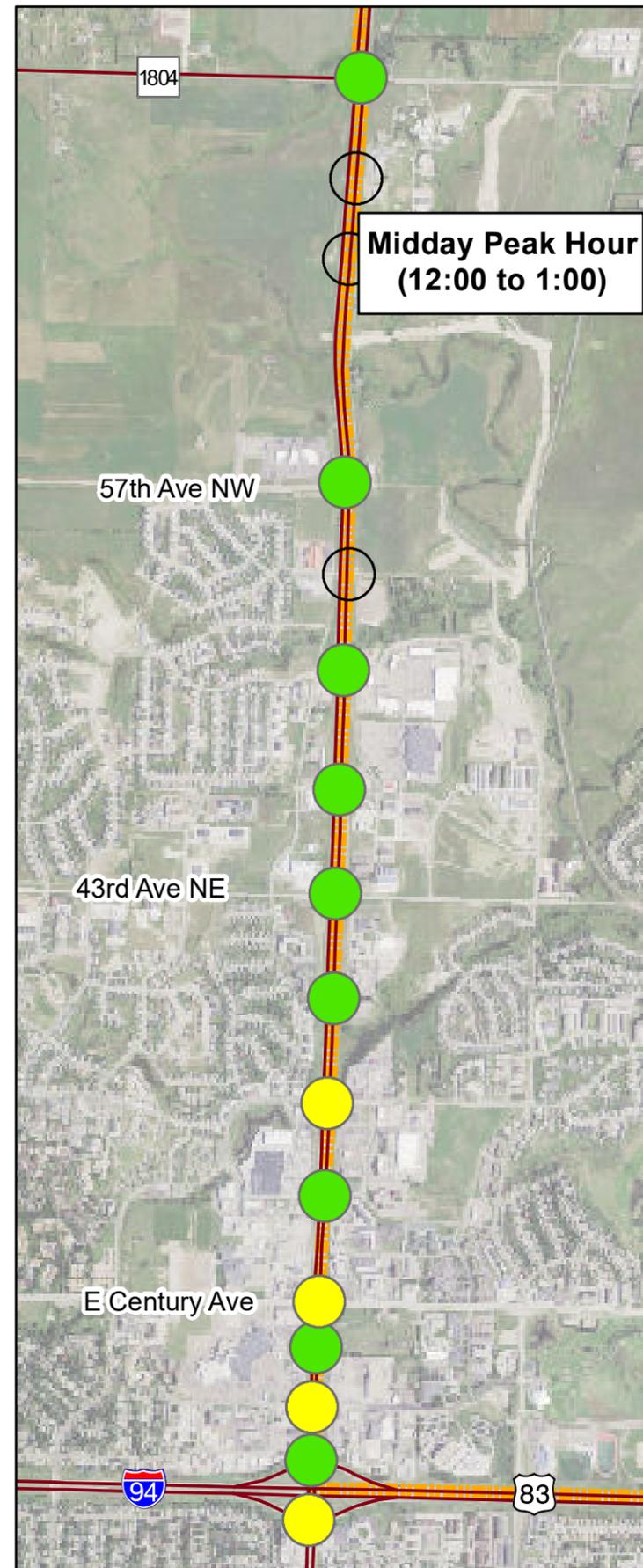
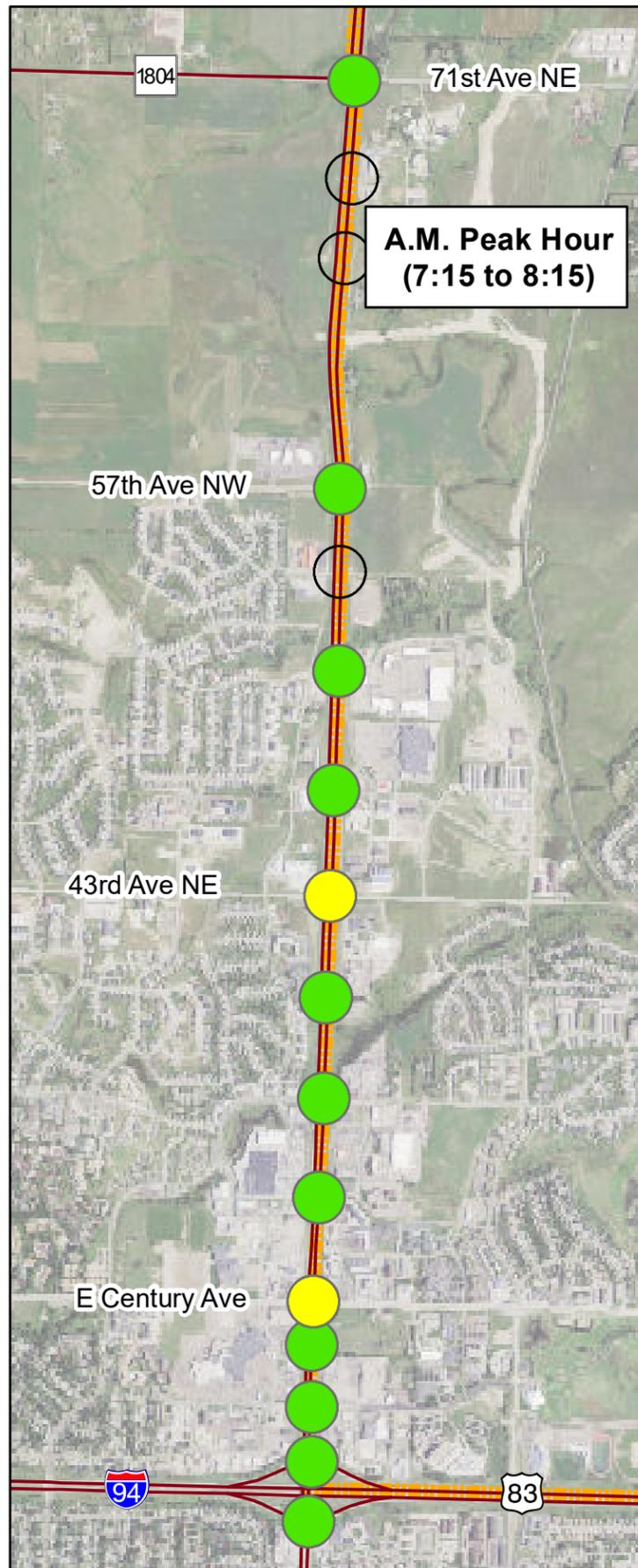
An intersection capacity analysis was conducted to quantify current operations along US Highway 83 within the study area. Given the free-flow nature of US Highway 83 (i.e. no stops) within much of the study area, the intersection capacity analysis focused on US Highway 83 between ND Highway 1804/71st Avenue and I-94. The intersection capacity analysis was conducted using a combination of Synchro/SimTraffic and VISSIM software and were calibrated to existing observations along the corridor. Existing signal timing provided by the City of Bismarck was incorporated into this analysis.

Intersection capacity is evaluated by defining a level of service (LOS) for each intersection. The LOS is defined by a letter grade (A through F), which is determined by the calculated delay and/or the density of the roadway. Intersections are quantified from LOS A through LOS F based on these factors, in accordance with the Highway Capacity Manual (HCM). Current NDDOT guidance indicates overall intersection LOS D operations or better are considered acceptable.

Results of the existing intersection capacity analysis indicates that each study intersection along US Highway 83 from ND Highway 1804/71st Avenue to I-94 operates at LOS D or better during the a.m. (7:15 to 8:15), midday (12:00 to 1:00), and p.m. (4:30 to 5:30) peak hours. Most of the study intersections operate at LOS C or better. However, there are individual movements or approaches that operate at LOS E or LOS F during certain peak hours within the study area. However, it is common for certain movements or approaches to operate worse than LOS D and this does not necessarily indicate a capacity issue. No significant queuing issues currently exist within the study area. A summary of the existing intersection capacity analysis is illustrated in Figure 6. Detailed intersection capacity analysis results are included in the **Appendix B**.

Travel Time

Corridor travel times along US Highway 83 from ND Highway 1804/71st Avenue to I-94 were reviewed to compare to future conditions. The travel times were identified using a combination of field observations, results from the intersection capacity analysis, and Google Analytics. In general, travel times along US Highway 83 can range from five (5) minutes to nearly nine (9) minutes depending on the time of day and direction of travel. A summary of the existing travel times during the a.m. and p.m. peak hours by direction, as well as off-peak free-flow conditions are shown Figure 7.

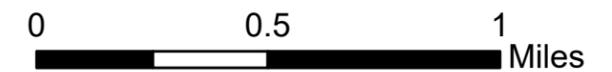


Hwy 83 Alternative Study

-  US Hwy 83 Alternative Study Boundary
-  State/Federal Highways
-  Level of Service - A or B
-  Level of Service - C
-  Level of Service - D
-  Level of Service - E or F
-  Level of Service Not Analyzed

**Figure 6
Intersection Operational Analysis**

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



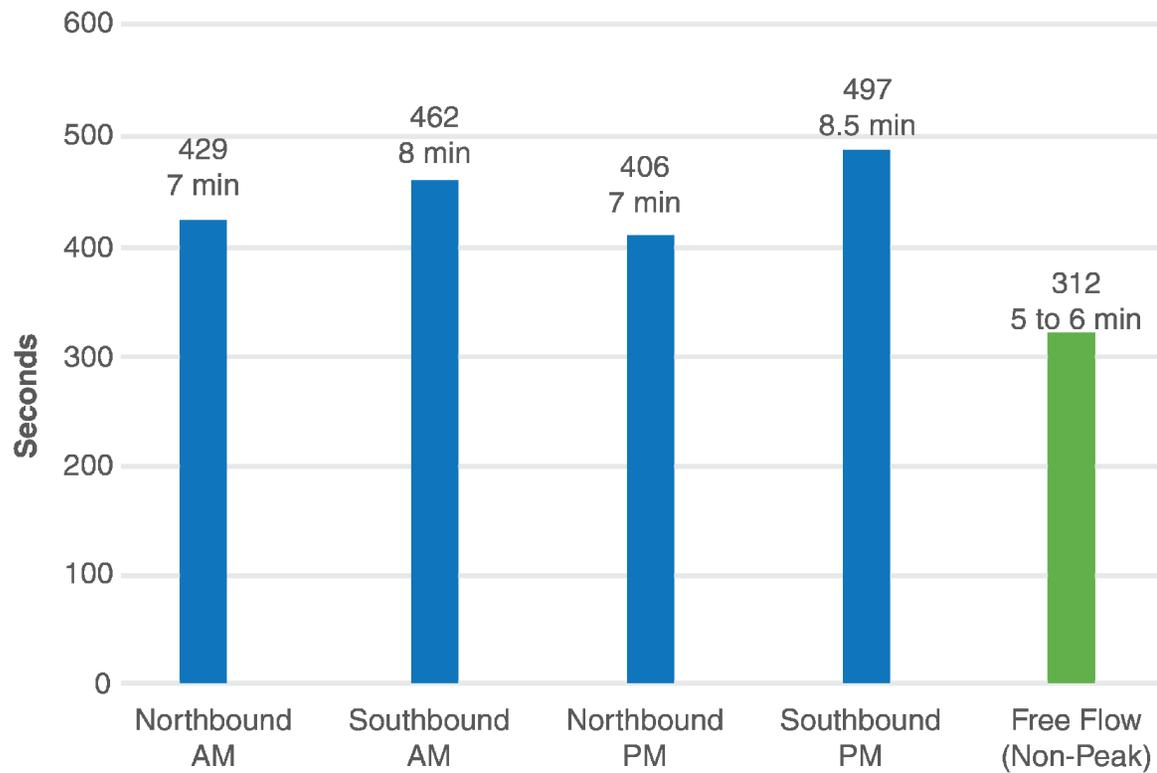


Figure 7
US Hwy 83
Average Travel Times

Bismarck-Mandan Metropolitan
Planning Organization
Prepared by: SRF Consulting Group, Inc.



Access Inventory

Access often has a direct correlation to corridor operations (i.e. mobility and safety). Therefore, existing access was inventoried along US Highway 83 from ND Highway 36 to I-94 to understand access density and conformance with current NDDOT guidance. In addition to the study intersections previously mentioned, there are locations that provide access to various land uses (i.e. public, commercial, farm, and residential).

The rural portion of US Highway 83 (from ND Highway 36 to 71st Avenue) is approximately 18-miles and has a total of 87 access locations. This equates to approximately five (5) access per mile. The urban portion of US Highway 83 (from 71st Avenue NE to I-94) is approximately 3.5 miles and has 16 access locations. This equates to approximately 4.6 access per mile, with greater access density near I-94.

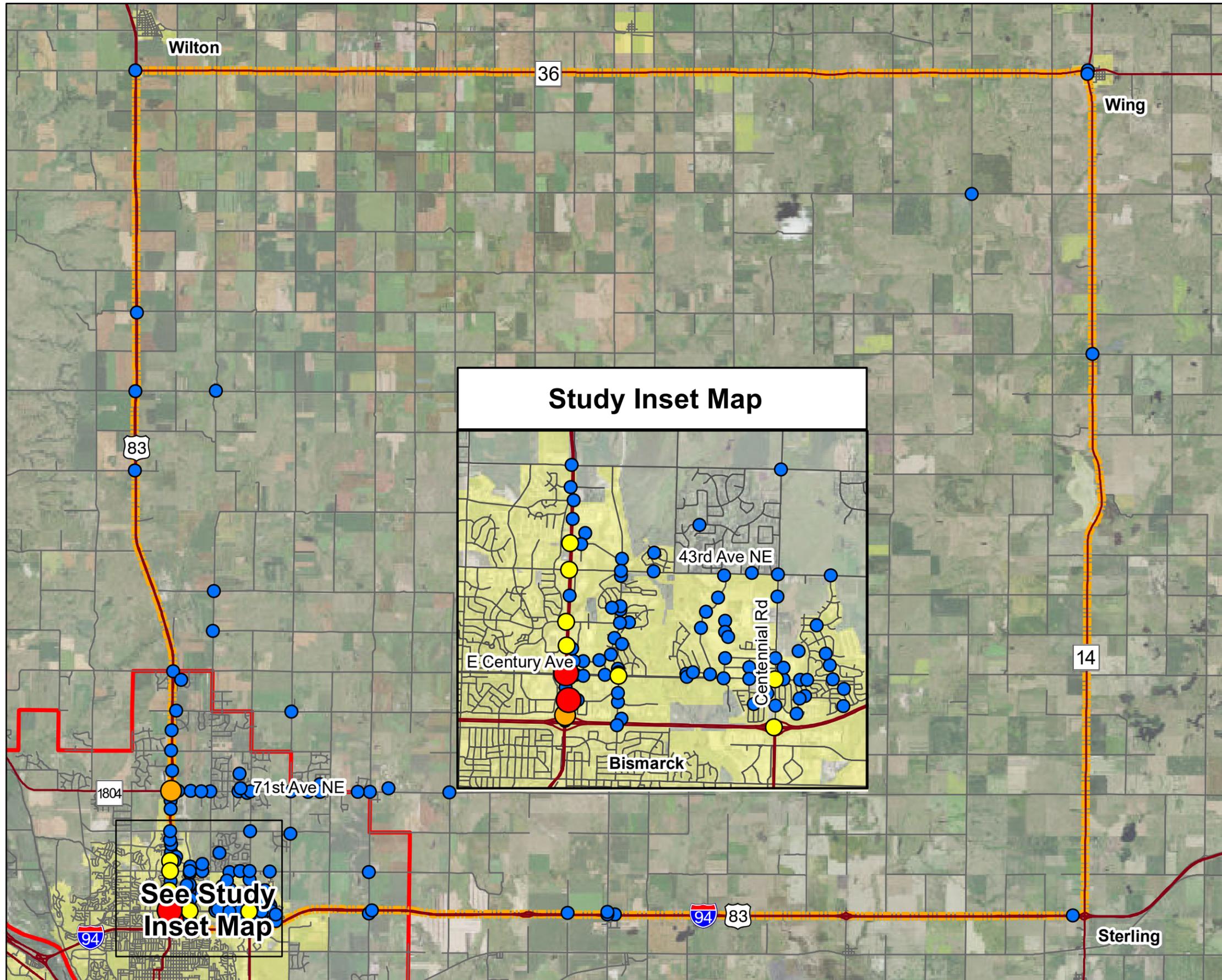
The NDDOT currently manages access along US Highway 83. Thus, current NDDOT access guidance states intersections on principal arterials should have one-quarter (1/4) mile spacing or five (5) access per mile per side including crossing arterial routes. Based on this criterion and the access inventory, the cross-streets along US Highway 83 in the rural and urban sections generally conform to the current guidance. The southern 1/2-mile section between Centennial Avenue and the north I-94 ramp terminal does not conform to the 1/4-mile spacing guidance.

Crash History

Crash data was provided by the NDDOT from January 1, 2012 to December 31, 2016 within the study boundaries (i.e. US Highway 83 to the west, I-94 to the south, ND Highway 36 to the north, and ND Highway 14 to the east). This data represents the most recent five-year period of data available at the time of the study initiation and included both crash frequency and severity. A summary of the crash frequency and severity are illustrated within Figure 8 and Figure 9, respectively.

Review of the crash data indicates intersections with higher crash frequency are in the southern portion of the US Highway 83 corridor (near I-94), where traffic volumes are higher. Many of reported crashes along US Highway 83 (i.e. approximately 55 percent) are rear-end type crashes, which are generally common at signalized intersections; other common crash types include angle (25 percent) and sideswipe (13 percent); with most being property damage only (75 percent) or possible injury (20 percent). During the five-year study period, there has been six (6) fatalities and 27 non-incapacitating injury crashes along US Highway 83.

Hwy 83 Alternative Study

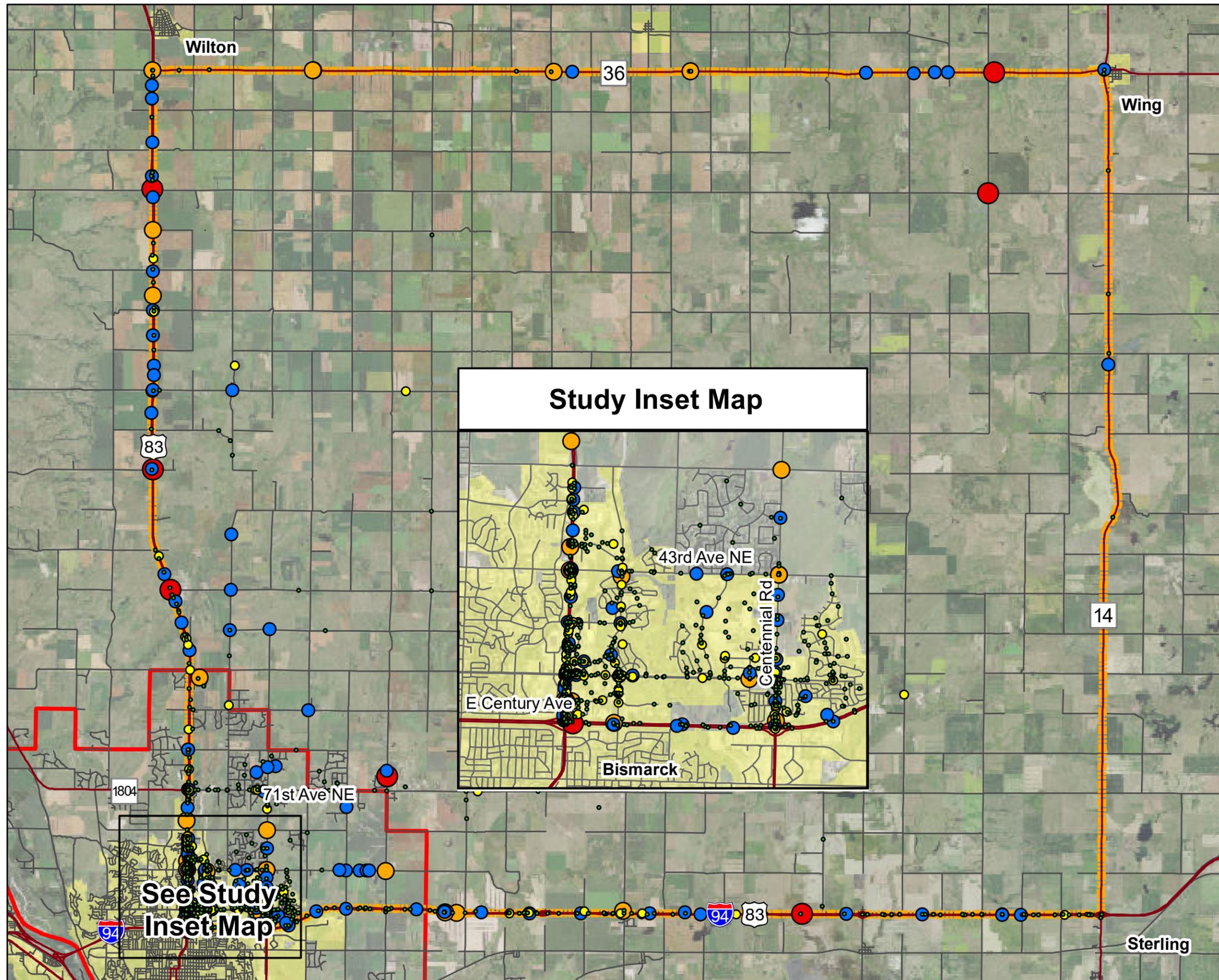


- US Hwy 83 Alternative Study Boundary
- State/Federal Highways
- City and County Roadway System
- City Boundary
- Negotiated ETA
- 0-10 Crash Frequency
- 11-25 Crash Frequency
- 26-50 Crash Frequency
- 50+ Crash Frequency

Figure 8
Study Area Crash Frequency (2012-2016)

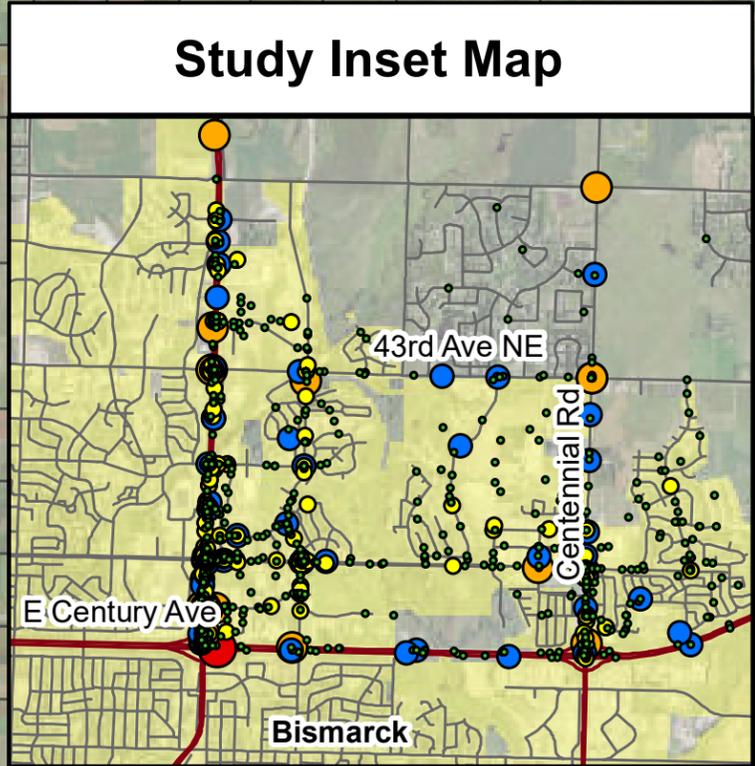
Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.





Hwy 83 Alternative Study

- ▬▬▬▬▬ US Hwy 83 Alternative Study Boundary
- ▬ State/Federal Highways
- ▬ City and County Roadway System
- City Boundary
- Negotiated ETA
- Fatal
- Incapacitating Injury
- Non-incapacitating injury
- Possible Injury
- Property Damage



**See Study
Inset Map**

**Figure 9
Study Area Crash Severity (2012-2016)**

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



Historical crash data along US Highway 83 dating back to 2004 was also reviewed to understand general crash frequency trends. The crash trends were also compared to average daily traffic volumes trends to understand potential correlation. Based on this review (see Figure 10), the amount of crashes is generally increasing proportionally to the area traffic volumes.

Crash data was also reviewed to better understand when during the day crashes occur along the US Highway 83 corridor. The time of the reported crashes was compared to the hourly traffic volume profiles along US Highway 83. This comparison (see Figure 11) indicates that the amount of crashes occurring throughout the day are generally related to traffic volume activity along the corridor. Most crashes occur between 12 p.m. and 6 p.m.

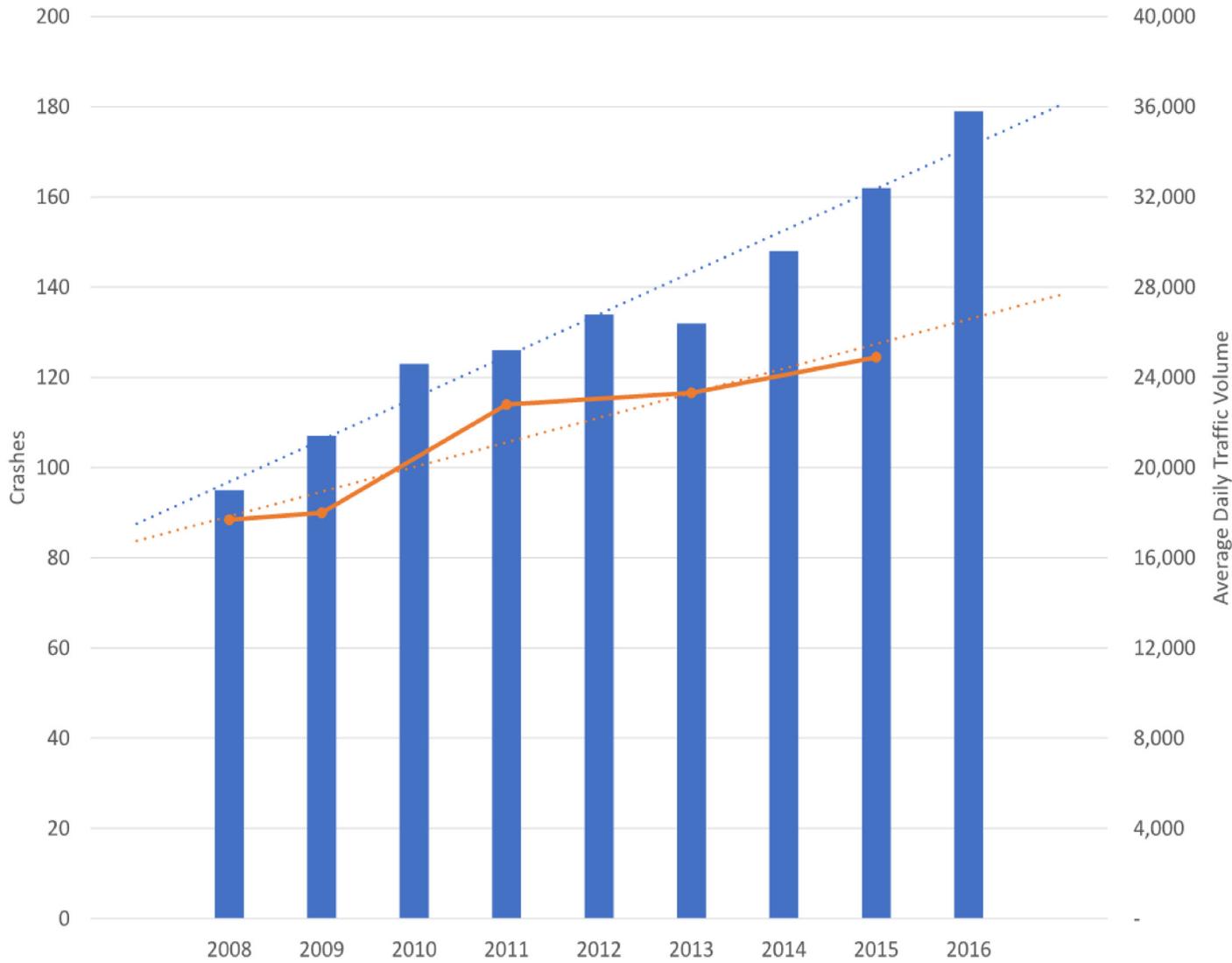


Figure 10
US Hwy 83 Crashes by Year

Bismarck-Mandan Metropolitan
Planning Organization
Prepared by: SRF Consulting Group, Inc.



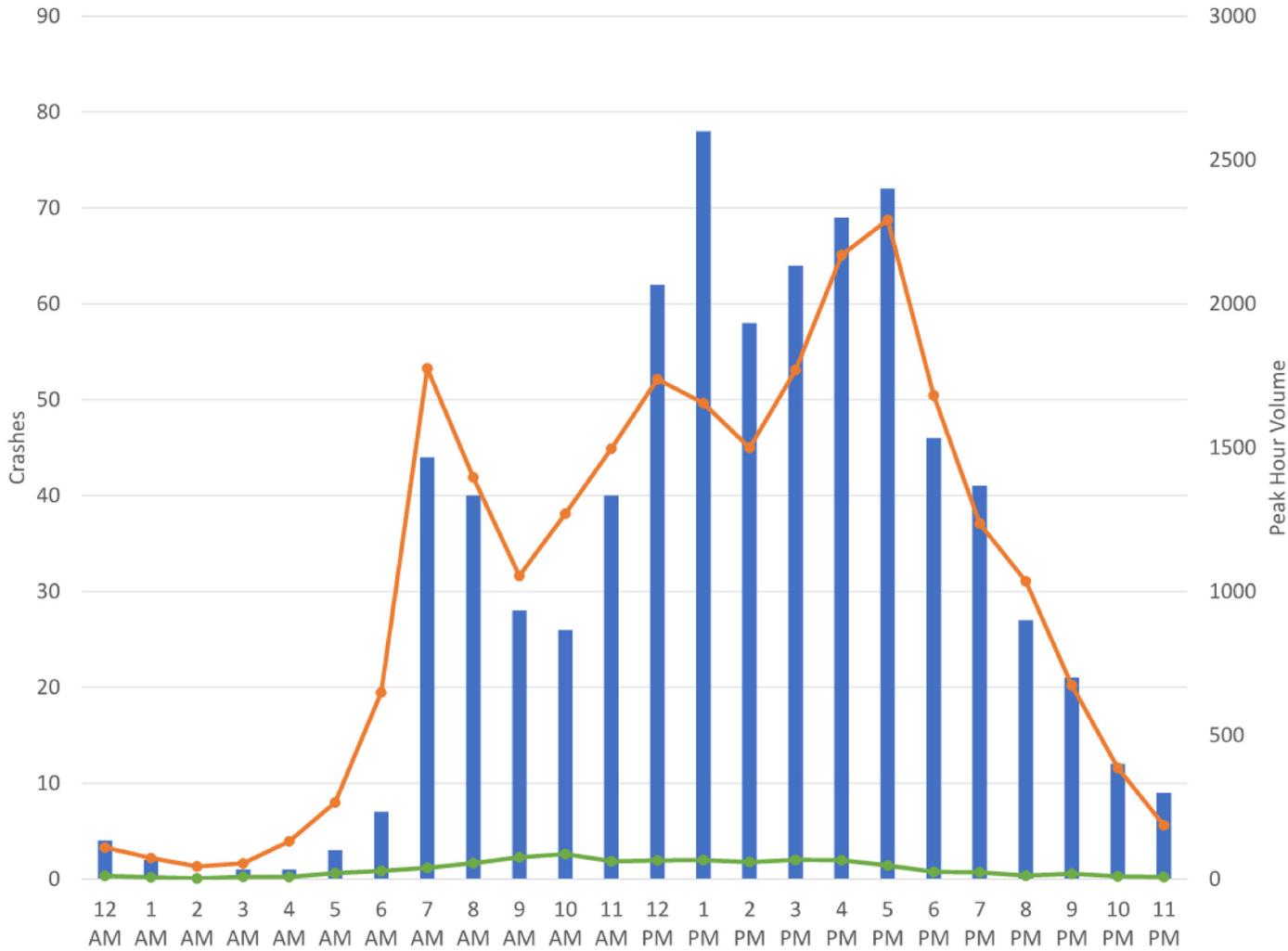


Figure 11
US Hwy 83 Crashes by Time

Bismarck-Mandan Metropolitan
Planning Organization
Prepared by: SRF Consulting Group, Inc.



Market Demographics

Current Bismarck-Mandan area demographics were reviewed by AECOM to understand the overall health of the Bismarck-Mandan market, as well as to help understand the economic impacts associated with an alternative US Highway 83. This section focuses on the current demographics within the area, while the economic impacts will be incorporated into the alternative evaluation. The demographic review included an assessment of area population and projections, population characteristics (age, education, and transportation), employment/labor markets, industries, housing, and comparable markets. Detailed results of the *Bismarck Demographic Analysis* are provided in the **Appendix C**. Key findings of the demographic analysis indicate the following:

- 1) Annualized population growth within the region continued to outpace the state of North Dakota and U.S. from 2000 to 2016. On average, Burleigh County added 2,000 residents per year from 2010 to 2016, over double that of the pre-recession period.
- 2) The North Dakota Department of Commerce projects population growth rates to face a steep decline from 2.6% (2010-2016) to 0.9% from 2020 to 2030. In comparison, the Bismarck MPO forecasts more moderate rates over the same periods at 2.1% and 1.7%, respectively.
- 3) Bismarck remains slightly older than the state median age at 37.1 (compared to 35.2). However, the MSA has become younger than the U.S. median (37.7) since 2000. Average household size in Burleigh County has declined from 2.42 in 2000 to 2.30 in 2016.
- 4) Burleigh County continues to densify as residents from the peripheral counties of Morton, Oliver and Sioux find employment opportunities within the city center. Burleigh County captured 4% of peripheral county population between 1990 and 2016.
- 5) The Bismarck MSA has 58,903 total housing units, 71% of which are in Burleigh County. Contrary to U.S. trends, Bismarck and the state are gaining more residents and housing units in the current period than pre-recession.
- 6) Bismarck regularly delivered above the average housing stock replacement rate while maintaining high demand from new residents. Morton County is adding housing faster than all other MSA counties at 3.3%.
- 7) Bismarck boasts a low unemployment rate of 2.9% in comparison to the U.S. at 4.9%. Sectors with the highest employment growth in Bismarck include retail trade and accommodations, wholesale trade, healthcare services and construction.
- 8) Petroleum wholesale has become the most highly concentrated employment sector within the Bismarck MSA relative to the U.S. with a location quotient of 4.39. Crude oil production in North Dakota has increased from 1.5% of total U.S. production in 2000 to 11.7% in 2016.

Preliminary Social, Economic, and Environmental Scan

An initial scan of critical social, economic, and environmental (SEE) resources was completed to identify major issues and potential impacts that may arise from planned corridor and intersection improvements identified as a part of the US Highway 83 Alternative Study. The scan area coincides with the study area generally bounded by US Highway 83 to the west, I-94 to the south, ND Highway 36 to the north, and ND Highway 14 to the east. This area is referred to throughout this section as the “environmental study area.”

The following social, environmental, and economic resources within the environmental study area are identified and discussed within this section. Note that if data was not available to identify the specific location of a resource, then the resource is discussed in general terms. While the presence of issues identified in this scan may require additional review and mitigation efforts in the future, they do not preclude the viability of potential alternative US Highway 83 alignments. Further, this review focused on issues that may require future coordination and permitting with local, state, and federal agencies.

- 1) Wetlands
- 2) Floodplains
- 3) Water Resources
- 4) Farmland
- 5) Public Lands
- 6) Threatened and Endangered Species
- 7) Visual and Noise
- 8) Social
- 9) Environmental Justice

In general, the US Highway 83 study area includes a variety of existing natural resources. The impacts to these resources should be considered throughout the alternative development process. The following sections identifies the existing resources throughout the environmental study area.

Wetlands

Wetlands are federally protected through Section 404 and 401 of the Clean Water Act, with the exception of those that are isolated hydrologically (1) on the landscape. Section 404 of the Clean Water Act requires a permit from the United States Army Corps of Engineers prior to the placement of any dredged or fill material into any waters of the United States, including wetlands. Additionally,

⁽¹⁾ The United States Army Corps of Engineers considers isolated wetlands to be those of any size that are not adjacent to or do not have a sufficient hydrologic connection to navigable waters.

the North Dakota State Water Commission (SWC) oversees various construction activities within, over, and/or under the state's water resources through the creation of several regulatory programs. These statutes were enacted to allow the state's water-related resources to be utilized prudently and minimize flooding.

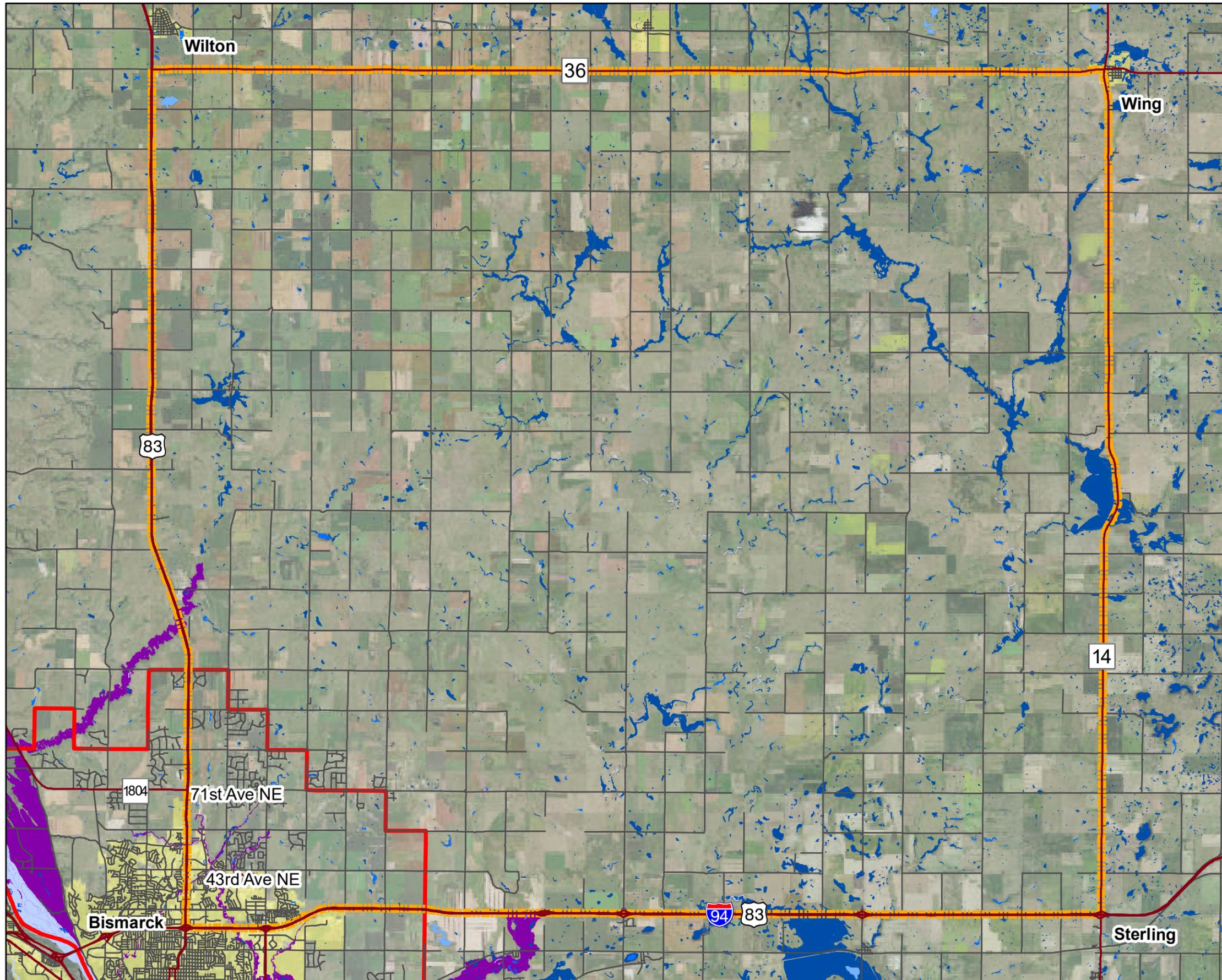
The United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) was used to explore existing wetlands within the environmental study area. The NWI provides the most comprehensive listing of existing wetlands in the nation, without the completion of a field wetland delineation. Therefore, the NWI can be used to provide a high-level understanding of the presence of wetlands, but a field delineation will be required to determine the actual limits of wetlands. The wetlands within the environmental study area are shown in Figure 12. Note that all boundaries are approximate and were not formally delineated.

Freshwater emergent wetlands are the dominating wetland type. These wetlands include marshes; swamps; bogs; ponds; rivers; and stream flood plains and banks. Freshwater ponds, lakes and riverine are also scattered throughout the environmental study area. It is anticipated that additional wetlands are present, beyond those identified by the NWI. Many of these wetlands are likely artificially created and should be defined by a wetland delineation to determine the size and type. The United States Army Corps of Engineers shall complete a jurisdictional determination following the delineation to determine the jurisdiction of each of the wetlands identified within the environmental study area during project development efforts.

Floodplain

Floodplains for the various waterbodies and watercourses in the study area are regulated under a few agencies. The 100-year and 500-year floodplain boundaries for many water bodies are established via the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) program. Municipalities and watershed management organizations use these maps to establish rules and/or ordinances that regulate the use of and fill encroachment into floodplains. Additionally, the North Dakota SWC oversees various construction activities within, over, and/or under the state's water resources through the creation of several regulatory programs. These statutes were enacted to allow the state's water-related resources to be utilized prudently and minimize flooding.

The Missouri River is located west of the environmental study area, along with many of its tributaries. The Federal Emergency Management Agency (FEMA) has mapped the existing floodplains for rivers and streams within portions of the environmental study area near Bismarck. Flood Insurance Rate Maps were updated in the Bismarck area in 2014 following flood events. Portions of the environmental study area are defined as special flood hazard areas subject to inundation by the one (1) percent annual chance of flood, otherwise known as the 100-year flood area, as shown in Figure 12. No base flood elevations have been determined for these areas. FEMA has not completed mapping for the entire environmental study area, therefore, the flooding potential of other rivers and streams within the environmental study area should be considered.

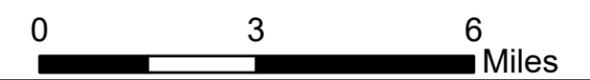


Hwy 83 Alternative Study

-  US Hwy 83 Alternative Study Boundary
-  State/Federal Highways
-  City and County Roadway System
-  City Boundary
-  Negotiated ETA
-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond
-  Lake
-  Riverine
-  Other
-  100 Year Floodplain

**Figure 12
Wetlands, Floodplains, and Water
Resources**

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



Watercourses and Waterbodies

As authorized by Section 402 of the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The NPDES permitting process involves calculating how much new impervious surface a project will create to calculate stormwater requirements.

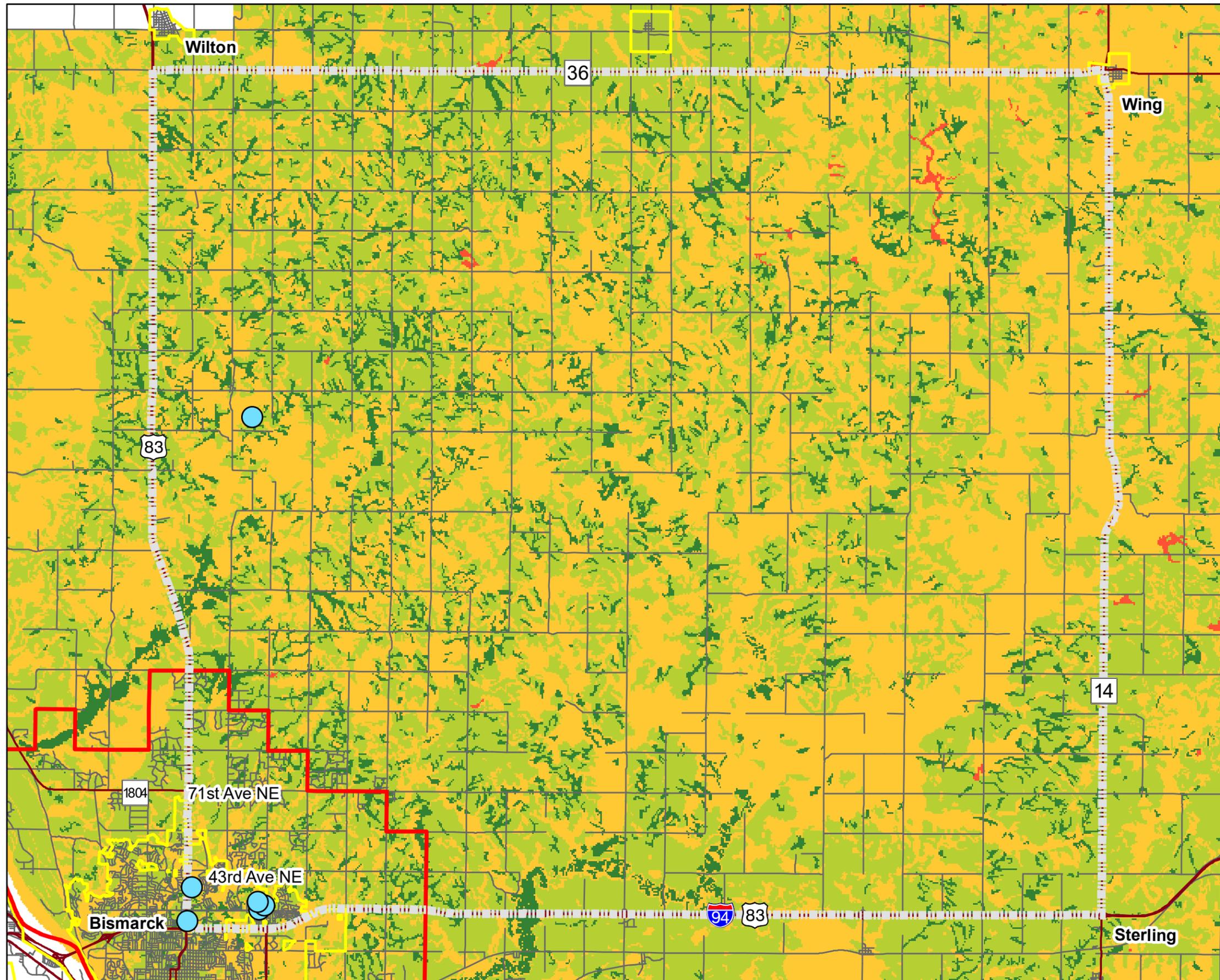
A Wellhead Protection Area (WHPA) is the recharge area to a public well and is the area managed by the public water supplier, as identified in the wellhead protection plan. Wellhead protection is a way to prevent drinking water from becoming polluted by managing potential sources of contamination in the area that supplies water to a public well. WHPAs typically have additional regulatory requirements to protect wells. Wellhead protection planning is administered by the North Dakota Department of Health.

Farmland

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact that federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. Under the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland (forest land, pastureland, cropland, are allowed, but not water or urban built-up land).

Agricultural production is an important employment sector for the central region of North Dakota. US Highway 83 and I-94 provide important transportation facilities for the movement of goods and equipment for agricultural uses. According to the USDA Natural Resources Conservation Service (NRCS), area of prime farmland and prime farmland if drained are located throughout the study area. Potential impacts to prime farmland areas should be considered during the review of potential alignments. Areas of prime farmland, unique farmland, and farmland of statewide or local importance were mapped using soil data from the Natural Resources Conservation Service (NRCS). As shown in Figure 13, farmland soils are abundant and mainly located outside of the Bismarck City limits.

At the federal level, the U.S. Environmental Protection Agency (EPA) manages Superfund cleanup sites regulated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In North Dakota, hazardous materials are tracked and regulated by the North Dakota Department of Health (NDDOH). Properties with potential to contain contaminated materials should be identified in the early stages of a project to avoid impacts caused by disturbing hazardous soils. The property owner or operator is liable for cleanup for contaminated areas, so it is critical to identify these areas before agency land acquisition to prevent unexpected costs and delays.



Hwy 83 Alternative Study

-  LUST (Leaking Underground Storage Tanks)
-  US Hwy 83 Alternative Study Boundary
-  State/Federal Highways
-  City and County Roadway System
-  Negotiated ETA
-  City Boundary
-  All Areas are Prime Farmland
-  Farmland of Statewide Importance
-  Not Prime Farmland
-  Prime Farmland if Drained

Figure 13
Farmland, Leaking Underground Storage Tanks

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



A list of leaking underground storage tanks (LUSTs) in Burleigh County was obtained from the NDDOH. LUST sites have the potential for petroleum or chemical contaminants to have been released into the soil and leach into the groundwater. LUST sites where site investigation and/or cleanup is ongoing were mapped in Figure 13. Based on this list, there are eight (8) potentially contaminated sites located within the environmental study area. Note that this list is not all inclusive and other sites that contain soil or groundwater contamination may exist that were not identified in the preliminary analysis. A more detailed analysis will be necessary to determine if construction of an alternative US Highway 83 would encounter contaminated soils or groundwater. A Phase I Environmental Site Assessment (ESA) could be completed for this project as part of a future environmental document, as determined to be necessary. The Phase I ESA will further assess impacts to potentially contaminated sites located within the construction limits.

Parks and Trails

The Section 4(f) legislation, as established under the Department of Transportation Act of 1966 (40 USC 303, 23 USC 138), provides protection for publicly owned parks, recreation areas, historic sites⁽²⁾, wildlife, and/or waterfowl refuges from conversion to transportation use. Conversion to transportation uses is not allowed unless all prudent and feasible alternatives to the Section 4(f) use and all possible planning activities to minimize harm have been considered.

Section 6(f) protects outdoor recreation properties planned, developed, or improved with funds from the Land and Water Conservation Fund (LWCF). These properties cannot be converted to other uses unless replacement land of equal fair market value and equivalent usefulness is provided.

Cultural Resources

The Section 4(f) legislation, as established under the Department of Transportation Act of 1966 (40 USC 303, 23 USC 138), provides protection for historic sites (publicly or privately owned) from conversion to transportation use. Conversion to transportation use is not allowed unless all prudent and feasible alternatives to the Section 4(f) use and all possible planning activities to minimize harm have been considered.

⁽²⁾ Section 4(f) legislation provides protection for historic sites (publicly or privately owned) from conversion to transportation use. Historic sites are subject to consideration under both Section 106 and Section 4(f) legislation; However, these resources are only discussed under the previous “Cultural Resources” section.

Projects that apply to receive federal funds must comply with Section 106 of the National Historic Preservation Act of 1966 (Section 106) and with other applicable federal mandates. To comply with Section 106, potential impacts to historic properties (those listed on or eligible for listing on the National Register of Historic Places (NRHP) must be considered during project planning and design. Section 106 requires federal agencies to consider the effects of their actions on historic properties before undertaking a project.

There are two historic places that fall within the environmental study area. One is the Menoken Indian Village Site and the other is the Depression Era Work Relief Construction Features at the Menoken Indian Village Site. These two locations are illustrated in Figure 14.

Public Lands

Public lands are present throughout the study area, owned and managed by the State of North Dakota and Burleigh County (see Figure 14). The North Dakota Game and Fish Department manages the Rice Lake Wildlife Management Area (WMA), located to the west of ND Highway 14. This WMA is 975 acres in size and is open to hunting, fishing and trapping. Burleigh County owns two other conservation areas within the environmental study area, totaling over 1,100 acres. Three Waterfowl Production Areas are located near or adjacent to the environmental study area. Note there is a section of public land located approximately 1,000 feet south of I-94.

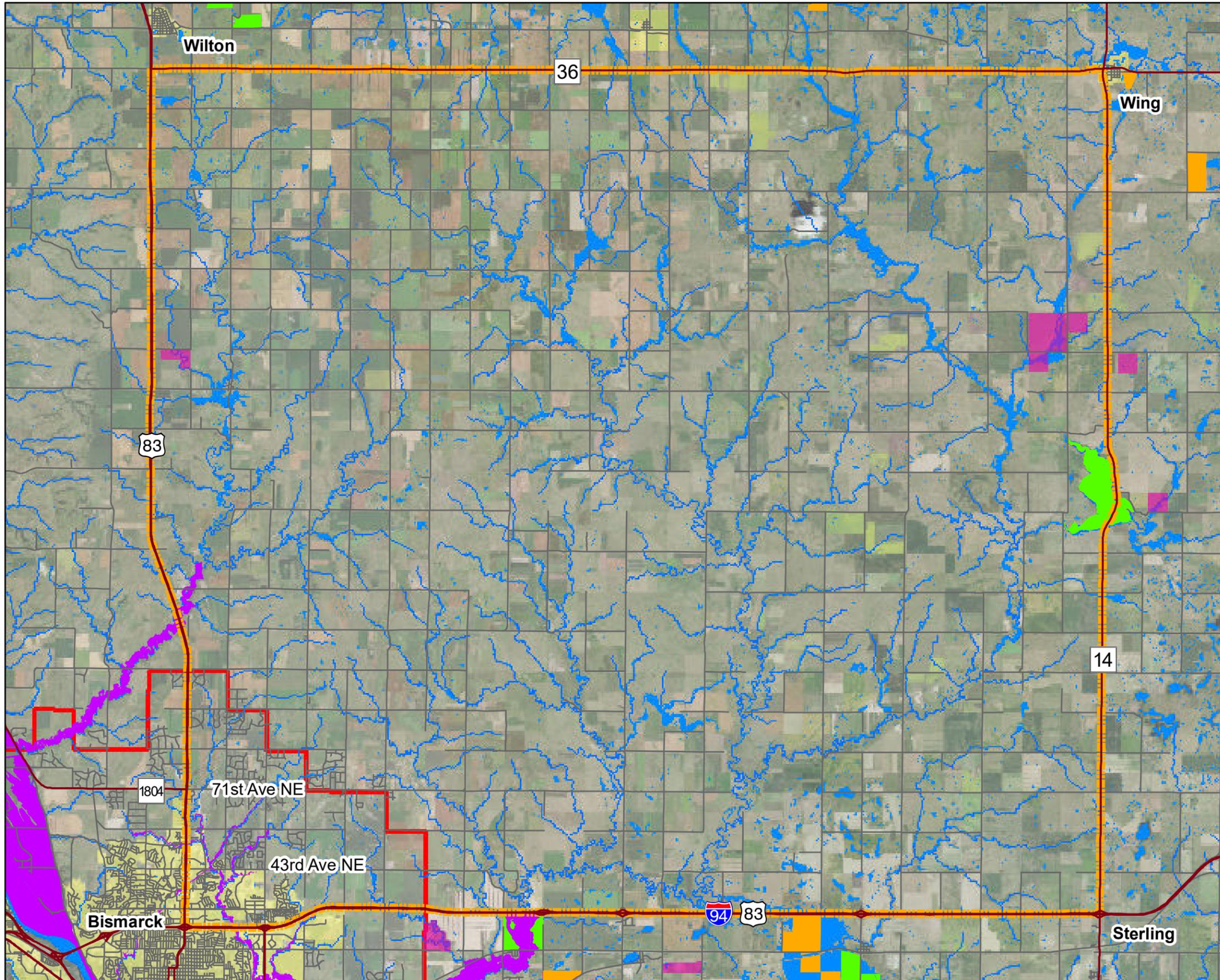
Threatened and Endangered Species

A review of the presence of Federally listed threatened and endangered species was conducted for the environmental study area. A total of eight species and one critical habitat were identified.

- 1) Interior Least Tern – Endangered
- 2) Whopping Crane – Endangered
- 3) Pallid Sturgeon – Endangered
- 4) Gray Wolf – Endangered
- 5) Piping Plover – Threatened
- 6) Rufa Red Knot – Threatened
- 7) Northern Long Eared Bat – Threatened
- 8) Sprague’s Pipit – Candidate

Visual and Noise

Impacts to the visual and audio quality of the corridor and the surrounding areas should be considered as alternatives are developed within the environmental study area. Particularly, any improvements that include a new roadway alignment or vertical alignment shift will need to be reviewed for visual and noise impacts to surrounding land uses during design development.



Hwy 83 Alternative Study

-  US Hwy 83 Alternative Study Boundary
-  State/Federal Highways
-  City and County Roadway System
-  City Boundary
-  Negotiated ETA
-  Historic Sites
-  Waterfowl Production Areas
-  Wildlife Management Areas
-  Public
-  Wetlands and Streams

**Figure 14
Public Lands**

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



Social

With large portions of the environmental study area currently in use for agricultural production, a review of existing large tract property owners was completed. According to the Burleigh County Tax Parcels, as of March 15, 2018, 57 property owners (individuals, groups, and businesses) each owned at least 1,000 acres within the study area. The State of North Dakota owns the most land, with over 9,000 acres in ownership. The second largest owner is a Limited Liability Partnership, which owns 55 parcels totaling nearly 8,500 acres. The presence of large tract property owners will need to be considered during the alignment analysis. Intersecting properties can provide challenges for the movement of livestock, equipment, and goods for agricultural uses.

Environmental Justice

The Bismarck-Mandan MPO Title VI and Non-Discrimination/APA Plan identifies socio-economic characteristics of the area related to environmental justice populations. A review of the findings of the plan within the environmental study area finds a combination of populations (see Figure 15). Areas of 25 percent or larger minority and low-income groups are scattered throughout the environmental study area. The presence of these population groups should be reviewed as potential alignments are considered.

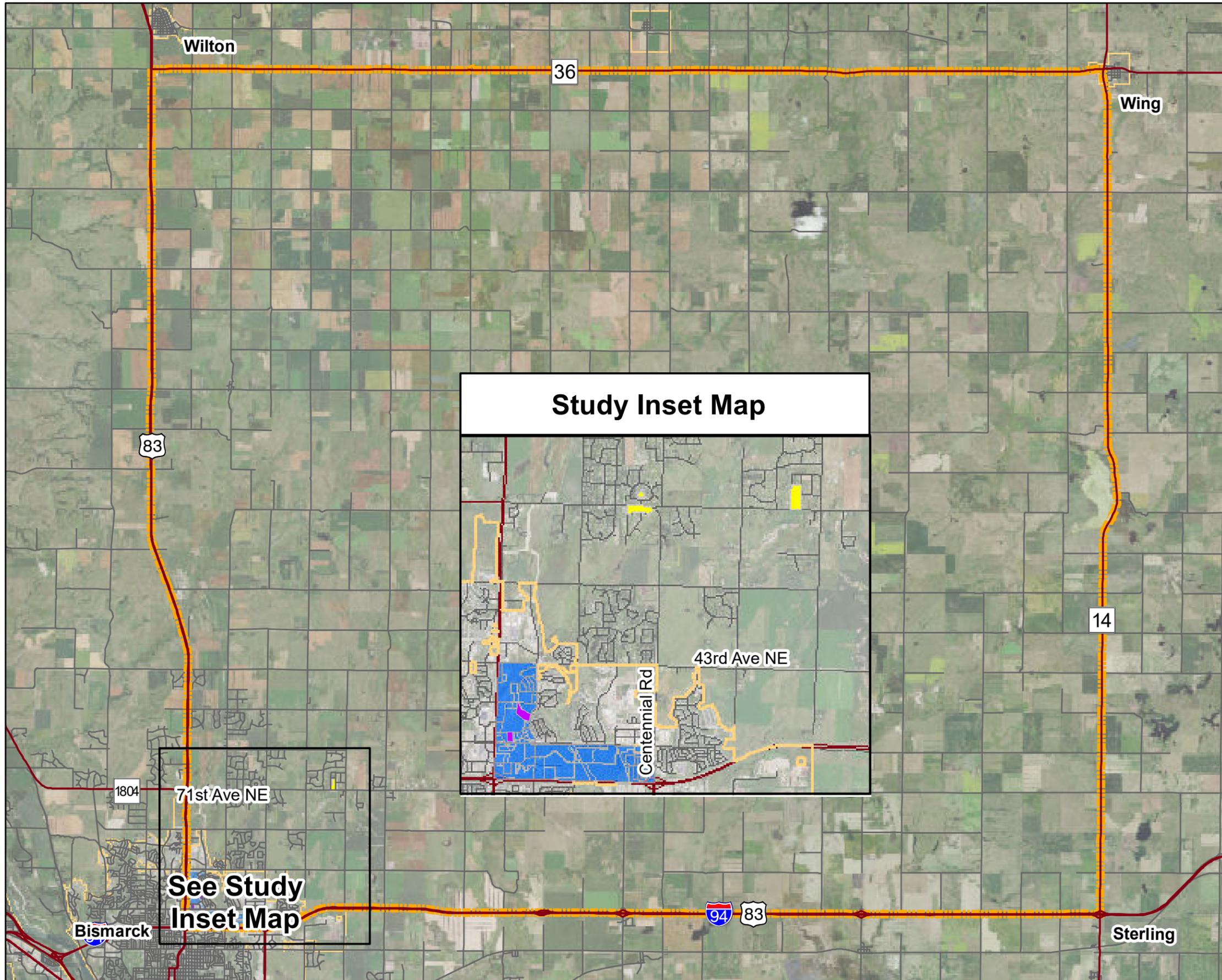
Year 2040 Conditions

Year 2040 conditions were identified as the future horizon year for this study. The purpose of reviewing year 2040 conditions is to identify the long-term viability of US Highway 83, as well as any infrastructure improvements and impacts necessary to maintain functionality. Therefore, the following information provides an overview of the year 2040 conditions.

2040 Land Use

Burleigh County and the City of Bismarck have adopted future land use plans for portions of the study area, as shown in Figure 16. Future land use along the US Highway 83 corridor, within city limits, is comprised of primarily existing commercial uses with scattered conservation, industrial and residential uses. Most of the land adjacent to US Highway 83 between 57th Avenue and I-94 is currently developed, with small pockets available for infill development.

The City of Bismarck and Burleigh County agreed upon an Extraterritorial Area (ETA) Boundary surrounding the city in 2014. This agreement provides the city sole zoning jurisdiction with the ETA boundary, shown by a red line in Figure 16. The city's growth management plan identifies future land uses within the ETA, including land adjacent to the US Highway 83 corridor, most of which is directly adjacent to the highway that is currently undeveloped. Existing residential uses have been developed near the ETA, with no direct access provided. Future land uses along the corridor have been designated as commercial, high density residential, business park, industrial, and/or urban reserve.



Hwy 83 Alternative Study

-  US Hwy 83 Alternative Study Boundary
-  City Boundary
-  State/Federal Highways
-  City and County Roadway System
-  25% or More Minority Population*
-  25% or More Households in Poverty**
-  25% or More Both Minority and Poverty***

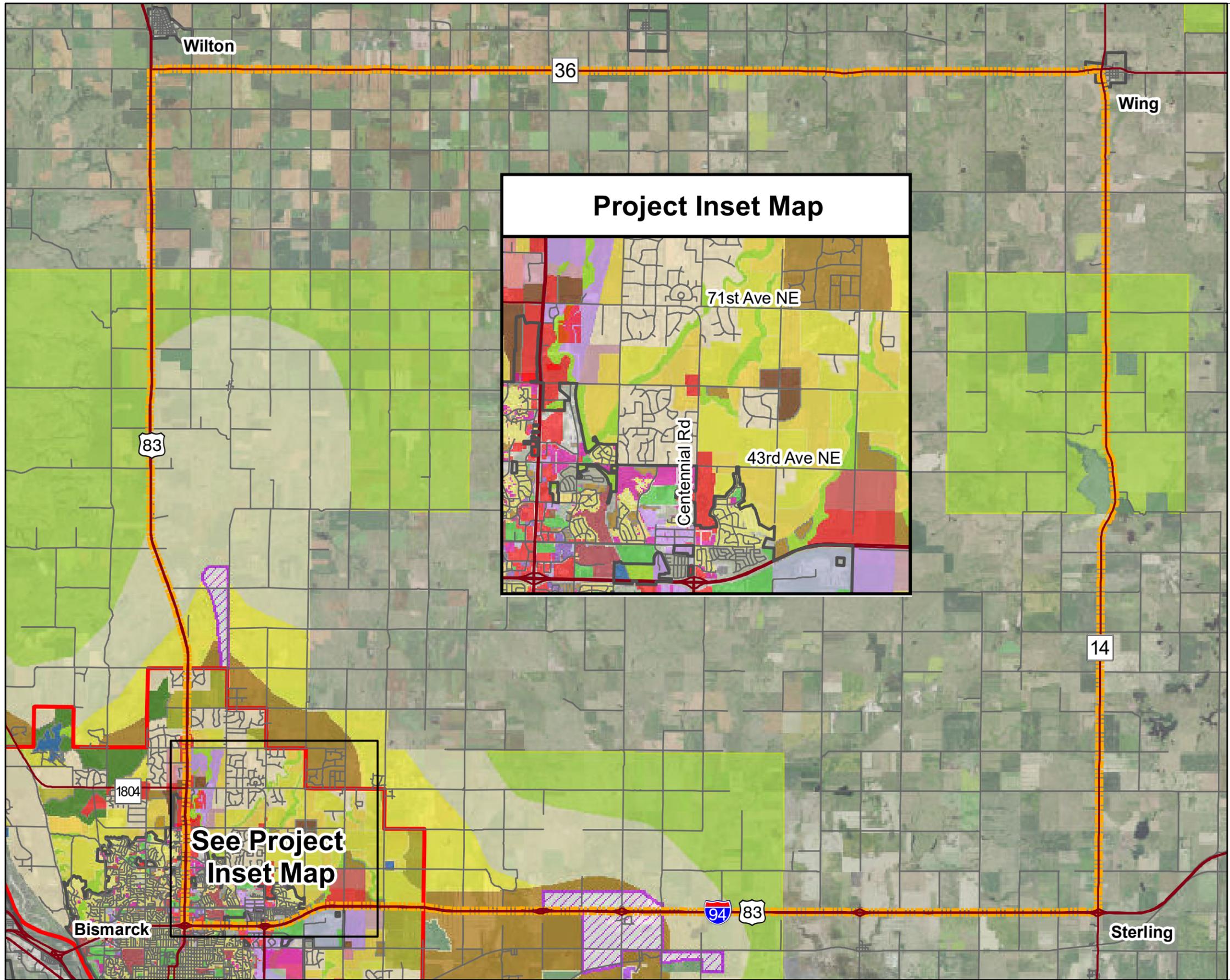
*25% or More Minority Population (Census Block)
 **25% or More Households in Poverty (Census Block Group)
 ***25% or More Minority Population (Census Block) and Households in Poverty (Census Block Group)

**Figure 15
Environmental Justice**

Bismarck-Mandan Metropolitan Planning Organization
 Prepared by: SRF Consulting Group, Inc.







Hwy 83 Alternative Study

CITY OF BISMARCK		BURLEIGH COUNTY	
	Commerical		Agriculture
	Commerical Mixed Use		Greenway Overlay
	Health-Medical		Industrial
	Industrial		Industrial Opportunities
	Institutional		Outlying Suburban
	Leisure		Public
	Office		Rural
	High Density Residential		Suburban
	Residential Institutional		Negotiated ETA
	Manufactured Residential		City Boundary
	Medium Density Residential		US Hwy 83 Alternative Study Boundary
	Rural Residential		State/Federal Highways
	Low Density Residential		City and County Roadway System
	Residential Two Family		
	Transportation		
	Undeveloped		

Figure 16
Future Land Use and ETA Boundary
 Bismarck-Mandan Metropolitan Planning Organization
 Prepared by: SRF Consulting Group, Inc.

Future land uses are identified within Burleigh County per the *Burleigh Growth 2015 - Burleigh County Land Use Plan*. Burleigh County maintains zoning authority for ten (10) townships, six (6) of which are within the study area (Glenview, Crofte, Burnt Creek, Gibbs, Menoken, and Lyman Townships). Future land uses in these areas primarily includes agricultural and rural uses. Future outlying suburban and industrial opportunities are identified near I-94 and US Highway 83.

2040 Transportation Network

The basis for this study is identified within *Envision 2040*, which outlines future land use and assumed transportation improvements planned within the region. The existing plus committed transportation network was used as the basis for this study. A key improvement that directly impacts area operations - an interchange along I-94 at 66th Street - was also included to understand its impact on travel patterns and system function. While this improvement is not currently funded, it is an important component of the system that must be accounted for regarding travel patterns.

Traffic Forecasts

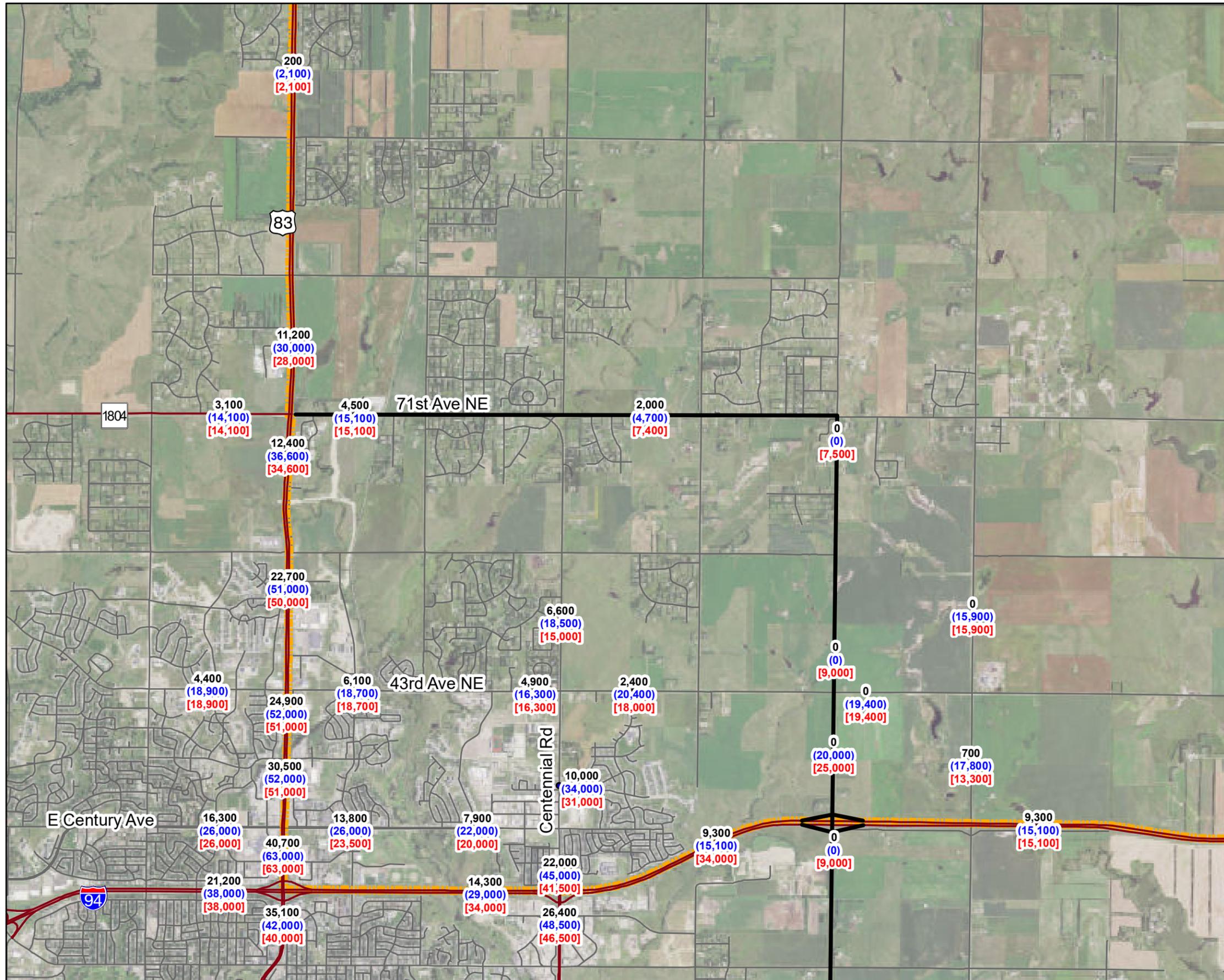
Traffic forecasts were developed for year 2040 conditions using the *Bismarck-Mandan Regional Travel Demand Model* to better understand how the existing US Highway 83 corridor will be expected to operate under future conditions. The forecasts were developed by the North Dakota State *Advanced Traffic Analysis Center (ATAC)* utilizing the most recent socio-economic data, the existing plus committed transportation network, and Airsage origin-destination information recently acquired by the MPO for all North Dakota. As previously noted, the I-94 interchange at 66th Street was also included to help understand the implications that a new interchange along I-94 would have on volumes along the current US Highway 83 corridor and other area roadways. A summary of the existing, year 2040, and year 2040 with the I-94/66th Street interchange average daily traffic volumes is illustrated in Figure 17.

Results of the forecast process indicate that future traffic volumes along US Highway 83 are expected to range from approximately 28,000 vpd (north of 71st Avenue/ND Highway 1804) up to approximately 63,000 vpd (near I-94). Based on this information, the segment of US Highway 83 between I-94 and 43rd Avenue is expected to be near/over-capacity, regardless of a new interchange along I-94 at 66th Street. Thus, various improvements are expected to be needed to help maintain the long-term mobility and safety of the US Highway 83 corridor. Potential improvements and alternatives will be discussed further as part of the *US Highway 83 Alternative Study*.

Based on the future year 2040 average daily traffic volumes, year 2040 a.m., midday, and p.m. peak hour intersection volumes were developed along US Highway 83 from 71st Avenue/ND Highway 1804 to I-94. This information was used as part of the future year 2040 intersection capacity analysis outlined in the following section of this document. The specific peak hour intersection volumes are provided in the **Appendix D**.

Hwy 83

Alternative Study



- US Hwy 83 Alternative Study Boundary
- State/Federal Highways
- City and County Roadway System
- Beltway
- xxxx Existing Daily Traffic Volumes
- (xxxx) Year 2040 Daily Traffic Forecasts (Existing and Committed Conditions)
- [xxxx] Year 2040 Daily Traffic Forecasts (66th Street Beltway Conditions)

Figure 17
Year 2040 Average Daily Traffic Volumes

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



2040 Intersection Capacity Analysis

Based on the preliminary traffic forecasts and planning level average daily traffic volume review, the existing US Highway 83 corridor from I-94 to 43rd Avenue is expected to be near/over-capacity. However, an intersection capacity analysis was conducted to provide a more detailed assessment of area operations. The purpose of this analysis is to understand how area intersection delays, queuing, and travel times can be expected to change under future conditions.

Result of the year 2040 intersection capacity analysis indicates several intersections are expected to operate at LOS E or worse during the a.m., midday, and p.m. peak hours. In addition to the poor operations, significant queuing issues are also expected within the corridor. A summary of the year 2040 intersection capacity analysis results is illustrated in Figure 18.

US Highway 83 Travel Times

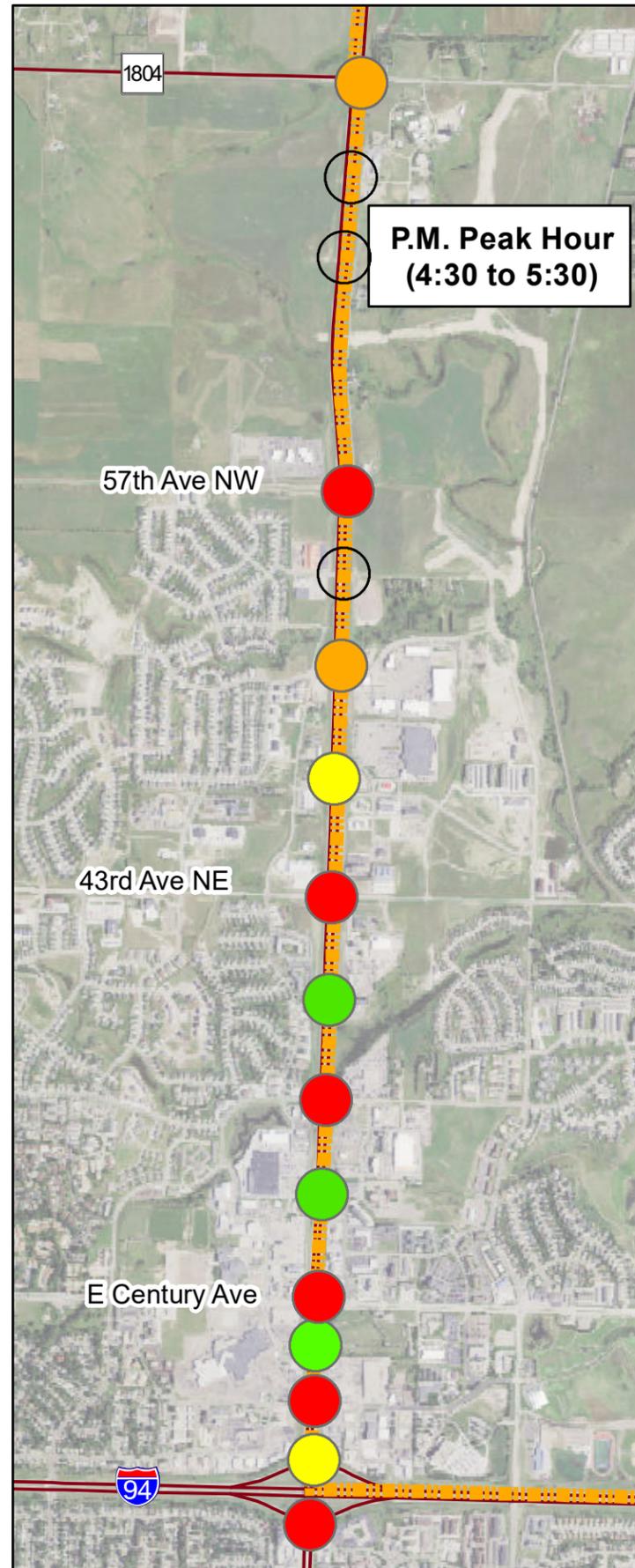
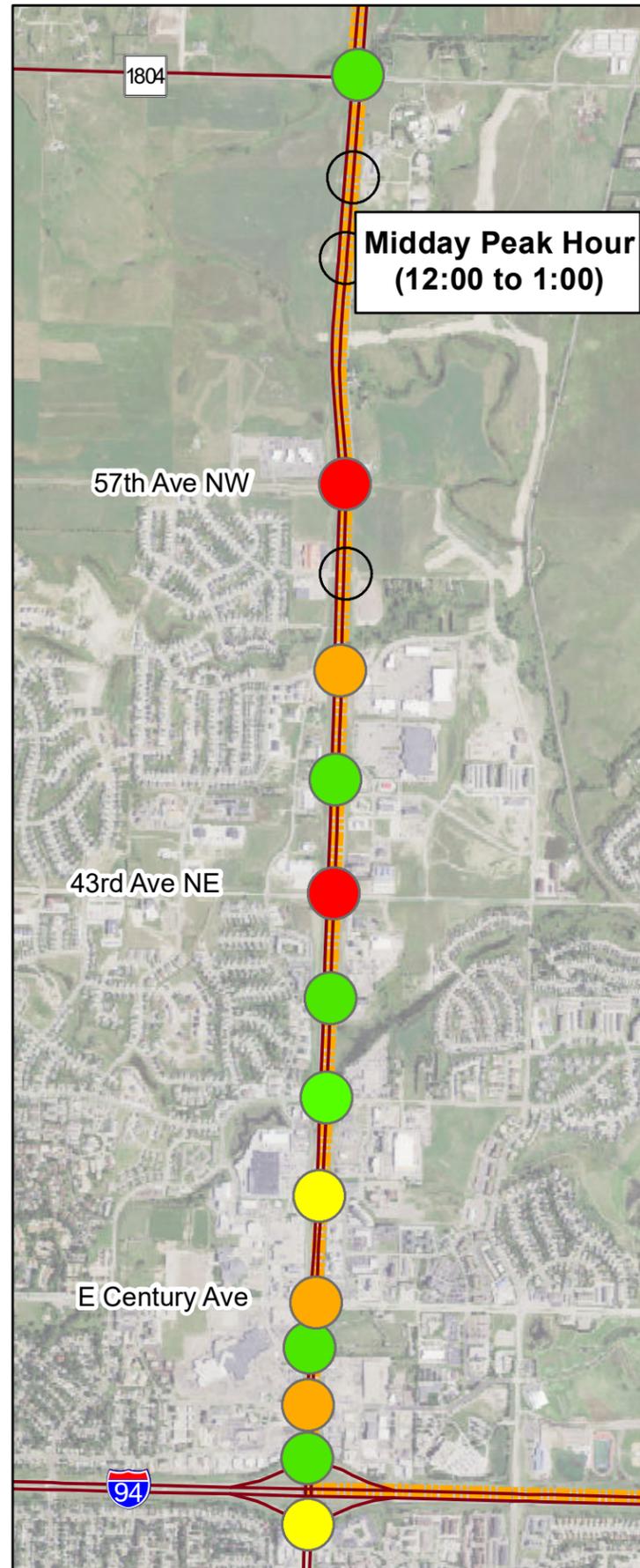
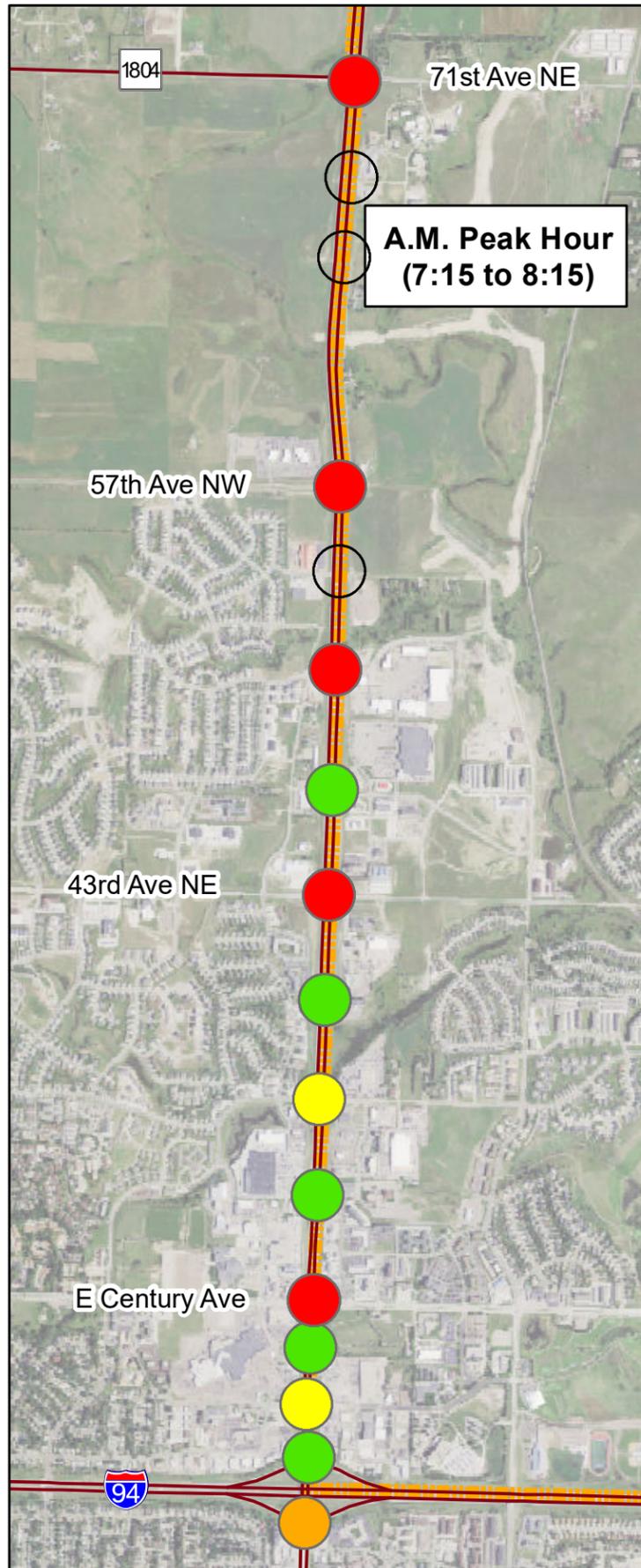
Existing corridor travel times along US Highway 83 from ND Highway 1804/71st Avenue to I-94 range from five (5) minutes to nearly nine (9) minutes depending on the time of day and direction of travel. Under future year 2040 conditions, these travel times are expected to increase, ranging from eight (8) to 20 minutes, depending on the time of day and direction of travel (see Figure 19). This change in travel time is the result of limited intersection capacity to accommodate the future growth expected within the region and along the US Highway 83 corridor.

Future Expected Crashes

SRF utilized the Federal Highway Administration's (FHWA) *Highway Safety Manual (HSM) Predictive Method* to predict crash frequency along the US Highway 83 corridor within the study area based on existing/future traffic volumes and roadway characteristics. The predictive method was evaluated for existing and future conditions with existing geometrics and traffic controls. This approach will also be leveraged to understand changes associated with a potential alternative US Highway 83 alignment.

To conduct this analysis, the Interactive Highway Safety Design Model (IHSDM) interface provided by the Federal Highway Administration (FHWA) was utilized. Inputs included crash history, traffic volumes, and calibration factors (provided by the NDDOT). The calibration factors were used to ensure the IHSDM accurately predicts current crashes, which in-turn helps provide reliability associated with the future predictions.

From 2012 to 2016 (a five-year period), there were a total of approximately 530 crashes along US Highway 83 at intersections within the study area. By year 2040, the amount of crashes is expected to increase by nearly 70 percent over a similar five-year period, primarily as a result of increased traffic volumes along the corridor. Therefore, the need to ensure safety along the current US Highway 83 corridor is a critical component to the development of an alternative US Highway 83 alignment and/or improvements along US Highway 83.



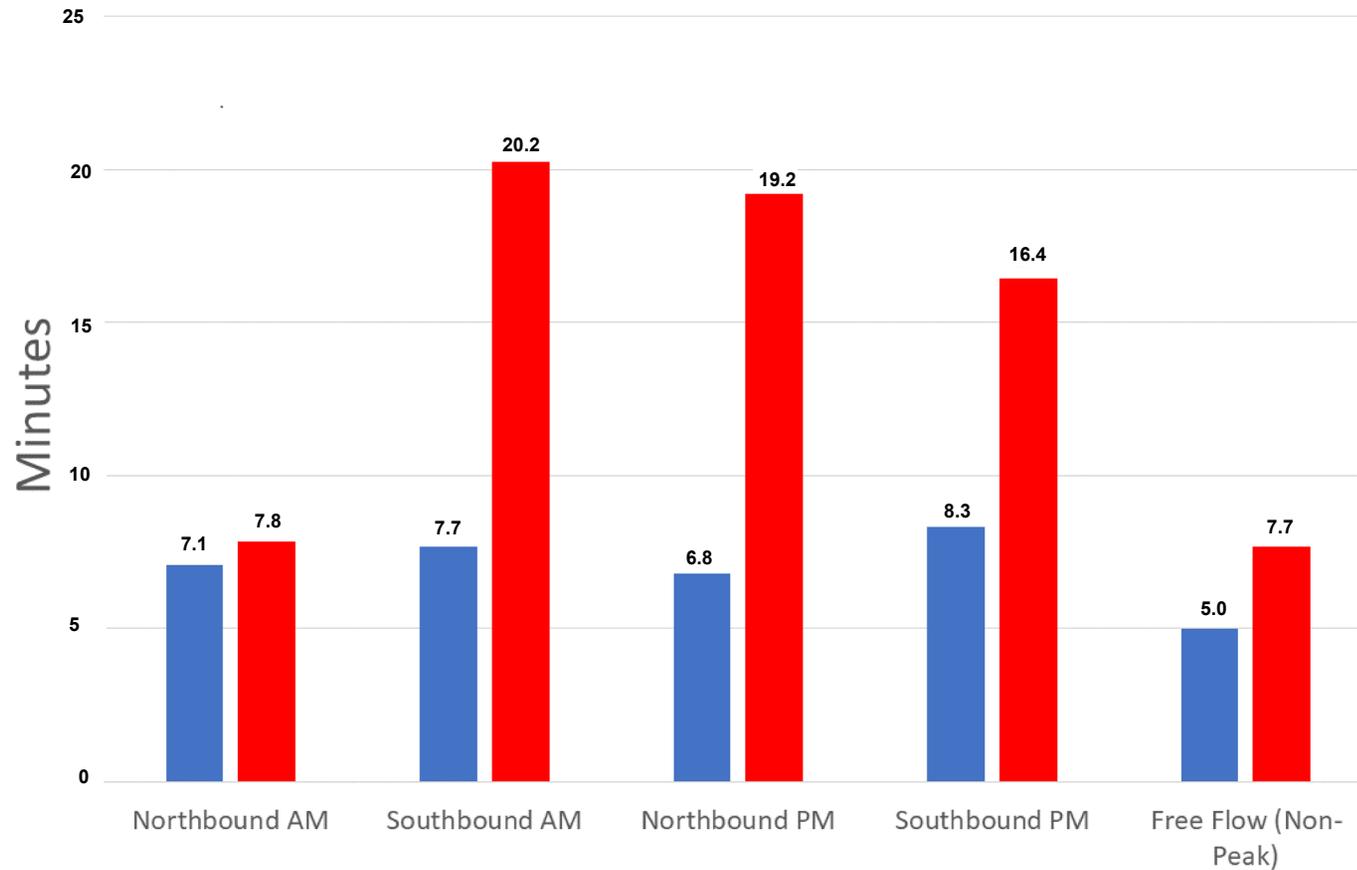
Hwy 83 Alternative Study

-  US Hwy 83 Alternative Study Boundary
-  State/Federal Highways
-  Level of Service - A or B
-  Level of Service - C
-  Level of Service - D
-  Level of Service - E or F
-  Level of Service Not Analyzed

**Figure 18
Year 2040 Intersection
Operational Analysis**

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.





Existing Travel Time
Year 2040 Travel Time

Figure 19
US Hwy 83 Average
Travel Time

Bismarck-Mandan Metropolitan
Planning Organization
Prepared by: SRF Consulting Group, Inc.



Existing and Future Issues and Needs Summary

The primary purpose of the *US Highway 83 Alternative Study* is to ensure the short- and long-term viability of the US Highway 83 corridor, whether that is along the current or alternative alignment. Thus, as part of this study, several issues and needs were identified throughout the study's preliminary evaluation process, which are summarized as follows.

- 1) **Safety** - Crash frequency along the US Highway 83 corridor has been steadily increasing, primarily in proportion to area traffic volumes. However, as the corridor becomes more congested in the future, the amount crashes are expected to increase by approximately 70 percent by the year 2040.
- 2) **Mobility** - Without improvements, the US Highway 83 corridor (between 71st Avenue/ ND Highway 1804 and I-94) is expected to operate near or over capacity by year 2040 for all motorists, including freight. Travel times are expected to increase by up to 13 minutes and overall intersection delays are also expected to increase, including access to/from various driveways and cross-streets.

Based on this information and feedback provided through the study's public engagement process, a range of alternatives will be developed, evaluated, and discussed with area stakeholders to ensure the future viability of the US Highway 83 corridor within the study area and region.

Alternative Alignment Vision

A long-term corridor function vision was established to provide the basis for the development of preliminary alternative alignment concepts. What follows is a brief discussion of the key corridor characteristics that were considered during the alternative alignment development process. These characteristics considered input from the PMT, SRC, public input, and technical analysis.

The SRC established and affirmed the following characteristics about the US Highway 83 corridors' long-term function and vision.

Alternative Alignment Corridor Vision

- Envision mostly a two-lane rural highway with some consideration of a four-lane expressway, speed limit of 55 to 70 mph, and variable adjacent land uses
- Consider US Highway 83 primarily used for regional to regional traffic (Canada to Mexico) and some regional to local traffic as necessary (based on development potential on new route)
- Limit direct access to corridor
- Consider connection points to current US Highway 83 and I-94

Existing Alignment Corridor Vision

- Consider potential for multimodal connectivity
- Envision a mostly four-lane urbanizing highway with a speed limit of 40 to 70 mph
- Existing US Highway 83 primarily used for regional to local and local to local traffic with some regional to regional traffic served
- Limit direct access to corridor
- Consider alternative access configurations or traffic control, where necessary and/or possible
- Cognizant of balance needed for vehicle mobility and accessibility along the corridor

Development of Alternatives

The key goals of this study relative to development of alternatives were to:

- 1) Identify, evaluate, and develop viable highway alternatives along US Highway 83 north of Bismarck to best serve existing and future stakeholders within the region.
- 2) Analyze potential new routes for regional traffic and identify operational improvements for the current US Highway 83/State Street corridor.
- 3) Analyze anticipated outcomes of a US Highway 83 realignment on Bismarck and Burleigh County.
- 4) Determine if other infrastructure improvements near the State Street corridor could help alleviate congestion on the current US Highway 83/State Street corridor.

These alternatives can then be carried forward for further analysis in future environmental processes. Note that the alignment alternatives developed by the study team and SRC were compared against a No Build Alternative. The No Build Alternative evaluated as part of this study assumed that the US Highway 83 designation remained on the current State Street alignment. However, as previously noted based on the 2040 issues and needs, the existing US Highway 83/State Street corridor is expected to need significant improvements under future conditions to function with reasonable mobility, access to destinations, and adequate intersection traffic control. Thus, a range of preliminary alternatives were developed for an alternative US Highway 83 alignment, as well as potential improvement scenarios to enhance the current US Highway 83/State Street corridor. The following information provides a summary of the alternative development process.

Preliminary Alternative US Highway 83 Development Process

The development process was multifaceted using a range of inputs, including technical data, public comments, issues and needs identification, corridor vision, design parameters, and direction from the PMT and SRC. Some of the issue areas considered include:

- Mobility (operations/congestion)
- Safety
- Freight
- Neighborhood impacts
- Alignment curvature
- Constructability
- Economic Development
- Environmental constraints
- Planning-level cost
- Agency/public input

The study team facilitated an SRC meeting at which the committee members identified initial alignment alternatives following review of technical analysis results from year 2040 and input received from the public. This analysis included data from ATAC that was conducted utilizing both the Statewide Freight and Bismarck-Mandan MPO Regional Travel Demand models to help identify alternative US Highway 83 alignments that would maximize utilization of the route. This meeting was a brainstorming session meant to consider various options and potential routes. After review and basic refinement, these alignment alternatives were presented as potential options to the public at the second open house (see **Appendix A** for open house #2 board materials). Figure 20 illustrates the US Highway 83 alternative alignments.

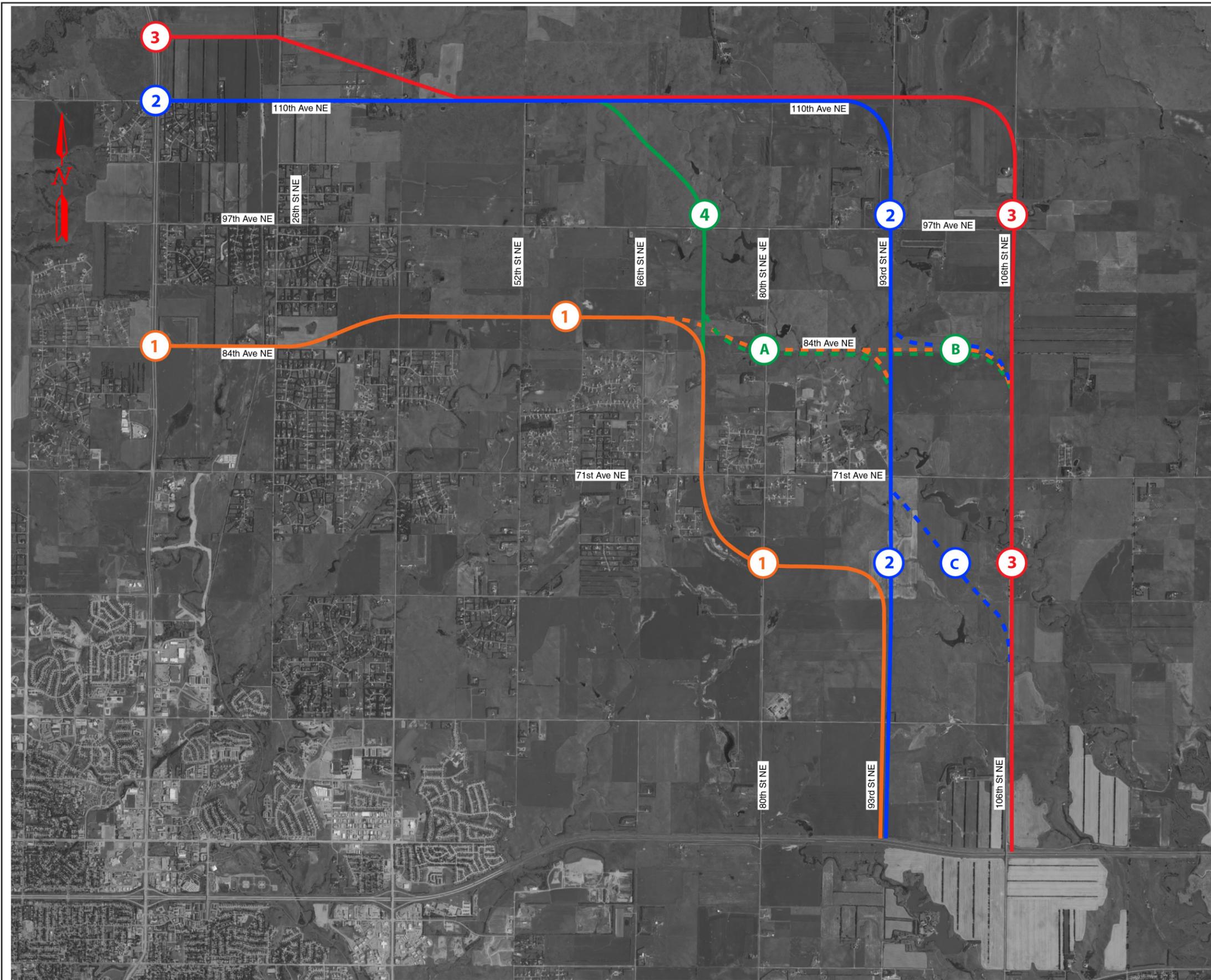
Defining these routes from west to east, the study team arrived at the following three primary alternatives as they relate to alternative US Highway 83 alignments:

- Alternative 1 (Orange Route) - generally aligns with 84th Avenue NE at US Highway 83 and 93rd Street NE at I-94
- Alternative 2 (Blue Route) - generally aligns with 110th Avenue NE at US Highway 83 and 93rd Street NE at I-94
- Alternative 3 (Red Route) - generally aligns 1/2-mile north of 110th Avenue NE at US Highway 83 and 106th Street NE at I-94

Each of these alternatives include varying alignment alternatives through the central segment, and slightly less variability in the south segment. There were also several sub-alternatives that were identified with the intent of providing different alignment alternatives for the central segment for consideration and evaluation (see sub alternatives 4, A, B, and C).

The general locations of these alternatives were identified such that there was a balance between maximizing the utilization of the alternative route, and minimizing the overall length and impacts of the new alignment. Alternatives located further north and east of the ones shown were considered; however, they were determined to not provide value given their increase in length (i.e. more cost) and less utilization (i.e. less projected traffic). Alternatives located closer to Bismarck, such as 71st Avenue, Centennial Road, and/or 66th Street did not meet the overarching vision of maintaining the regional to regional viability of US Highway 83 and would have resulted in more impacts.

In addition to the primary alternative US Highway 83 alignments, a close review of the existing ND Highway 36 to ND Highway 14 route was considered. This existing route already provides regional to regional users of US Highway 83 an alternative if they are destined to/from I-94 to the east or US Highway 83 (south of I-94). Currently, the ND Highway 36/14 route does not meet US Highway standards/design criteria; which would need to be upgraded if the US Highway designation were applied. The shoulder widths of the current route are deficient, along with the vertical grades for heavy commercial trucks. More discussion regarding this route is provided as part of the alternative evaluation.



Hwy 83
 Alternatives Study

Figure 20 - US Highway 83 Alternatives (New Alignments)

Bismarck-Mandan Metropolitan Planning Organization
 Prepared by: SRF Consulting Group, Inc.



Current US Highway 83/State Street Alternatives

A range of alternatives were also developed for the existing US Highway 83/State Street corridor. These alternatives were developed to understand the level of infrastructure investment and relative operations that could be provided for area users. The purpose of developing these alternatives was to help answer the question of how to best maintain the functionality of US Highway 83 in a cost-effective manner, especially given the issues and needs identified for the current US Highway 83/State Street corridor with or without an alternative alignment in place in the future.

The following preliminary alternatives for the current US Highway 83/State Street corridor were identified and shared with the public at the second open house in July 2018 (see Figure 21).

- Alternative A (Minimal Improvements) - generally signal/traffic control improvements only
- Alternative B (Optimized At-Grade Improvements) - signal/traffic control, access, and capacity improvements
- Alternative C (Grade-Separated Improvements) - interchanges at 43rd Avenue and 71st Avenue/ND Highway 1804, restricted cross-street access, and access management/frontage and backage roads

Following the second open house, the current US Highway 83/State Street corridor alternatives were refined based on feedback received from the public and additional review by the study team and SRC. Based on the understood need for improvement to the existing US Highway 83/State Street corridor (regardless of an alternative US Highway 83 alignment), the study team developed two hybrid alternatives for consideration. These hybrid alternatives considered combinations of improvements from Alternatives A, B, and C as described below:

- Hybrid 1 (Urban six-Lane Facility) - grade-separation at Interstate Avenue, at-grade intersections from Century Avenue to the north
- Hybrid 2 (four-Lane Expressway) - grade-separation at Interstate Avenue, 43rd Avenue, and 71st Avenue, at-grade intersections from Century Avenue to Calgary Avenue

Each hybrid alternative includes a grade-separated concept that was identified for the US Highway 83 and Interstate Avenue intersection. This grade separation and the two US Highway 83/State Street corridor hybrid alternatives are illustrated in Figure 22.

Minimal

At-Grade

Grade Separated

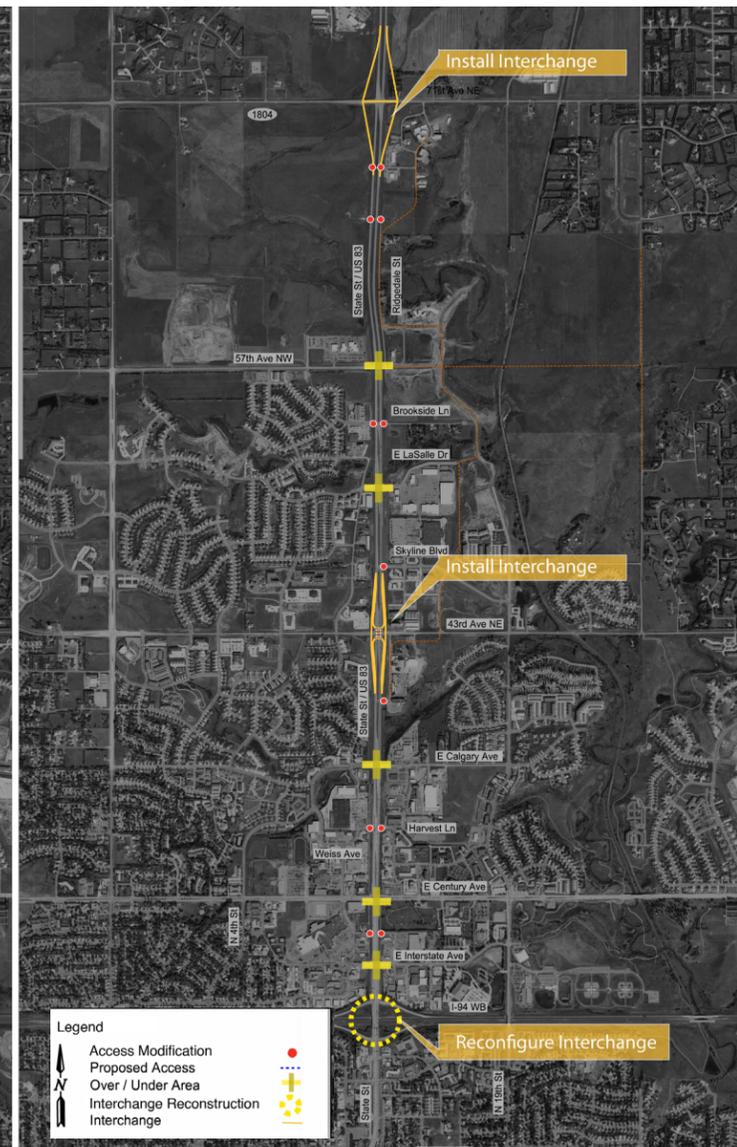


Figure 21 - US Highway 83 Alternatives (Existing State Street Corridor)

Bismarck-Mandan Metropolitan Planning Organization
 Prepared by: SRF Consulting Group, Inc.

Hwy 83

Alternatives Study

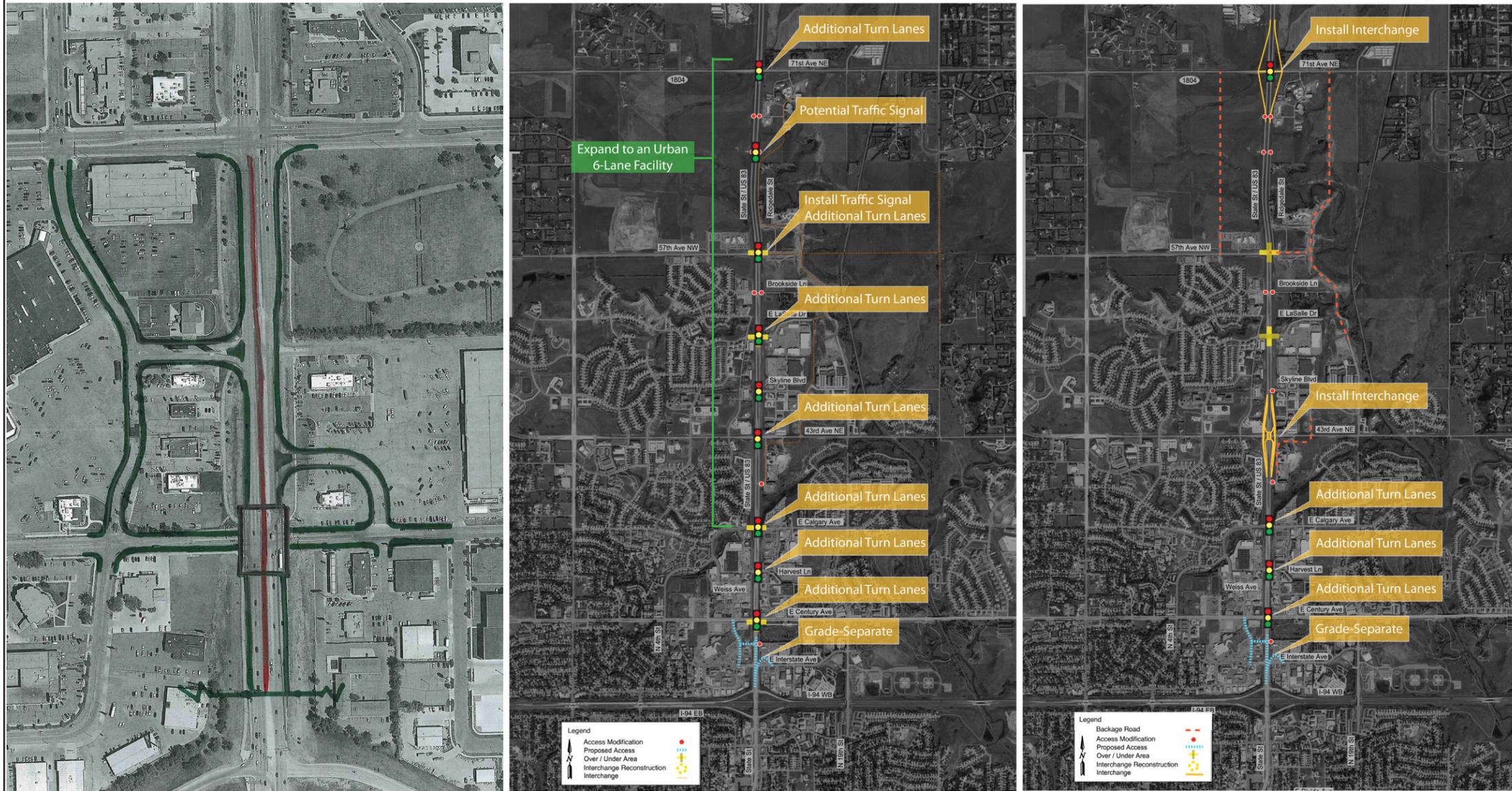


Figure 22 - US Highway 83 Hybrid Alternatives (Existing State Street Corridor)

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



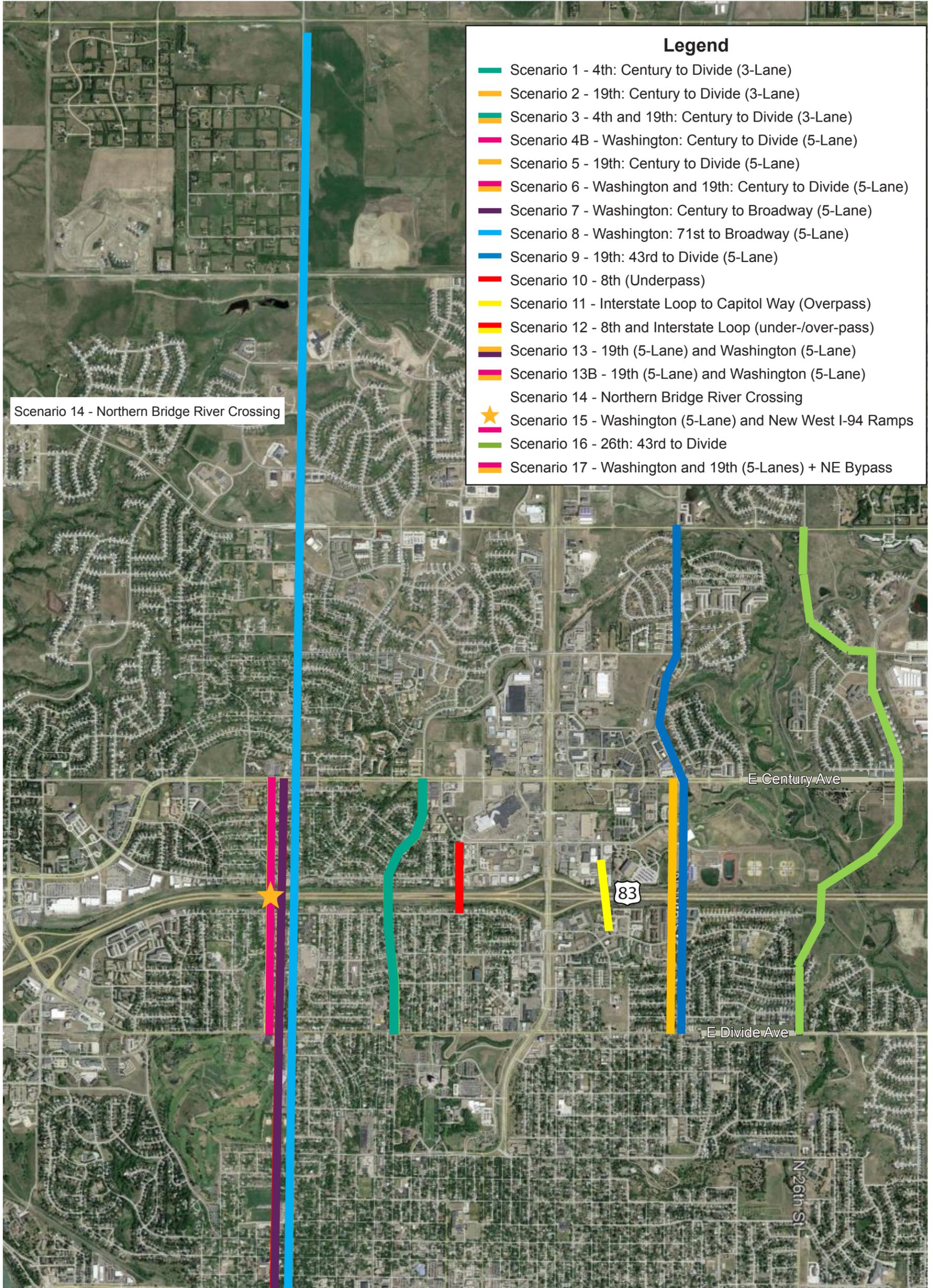
Parallel North-South US Highway 83/State Street Alternatives

Following the second open house, SRF presented the preliminary study findings to NDDOT Management in September 2018 to solicit input on the study direction. A key directive taken from the meeting was to evaluate parallel routes to the US Highway 83/State Street corridor. The goal of this evaluation was to identify potential local roadway improvements that may provide benefit (traffic volume reduction) to the current US Highway 83/State Street corridor (order of magnitude). The additional roadway alternatives reviewed were:

- Washington Street (three-lane and five-lane facilities)
- 4th Street (three-lane facility)
- 8th Street (new roadway)
- Connection between Capitol Way and Interstate Loop (new roadways)
- 19th Street (three-lane and five-lane facilities)
- 26th Street (new roadway)
- Northern Bridge River Crossing (new roadway)

These general roadway alternatives included varying limits as well, ranging from Rosser Avenue to 71st Avenue; most of these alternatives focused on the area between Century Avenue and Divide Avenue. An overview of the parallel north-south US Highway 83/State Street alternatives reviewed are illustrated in Figure 23.

The north-south alternatives were reviewed from a planning-level capacity perspective. ATAC again ran the Bismarck-Mandan Regional Travel Demand model to understand how changes to these facilities would impact area travel patterns and traffic volumes. The traffic volume/capacity focus of this analysis was on the existing US Highway 83/State Street corridor between Century Avenue and I-94, which represents the corridor segment expected to be significantly over-capacity under future conditions. If it can be determined that enough volume can be reduced through this section, the north-south parallel route alternatives can be deemed beneficial (discussed in the following section).



**Figure 23 - North-South Parallel US Highway 83/
State Street Corridor Alternatives**

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.



Evaluation of Alternatives

The primary activities completed as part of the alternative evaluation process include preparing evaluation criteria, assessing the impacts of each alternative, and conducting a benefit/cost evaluation relative to the alternatives for both the current US Highway 83/State Street corridor, as well as the alternative US Highway 83 alignment alternatives. The evaluation also incorporated the north-south parallel alternatives and their respective merit. As part of this process, and in coordination with the PMT and NDDOT Management, potential alternatives were identified that meet the overall study goals and objectives. These identified alternatives can be moved forward as part of the future environmental stage of a project(s).

Evaluation Criteria

Evaluation criteria were developed based on the issues and needs information, and alternative vision(s). In addition to measurable technical criteria, public preference and planning-level costs were used in the evaluation process. The screening criteria include:

- Mobility (operations/congestion)
- Safety
- Freight
- Neighborhood impacts
- Alignment curvature
- Constructability
- Economic Development
- Environmental constraints
- Planning-level cost
- Agency/public input

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

	Good; best meets criteria
	Ok; meets criteria well
	Moderate; close to achieving criteria
	Marginal; does not meet criteria
	Poor; fails to meet criteria

A multifaceted review process by the PMT/SRC vetted the evaluation criteria and iterations of the evaluation matrices. The study team also made multiple revisions to ensure that criteria, documented impacts, and evaluations were accurate before it was presented to the public for review. The resultant evaluation outcomes are provided as part of the open house materials in **Appendix A**.

Alternative US Highway 83 Alignment Traffic Evaluation

Understanding how many motorists will use the alternative US Highway 83 alignments (ND Highway 36/14 and alternatives 1 through 3, plus sub-alternatives) is key to evaluating their effectiveness, utility, and need. To identify the users, the study team worked closely with ATAC to review existing travel pattern data, origin-destination information provided by the MPO, and the Statewide Freight and Bismarck-Mandan MPO Regional Travel Demand models. The findings identified the expected number of users (i.e. the average daily traffic volume) for each alternative, as well as the resulting reduction in traffic volume along the current US Highway 83/State Street corridor.

Based on year 2040 traffic forecasts evaluated for the alternative US Highway 83 alignments (alternatives 1 through 3, plus sub-alternatives), the overall net reduction of volume along the existing US Highway 83/State Street corridor is expected to range from approximately 1,000 to 1,500 vehicles per day. At this level of volume reduction, the existing US Highway 83/State Street corridor is expected to continue to operate poorly under future conditions, regardless of a new alternative US Highway 83 alignment. The peak average daily traffic volume along the current US Highway 83/State Street corridor, accounting for an alternative US Highway 83 alignment, is expected to be approximately 63,000 vehicles per day (between Century Avenue and I-94). Based on the operations analysis and planning guidance, the average daily traffic volume would need to be approximately 48,000 to 52,000 vpd to achieve acceptable (LOS D or better) operations in this area.

The traffic forecasts indicate that based on the current and expected travel patterns, approximately 1,500 to 5,000 vpd would be expected to use an alternative US Highway 83 alignment (alternatives 1 through 3, plus sub-alternatives). A new US Highway 83 alignment as currently shown would serve a combination of existing area residents (local to local and local to regional trip patterns) and regional users. However, key factors that limit the overall effectiveness (or overall utilization) of an alternative US Highway 83 alignment is the general roadway length (i.e. approximately 10 to 12 miles) relative to desired travel patterns and destinations. This results in the existing US Highway 83/State Street corridor continuing to provide the more efficient route to the majority of area destinations and services, even though the corridor is expected to experience an increase in congestion.

The ND Highway 36/14 route alternative was reviewed as well, with it not expected to provide any noticeable traffic volume benefit to the existing US Highway 83/State Street corridor. This is primarily a result of the corridor existing today, thus there is no significant change in general travel patterns expected, even if the ND Highway 36/14 alternative were reconstructed to meet current US Highway standards. In general, a significant number of existing US Highway 83 users ultimately have destinations within the Bismarck-Mandan metropolitan area or are destined to the south or west of the cities.



Alternatives Study

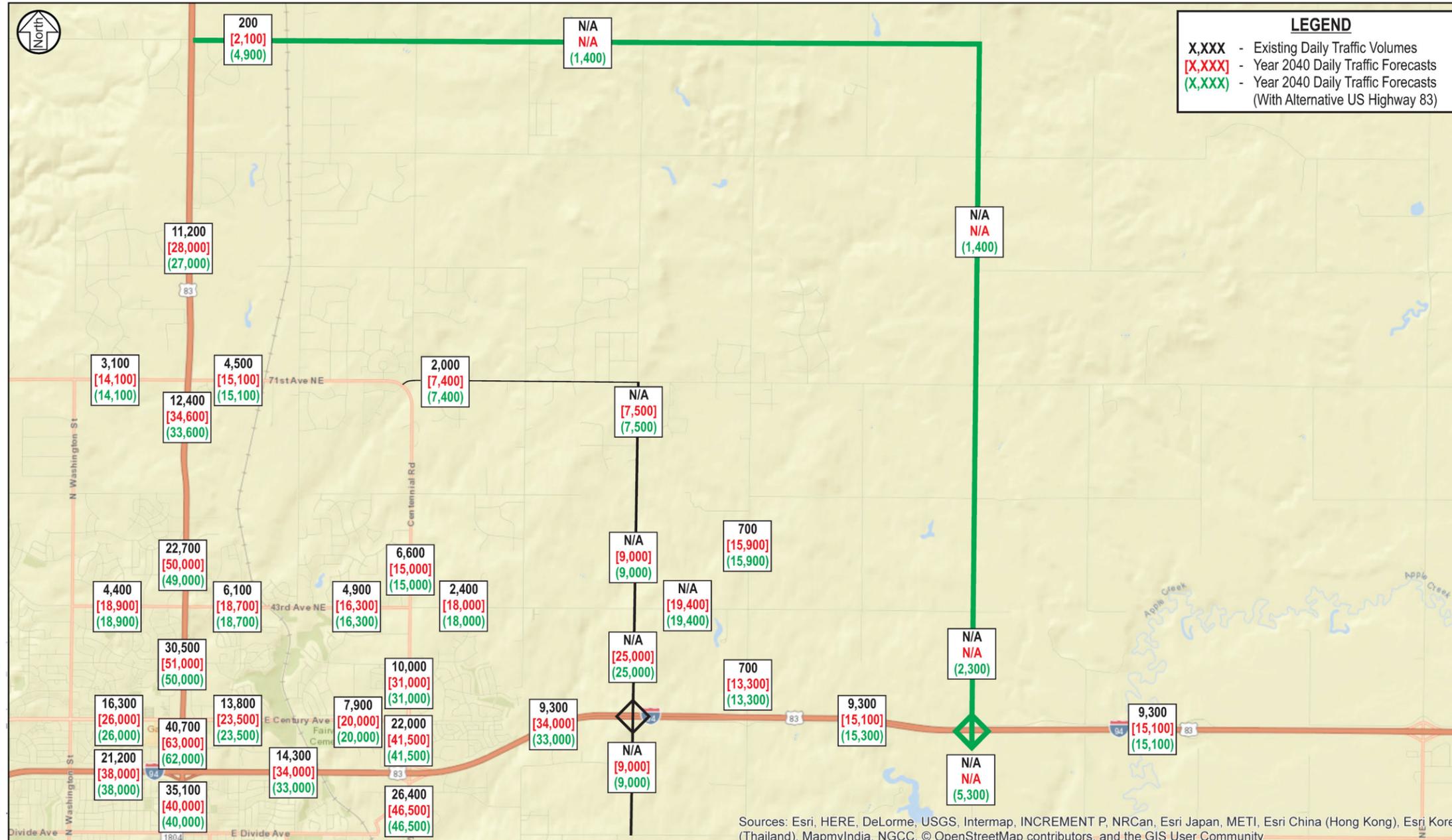


Figure 24 - Year 2040 Traffic Forecasts with Alternative US Highway 83 Alignment

Bismarck-Mandan Metropolitan Planning Organization
Prepared by: SRF Consulting Group, Inc.

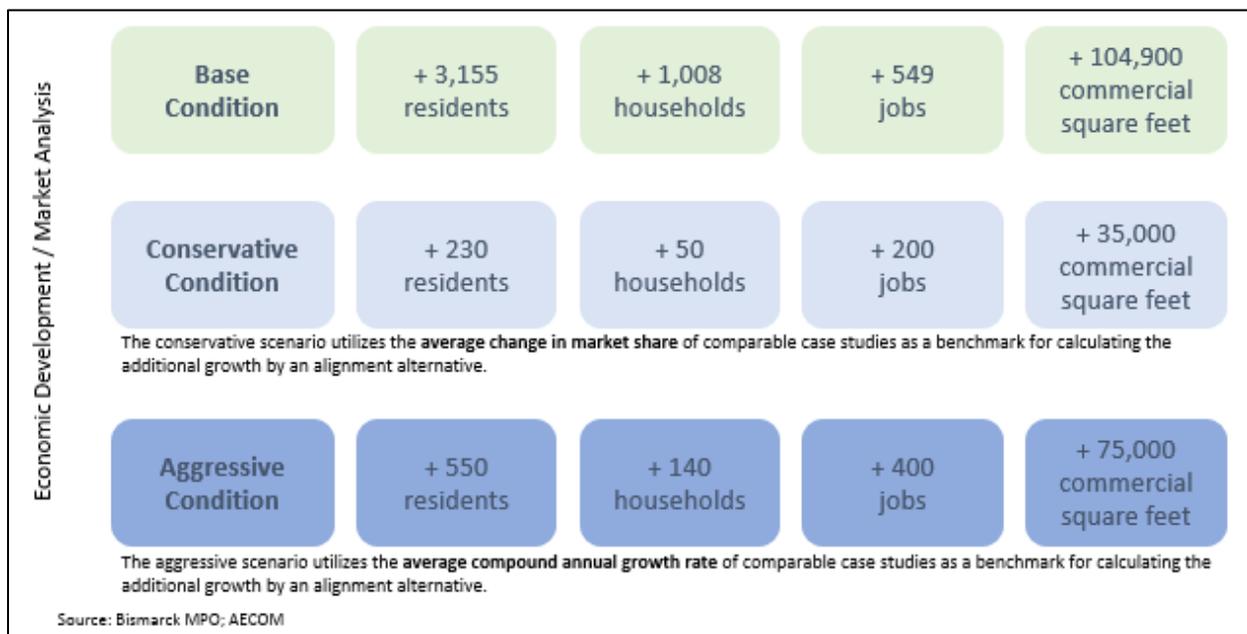


Alternative Economic Development/Market Analysis

Given the limited overall traffic volume reduction to the existing US Highway 83/State Street corridor considering the alternative US Highway 83 alignments, there is not expected to be a noticeable impact from an economic development perspective to current businesses along the corridor. However, there is expected to be some level of economic development associated with the alternative US Highway 83 alignment with respect to households and employment. Therefore, a case-study review was completed by the study team partner AECOM to understand the economic impact associated with similar alternative route construction projects in comparable markets.

The findings of this case-study review identified three (3) potential economic conditions associated with the construction of a new alternative US Highway 83 alignment. These conditions included base, conservative, and aggressive scenarios and identified development assumptions for residents, households, jobs, and commercial square footage. These socio-economic data elements contribute to potential traffic generation and assume a 10-year post construction condition. These assumptions account for a lack of city services (i.e. sewer, water), which limits the development potential along the corridor.

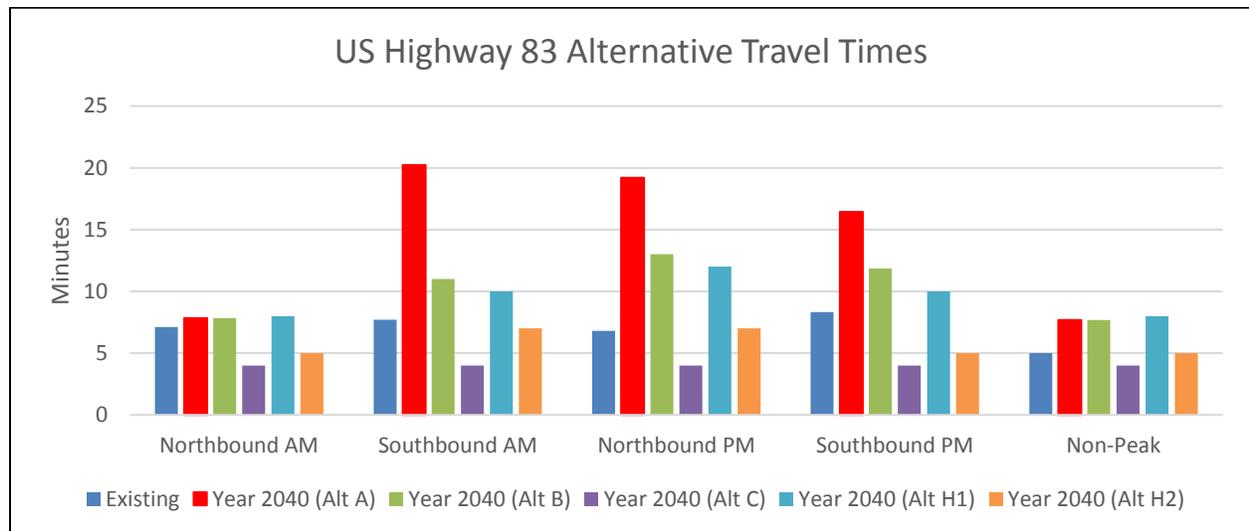
Based on the economic development analysis, the potential additional development along the corridor could result in an increase in traffic in the range of 1,750 to 4,700 vpd along an alternative US Highway 83 alignment. Thus, for purposes of this study, the maximum alternative US Highway 83 alignment traffic volume is expected to be approximately 7,250 vpd assuming the aggressive condition illustrated in the following chart.



US Highway 83/State Street Corridor Alternative Traffic Evaluation

Each US Highway 83/State Street corridor alternative was reviewed from a traffic operations perspective. For comparison purposes, the evaluation focused on overall corridor travel time from 71st Avenue/ND Highway 1804 to I-94 and was completed using a combination of Synchro/SimTraffic software and expected travel speeds, depending on the alternative (urban arterial versus expressway).

Result of the traffic evaluation for the US Highway 83/State Street corridor alternatives, illustrated in the following chart, indicate that future corridor travel times along US Highway 83/State Street are expected to range from approximately four (4) minutes up to approximately 20 minutes, depending on the time of day and direction of travel. The variation is a result of the primary differences between the various alternatives, whereas some alternatives offer more free-flow conditions (i.e. alternatives C and H2) and others maintain more of a status quo/at-grade intersection condition (i.e. alternatives B and H1). It is important to note that both the ND Highway 36/14 alternative and the alternative US Highway 83 alignments (alternatives 1 through 3, plus sub-alternatives) do not offer any significant travel time savings (i.e. benefit) to the existing US Highway 83/State Street corridor.



Alternative Cost Estimates

Preliminary cost estimates were developed for each alternative for comparison purposes, as well as to assist with overall implementation planning and funding considerations. The cost estimates were developed by the study team partner Apex Engineering Group, in conjunction with the PMT. All costs were developed using a planning-level approach, using cost-per mile guidance and/or general infrastructure costs for typical items, such as traffic signals, lighting, etc. Costs do not include contingencies, engineering, construction administration, right-of-way acquisition, nor do they account for inflation. The costs for the alternatives are summarized as follows and include specific details as noted. The more detailed cost estimates are included in **Appendix E**.

- ND Highway 36/14 Alternative - \$80,000,000
 - Includes upgrading the roadway to US Highway standards (shoulder widening, grade changes, and realignment at the ND Highway 36/14 intersection)
- Alternative US Highway 83 Alignments (Alts 1 through 3, plus sub-alts) - \$58,000,000
 - Assumes a two-lane alternative, 55-mph limited access highway
- Alternative US Highway 83 Alignments (Alts 1 through 3, plus sub-alts) - \$87,000,000
 - Assumes a four-lane alternative, 55-mph limited access highway
- Alternative B (at-grade improvements) - \$55,000,000
 - Includes six-lane reconstruction from Calgary Avenue to 71st Avenue and intersection improvements (turn lanes) from I-94 to Calgary Avenue
- Alternative C (grade-separated improvements) - \$160,000,000
 - Includes six-lane expressway from I-94 to Calgary Avenue, interchanges at Interstate Avenue, 43rd Avenue, and 71st Avenue, four (4) under-/over-passes, and various frontage/backage roads
- Alternative H1 (urban hybrid improvements) - \$80,000,000
 - Includes six-lane reconstruction from Calgary Avenue to 71st Avenue, intersection improvements (turn lanes) from I-94 to Calgary Avenue, and an interchange at Interstate Avenue
- Alternative H2 (expressway hybrid improvements) - \$124,000,000
 - Includes interchanges at Interstate Avenue, 43rd Avenue, and 71st Avenue, two (2) under-/over-passes, intersection improvements (turn lanes) from I-94 to Calgary Avenue and various frontage/backage roads

Alternative User-Cost Evaluation Summary

To help compare the various alternatives evaluated as part of this study, a cost per user ratio was developed. This ratio considers the alternative construction cost divided by the future year 2040 average daily traffic volume for the respective alternative, which can help quantify the cost-effectiveness of an alternative. Based on this evaluation, which is summarized in Figure 25, the cost per user ranges from approximately \$1,100 up to \$80,000 per user depending on the alternative. A lower cost per user ratio equates to a more cost-effective improvement. However, other factors also need to be considered, such as travel time, which is also summarized in Figure 25.

An average corridor daily traffic volume for the existing US Highway 83/State Street alignment was utilized while the highest potential daily traffic volume for the alternative US Highway 83 alignments was used. Even with using these assumptions, the results of the evaluation indicate that the alternative US Highway 83 alignments (i.e. alternatives 1 through 3, plus sub-alternatives) have a higher cost per user compared to the improvement scenarios that look at improvements to the existing

US Highway 83/State Street corridor. Further, be reminded that the alternative US Highway 83 alignments do not significantly reduce traffic volumes along the existing US Highway 83/State Street corridor. Thus, if an alternative US Highway 83 alignment were constructed, a significant infrastructure investment is still needed for the existing US Highway 83/State Street corridor due to capacity issues.

It is determined that from a user-cost and overall infrastructure investment perspective, construction of a new alternative US Highway 83 alignment (i.e. alternatives 1 through 3, plus sub-alternatives) does not address the existing and projected US Highway 83/State Street issues. However, there are merits to building a new alignment, which would be expected to better serve regional to regional travel patterns, preserving the functional mobility of designated US Highway 83 while limiting/controlling access. Although the alternative US Highway 83 alignments (i.e. alternatives 1 through 3, plus sub-alternatives) do not appear to provide the necessary benefit to justify construction within the 2040-time horizon, the NDDOT, Burleigh County, and City of Bismarck may choose to move these alignment alternatives (and potentially others) forward as part of an environmental evaluation/documentation process. This process would involve additional evaluation and public input, with a goal of identifying a future corridor to preserve allowing for access control and the city and county jurisdictions to effectively manage land use decisions over time. The jurisdictional partners have not identified a timeframe for any future environmental evaluation.



Alternative	Length	Cost	2040 ADT	Cost/User	State Street Travel Time (ND Hwy 1804 to I-94)
Convert ND Hwy 36/14 to US Highway Standards (2-Lane)	45 miles	\$80,000,000	1,000	\$80,000	17 to 20 minutes
Alt Routes 1 thru 4B (2-Lane)	10.2 to 12.4 Miles	\$58,466,667	7,250	\$8,064	17 to 20 minutes
Alt Routes 1 thru 4B (4-Lane)	10.2 to 12.4 Miles	\$87,622,222	7,250	\$12,086	17 to 20 minutes
Alternative B (At-Grade Improvements)	3.5 miles	\$55,000,000	48,800	\$1,127	11 to 13 minutes
Alternative C (Grade - Separated Improvements)	3.5 miles	\$160,000,000	48,800	\$3,279	4 to 5 minutes
Alternative H1 (Urban Hybrid Improvements)	3.5 miles	\$80,000,000	48,800	\$1,639	8 to 12 minutes
Alternative H2 (Expressway Hybrid Improvements)	3.5 miles	\$124,000,000	48,800	\$2,541	5 to 7 minutes

Figure 25
US Hwy 83 Alternative
User Cost Summary

Bismarck-Mandan Metropolitan
 Planning Organization
 Prepared by: SRF Consulting Group, Inc.



Parallel North-South US Highway 83/State Street Alternatives Evaluation

As previously mentioned, SRF presented the preliminary study findings to NDDOT Management in September 2018 to solicit input on the study direction. A key directive taken from the meeting was to evaluate parallel routes to the US Highway 83/State Street corridor, with a goal being to identify potential local roadway improvements that may provide benefit (traffic volume reduction) to the current US Highway 83/State Street corridor (order of magnitude).

The chart below provides a planning-level capacity of various facility types, sizes (i.e. number of lanes), and level of service thresholds. The primary focus along the US Highway 83/State Street corridor was between I-94 and Century Avenue, where the future year 2040 average daily traffic volume is forecasted to be approximately 63,000 vpd. Based on the capacity ranges provided in the chart, it is estimated that a functional volume of approximately 48,000 to 52,000 vpd would need to be achieved for an acceptable level of service D or better. This would require a volume reduction of approximately 11,000 to 13,000 vehicles per day. This level of reduction in daily traffic volumes and/or a corresponding increase of corridor capacity are needed to achieve acceptable future traffic operations along the existing US Highway 83/State Street corridor.

Facility Type	Number of Lanes	Level of Service Threshold (<i>upper capacity limits</i>)					
		Approaching Capacity			At-Capacity	Over-Capacity	
		A	B	C	D	E	F
Interstate / Freeway	8	46,000	73,000	109,000	140,000	170,000	> 170,000
	6	34,000	55,000	82,000	105,000	127,000	> 127,000
	4	17,000	37,000	55,000	70,000	85,000	>85,000
Divided Arterial / Expressway	6	22,000	35,000	56,000	63,000	70,000	>70,000
	4	15,000	23,000	37,000	42,000	47,000	>47,000
Divided Minor Arterial	6	18,000	28,000	42,000	51,000	59,000	>59,000
	5	16,000	25,000	40,000	45,000	50,000	>50,000
	4	12,000	19,000	30,000	36,000	42,000	>42,000
	3	8,000	13,000	20,000	27,000	34,000	>34,000
	2	5,000	8,000	12,000	18,000	24,000	>24,000
	2 (one-way)	6,000	10,000	16,000	19,000	25,000	>25,000
Undivided Minor Arterial	6	17,000	27,000	40,000	49,000	57,000	>57,000
	5	15,000	24,000	38,000	43,000	47,000	>47,000
	4	11,000	18,000	28,000	34,000	40,000	>40,000
	3	7,000	12,000	19,000	26,000	32,000	>32,000
	2	4,000	7,000	11,000	17,000	23,000	>23,000
	2 (one-way)	6,000	9,000	15,000	18,000	24,000	>24,000
Collector	4	7,000	11,000	18,000	22,000	26,000	>26,000
	3	5,000	8,000	12,000	17,000	21,000	>21,000
	2	3,000	5,000	7,000	11,000	15,000	>15,000
	2 (one-way)	4,000	6,000	9,000	12,000	16,000	>16,000

Source: Highway Capacity Manual, Regional Model Case Study review, SRF Consulting judgement.

The north-south alternatives were reviewed from a planning-level capacity perspective. Recall, ATAC ran the Bismarck-Mandan Regional Travel Demand model to understand how changes to these facilities would impact area travel patterns and traffic volumes. The traffic volume/capacity focus of this analysis was on the existing US Highway 83/State Street corridor between Century Avenue and I-94, which represents the corridor segment expected to be significantly over-capacity under future conditions.

A summary of the resultant evaluation and volume reductions are presented in Figure 26. It includes preliminary cost estimates for each of the improvement scenarios as well as the expected volume reduction or capacity increase along the US Highway 83/State Street corridor. It also identifies a benefit/cost ratio, which helps compare the cost-effectiveness of the various improvement options.

In general, the benefit (i.e. reduction in average daily traffic volume) to the US Highway 83/State Street corridor from the various north-south alternatives range from approximately 3,000 to 10,300 vpd. However, based on the planning-level capacity thresholds and the necessary reduction to achieve adequate future operations, none of these improvement scenarios would solely address the long-term capacity issues identified along the US Highway 83/State Street corridor. Although, one or more of the north-south alternatives may be part of a long-term solution to ensuring the viability of the US Highway 83/State Street corridor.

Scenarios 1 through 3 are cost-effective striping improvements that are expected to benefit the US Highway 83/State Street corridor, particularly as operations near capacity. It is understood that parking restrictions would be needed to implement one or more of these options. Given the cost of other north-south improvements relative to their expected benefit, this may warrant further consideration by local officials.

In addition to the north-south alternatives, capacity increase at several the intersections along US Highway 83/State Street was identified. Most of the improvements identified are consistent with previous study work for the corridor within the past few years, and primarily include turn lane and safety improvements. The capacity increase from the grade-separation concept for the Interstate Avenue intersection was also included. In general, the intersection improvements increase capacity from approximately 2,400 to 15,000 vpd. As is the case with the north-south alternatives, the intersection improvements are not expected to solely address the long-term capacity issues identified along the US Highway 83/State Street corridor. However, one or more of the intersection improvements may be a part of a long-term solution to ensuring the viability of the US Highway 83/State Street corridor.



Improvement	Cost	Benefit to US Highway 83/State Street		Benefit/Cost
		Reduction in State Street Volume (ADT)	Increase in State Street Capacity (ADT)	
North-South Alternative Scenarios				
Scen 1 - 4th: Century to Divide (3-Lane)	\$ 80,000	3200	---	\$ 25
Scen 2 - 19th: Century to Divide (3-Lane)	\$ 97,000	3000	---	\$ 32
Scen 3 - 4th and 19th: Century to Divide (3-Lane)	\$ 177,000	4000	---	\$ 44
Scen 4B - Washington: Century to Divide (5-Lane)	\$ 16,700,000	4700	---	\$ 3,553
Scen 5 - 19th: Century to Divide (5-Lane)	\$ 17,100,000	7000	---	\$ 2,443
Scen 6 - Washington and 19th: Century to Divide (5-Lane)	\$ 33,800,000	7900	---	\$ 4,278
Scen 7 - Washington: Century to Broadway (5-Lane)	\$ 27,700,000	5100	---	\$ 5,431
Scen 8 - Washington: 71st to Broadway (5-Lane)	N/A			
Scen 9 - 19th: 43rd to Divide (5-Lane)	N/A			
Scen 10 - 8th (Underpass)	\$ 9,600,000	3500	---	\$ 2,743
Scen 11 - Interstate Loop (Overpass)	\$ 10,300,000	5300	---	\$ 1,943
Scen 12 - 8th and Interstate Loop (underpass and overpass)	\$ 19,900,000	6000	---	\$ 3,317
Scen 13 - 19th (5-Lane) and Washington (5-Lane): i.e. Scenarios 5 and 7	\$ 44,800,000	10100	---	\$ 4,436
Scen 13B - 19th (5-Lane) and Washington (5-Lane): i.e. Scenarios 5 and 4B	\$ 33,800,000	10100	---	\$ 3,347
Scen 14 - North River Crossing	\$ 130,600,000	3000	---	\$ 43,533
Scen 15 - Washington (5-Lane) and New West I-94 Ramps	\$ 28,800,000	6400	---	\$ 4,500
Scen 16 - 26th: 43rd to Divide	\$ 32,000,000	9100	---	\$ 3,516
Scen 17 - Washington and 19th (5-Lanes) + US 83 Alternative (2-Lane)	\$ 103,000,000	10300	---	\$ 10,000
Intersection Improvements				
Interstate Avenue - At-Grade Improvements (turn lanes)	\$ 370,000	---	2400	\$ 154
Interstate Avenue - Grade Separate	\$ 23,000,000	---	15000	\$ 1,533
Century Avenue - At-Grade Improvements (turn lanes)	\$ 1,920,000	---	2400	\$ 800
Harvest Lane/Weiss Avenue - At-Grade Improvements (turn lanes)	\$ 360,000	---	4000	\$ 90
Calgary Avenue - At-Grade Improvements (turn lanes)	\$ 660,000	---	8000	\$ 83

**Figure 26
US Hwy 83 North-South
Alternative Evaluation
Summary**

Bismarck-Mandan Metropolitan
Planning Organization
Prepared by: SRF Consulting Group, Inc.



Implementation Plan

As part of the US Highway 83 Alternative Study, an implementation plan was developed. The purpose of the implementation plan is to provide a clear systematic blueprint that outlines the vision of US Highway 83 with a series of improvement projects. This plan coordinates improvements identified based on the operational needs analyzed at key intersections along US Highway 83/ State Street. This outline of projects is not fiscally constrained based on available funds. A summary of the capacity needs by intersection and anticipated future year (range) is provided in Table 2. This data was used as one of the primary components in development of the implementation plan.

Table 2 – Operational Need Summary by Intersection

US Highway 83/State Street Intersection	Anticipated Improvement Need Timeframe
71st Avenue/ND Highway 1804	2030 to 2033
57th Avenue N	2026 to 2028
LaSalle Drive	2031 to 2034
Skyline Boulevard	2038 to 2040
43rd Avenue N	2030 to 2033
Holiday Inn Access/Frontage Road	2023 to 2025
Calgary Avenue	2028 to 2030
Harvest Lane	2033 to 2035
Century Avenue	2030 to 2033
McDonalds/KFC Access	2030 to 2033
Interstate Avenue	2030 to 2033
I-94 North Ramps	2035 to 2040
I-94 South Ramps	2033 to 2035

Based on the improvement need timeline, a preliminary implementation plan was developed (see Figures 27 through 30). There are multiple intersections that will require additional thought and discussion amongst the local partners to determine what level of investment should be put forward and when, with the understanding that additional improvements are needed in the future (i.e., Interstate Avenue and 43rd Avenue). At these two locations, at-grade turn lane improvements will extend the capacity of the intersections for a while, but will ultimately fail, likely requiring grade-separated improvements within the year 2040 study horizon. Therefore, officials will need to determine if interim at-grade improvements should be invested in or if a larger investment should be considered when the need arises. Note that at Century Avenue, the at-grade improvements will improve capacity, but there are significant constraints to being able to provide long-term acceptable operations at this intersection. Because of this, adjacent north-south corridor improvements should be considered as part of the overall implementation plan.

Year 2025 Improvements

- **Improvement 1 – At-Grade Improvements**
 - Calgary Avenue - \$660,000
 - Harvest Lane / Weiss Avenue - \$360,000
 - Century Avenue - \$1,920,000
 - Interstate Avenue - \$370,000
- **Improvement 2 – Holiday Inn Access**
 - Close or convert to RI/RO - \$75,000
- **Improvement 3 – 57th Avenue * Development Driven**
 - Turn Lanes and Traffic Control - \$1,550,000
- **Total 2025 Improvement Cost**
 - \$3,546,000 to \$3,916,000

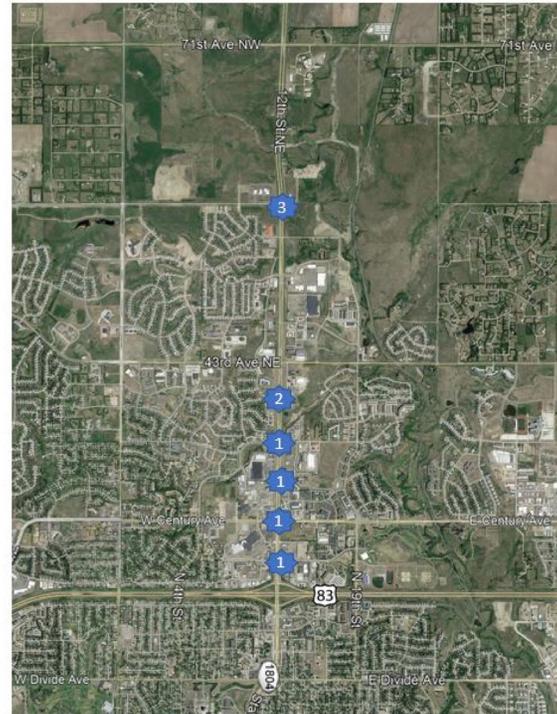


Figure 27
Implementation Plan
(Year 2025)

Bismarck-Mandan Metropolitan
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Year 2035 Improvements

- **Improvement 8 – 4th Street**
 - Restripe as 3-Lane Facility - \$80,000
- **Improvement 9 – 19th Street**
 - Restripe as 3-Lane Facility - \$97,000
- **Improvement 10 – US 83 Upgrade**
 - 6-Lane Urban Arterial - \$35,000,000
 - 4-Lane Expressway - \$42,800,000 *
- **Total 2035 Improvement Cost**
 - \$35,177,000 to \$42,977,000

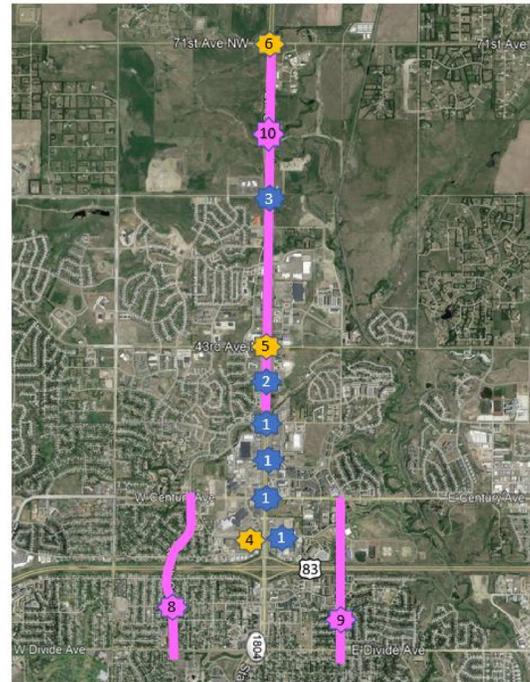


Figure 29
Implementation Plan
(Year 2035)

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Year 2040 Improvements

- **Improvement 11 – I-94 Interchange**

- Reconstruct - \$30,000,000

- **Total Corridor Investment**

- \$95M to \$155M
(includes I-94 Interchange)

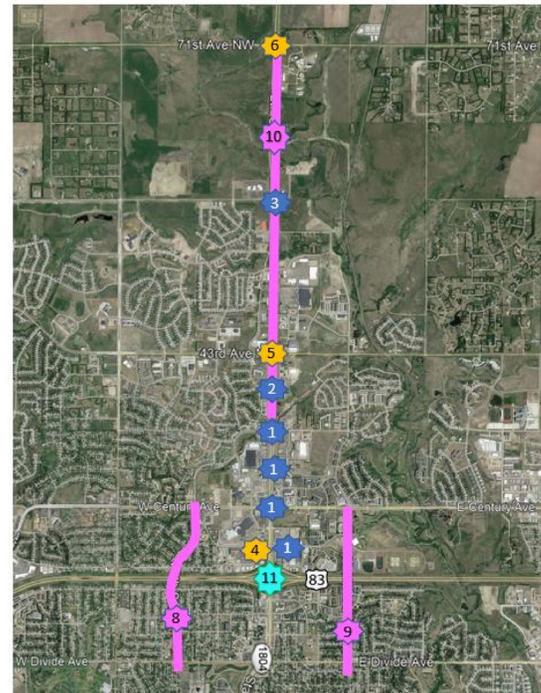


Figure 30
Implementation Plan
(Year 2040)

Bismarck-Mandan Metropolitan
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Next Steps

Although the implementation plan has specific dates and a general order of improvements, it is important for the local partners to consider reordering improvements down the line if the context at that time shows other benefits. For instance, local partners may feel implementing striping improvements along 4th Street and 19th Street may be more cost-effective compared to larger investments along the existing US Highway 83/State Street corridor. Local partners should continue to monitor operations and evaluate opportunities to implement all and/or a portion of the improvements identified as part of the implementation plan to ensure the long-term viability of US Highway 83. Further, these improvements will need to be considered in the broader scheme of potential improvements in the Bismarck-Mandan area and statewide needs as well.

The following steps should be considered by the study partners to move toward implementation:

- 1) Integrate the US Highway 83 Alternative Study findings into the Arrive 2045 Plan.
- 2) Consider future environment documentation of the alternative US Highway 83 alignments.
- 3) Consider future transportation studies, such as:
 - a. US Highway 83 Corridor Study – to better define impacts associated with the findings of this study
 - b. Bismarck North-South Arterial Study – to better define benefits and impacts associated with north-south connectivity within the community

Appendices

Final - July 2019

Appendix A: Public Engagement Materials

Appendix B: Existing Capacity Analysis Summary

Appendix C: Economic Development and Market Analysis

Appendix D: Year 2040 Capacity Analysis Summary

Appendix E: Detailed Cost Estimates