

*City of Minot, ND*

# TRANSPORTATION PLAN 2035



GOALS ALTERNATIVES ANALYSIS STRATEGIES SYSTEM IMPROVEMENTS DATA COLLECTION TRAFFIC FORECAST  
MODEL FUTURE ROAD NETWORK ANALYSIS SOUTHWEST BYPASS PRELIMINARY ANALYSIS US 83 BYPASS  
CAPACITY PUBLIC INVOLVEMENT EXISTING SYSTEM FUTURE TRANSPORTATION ISSUES IMPLEMENTATION

Final Document January 2015

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## ii. PREFACE



The Minot Area Long Range Transportation Plan serves as the region's guide to growth and transportation investments over the next 20 years. Plan elements were coordinated with other City efforts and with other agencies, in particular Ward County and the North Dakota Department of Transportation (NDDOT).

To achieve the Plan's desired outcomes, a series of tasks, activities, public meetings, and stakeholder involvement activities were completed. The study process included completing nine fundamental tasks:

1. Existing conditions
2. Goals/objectives/performance measures
3. Operations analyses and travel demand forecasts
4. Future system planning – subarea and corridor planning, future roadway network analysis, thoroughfare plan
5. System management – standards and policies
6. Implementation plan – revenue forecasts, project priorities, funding gaps, and funding strategies
7. Next steps outline – future planning guidance
8. Draft and final transportation plan
9. Public involvement program

With the recent surge in population, the City of Minot is approaching the federal threshold for designation as a Metropolitan Planning Organization (MPO)<sup>1</sup>. Project stakeholders agreed that this Plan would not be developed to meet federal MPO requirements, since Minot has not been designated and does not yet have the resources or responsibilities of an MPO. However, it was understood that the Plan should generally be organized in a manner that allows for a smooth transition to a fully compliant MPO transportation plan.

Therefore the Plan, in addition to fulfilling the objectives as cited above, was formulated to also serve as the initial document on which to build and transition the City's transportation planning efforts into a future MPO planning program. Specific activities to meet MPO requirements are listed in Chapter 8 – Next Steps.

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<sup>1</sup> The documentation by the US Census Bureau of Minot as an urbanized area with a population of greater than 50,000 people and the subsequent designation by US DOT of Minot as an MPO will have significant implications to the City. This federally mandated process requires an MPO be established to carry out the continuing, cooperative, and comprehensive ("3C") planning process as a condition of federal highway and transit aid.

# 1. INTRODUCTION



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# 1. INTRODUCTION



## OVERVIEW

The Minot Area Long Range Transportation Plan translates identified needs with specific actionable projects, prioritizes improvements to accommodate growth and the cities financial capacity, and presents new transportation initiatives and strategies.

The Plan elements were coordinated with other City efforts and with other agencies, in particular Ward County and the North Dakota Department of Transportation (NDDOT). These elements include:

- An assessment of existing conditions.
- Addressing multimodal needs for the City and its two-mile extraterritorial growth areas, as identified in the comprehensive plan.
- An updated traffic forecast model and future road network analysis.
- Short-term, medium-term, and long-term goals, policies, and performance measures.
- Subarea and corridor studies for the Southwest and US 83 Arterial.
- Alternative development and evaluation for identified existing and future system operational and capacity deficiencies, with a focus on the updated functional classification system.
- A future thoroughfare plan for the primary city roadway network (i.e., principle and arterial roadways).
- Project scoping, cost analysis, and prioritized project recommendations for system improvements.
- Plan implementation strategies and funding analysis for recommended system improvements.

## STUDY APPROACH AND PROCESS

To achieve the desired outcomes as noted above, a series of tasks, activities, public meetings, and stakeholder involvement activities were completed. The study process included completing nine fundamental tasks:

1. Existing conditions
2. Goals/objectives/performance measures
3. Operations analyses and travel demand forecasts
4. Future system planning – subarea and corridor planning, future roadway network analysis, thoroughfare plan
5. System management – standards and policies
6. Implementation plan – revenue forecasts, project priorities, funding gaps, and funding strategies
7. Next steps outline – future planning guidance
8. Draft and final transportation plan
9. Public involvement program

As indicated in the study process chart, Figure 1-1, each task was coordinated to lead to the next. Within each task a series of activities were identified and undertaken. These activities included

a variety of data assembly efforts, innovative technical analysis, practical implementation tools, and financial planning to help guide short and long-term improvements.

Overall, the transportation plan informs City policymakers on the conditions of the region's major transportation infrastructure assets, provides data on the level of investment needed to maintain and upgrade this infrastructure, and presents major findings to key stakeholders so that they understand these needs and can cooperatively work with the City to develop the future system.

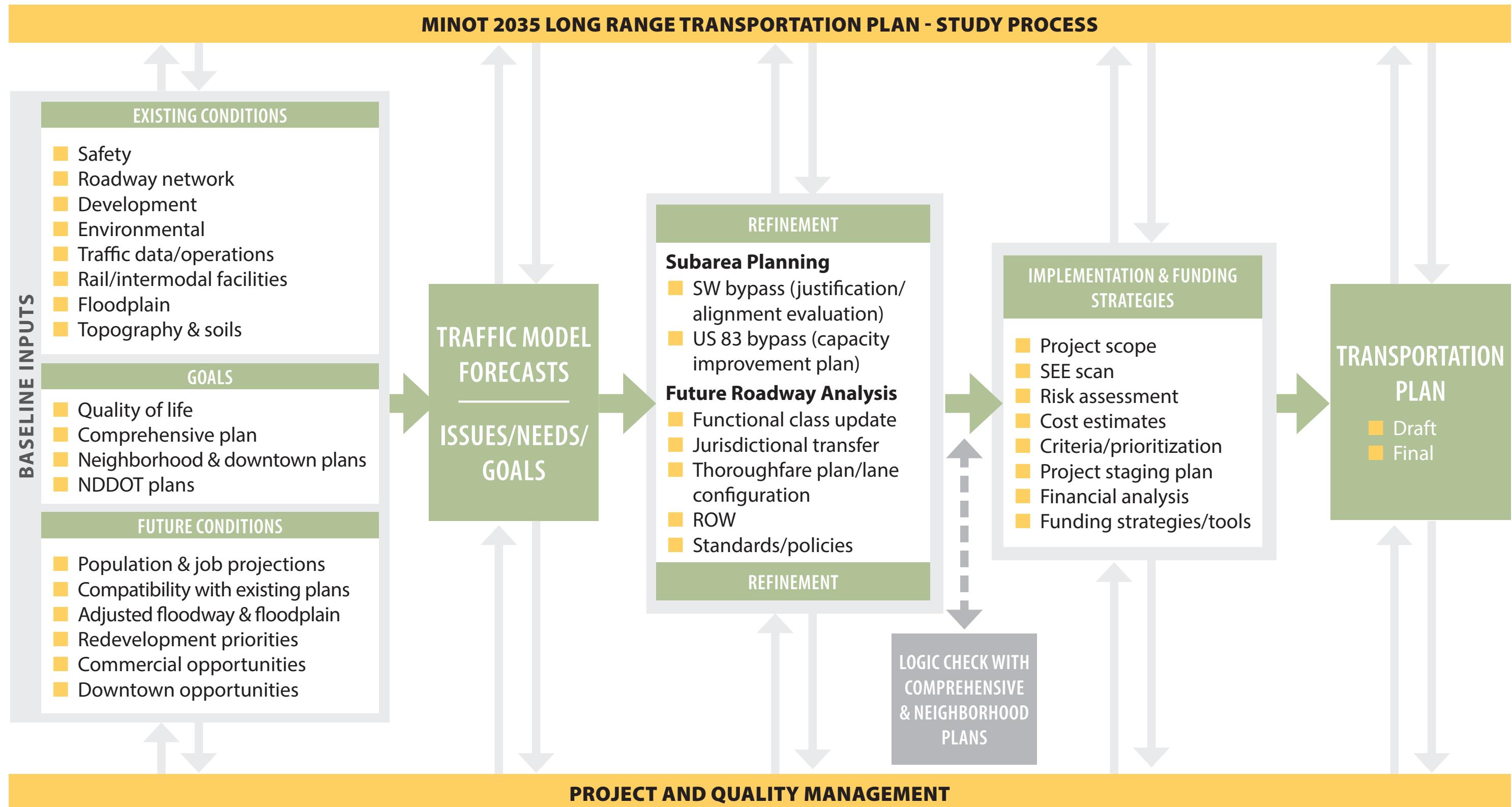
## PLAN FRAMEWORK

The City intends the Transportation Plan to serve as a blueprint for making transportation decisions. The Plan offers guidance and direction for elected leaders, citizens, economic interests, and stakeholders to achieve a shared vision for travel and mobility. In order to provide this guidance, the plan focused on six key planning elements, which include the following:

### EXISTING CONDITIONS

The existing conditions element provided a baseline to understand the current environment. This chapter presents current information on demographics, land use, roadway function and jurisdiction, existing traffic volumes and roadway congestion, a safety analysis, review of multimodal facilities, and a summary of identified issues and opportunities. The identification and confirmation of issues and opportunities was a focal part of the Plan, supported by technical analysis and input from focus groups and local stakeholders at public input meetings. All of the data presented and analyzed aided in the development of the Plan's goals, objectives, and performance checks, while providing insights on future roadway system operations and needs

Figure 1-1: Minot 2035 Long Range Transportation Plan - Study Process



## GOALS, OBJECTIVES AND PERFORMANCE MEASURE FRAMEWORK

In order to be effective, the Plan must address the City's stated transportation goals and objectives. The goals reflect the City's transportation vision, while the objectives provide direction and guidance in achieving those goals. These were developed early in the planning process based on a wide range of stakeholder input and were refined as the technical analysis progressed. In essence, the goals and objectives provided the foundation for the Plan's development, with performance checks identified to serve as benchmarks to assess progress on plan implementation

## TRAFFIC FORECASTS AND FUTURE TRAFFIC OPERATIONS

Over the next 20 years, Minot will experience change in land use patterns and traffic growth; it is important to recognize these changes and determine their impacts on the transportation system. Taking into account a metropolitan traffic model, 2025 and 2035 traffic volume forecasts were prepared. Using this data, existing and future level of service issues were identified for the network by conducting a corridor and intersection operations analysis. The traffic forecasts and operational analyses identified future traffic constraints to be addressed during the development of the future system plan.

## FUTURE SYSTEM ANALYSIS AND PLAN

The future roadway system plan considered all previous analyses, public input, and the updated goals and objectives to synthesize a coordinated set of system recommendations regarding future functional classification and jurisdiction. These recommendations were then expanded to prepare a future thoroughfare plan that identifies future intersection and lane configurations, and represents the universe of need-based projects identified to maintain or enhance mobility over the next 10 and 20 years. Further special analysis was completed for the US 83 bypass and a future SW bypass as well as 16th Street SW, US 2/42nd Street SE, and US 2/US 52/US 83 Access Alternatives.

## SYSTEM MANAGEMENT

The System Management section provides policy and tools needed to enhance and extend the utility of the current multimodal transportation system. These tools include access management, right-of-way (ROW) preservation, roadway setbacks, and guidance for a Complete Streets policy, transit enhancements, etc. The policy recommendations and tools identified in this section should be used in coordination with the recommendations identified in the implementation plan.

## IMPLEMENTATION PLAN

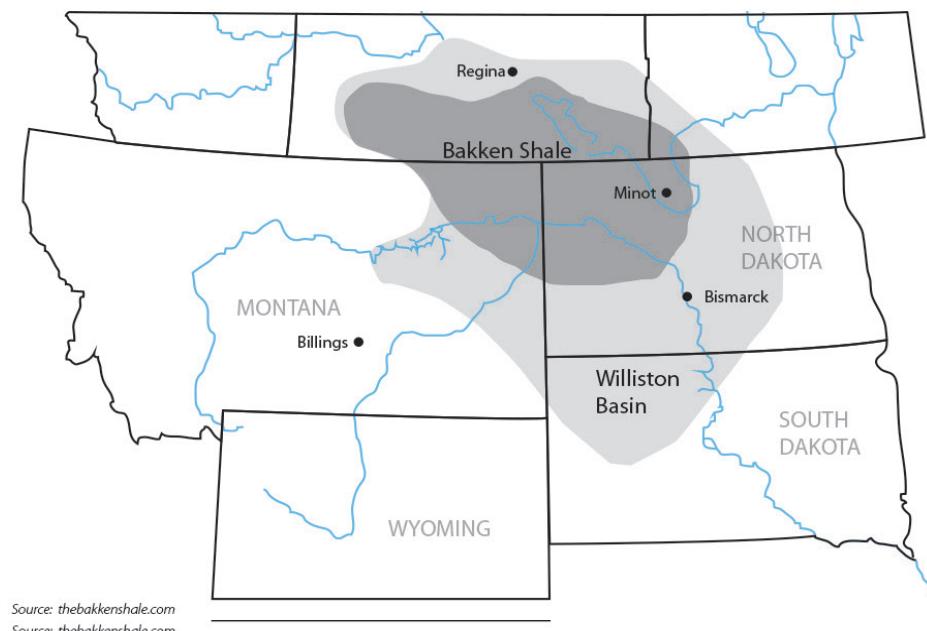
This section defines the scope and cost of needed roadway improvement projects, identifies potential environmental constraints, analyzes anticipated future revenue streams, presents the project prioritization method and schedule, and discusses the necessary steps and possible funding methods needed to implement the recommendations as identified in the Plan. Project recommendations were developed to maintain consistency with stakeholder input and technical analysis, while satisfying the identified goals. Projects were programmed into three phases: phase one between the years 2015-2019, phase two between the years 2020-2035, and phase three consisted of year 2035 or later.

## STUDY LOCATION

Minot is located at the crossroads of US Highways 83, US Highway 2, and US Highway 52 in north central North Dakota, approximately 50 miles south of the US/Canadian border. These three highways are the only facilities that accommodate long haul trips to and from other portions of the state.

Minot is located on the eastern edge of the Bakken Formation, an expansive oil reserve that is now the source of 10 percent of the US's total oil production (Figure 1-2). Being situated at the crossroads of three major US highways has resulted in Minot becoming a regional activity hub for oil-related workers and employers. This activity has spurred a surge of development and growth within the region, with long-term outlooks indicating that oil production will remain stable for the foreseeable future. As a result, Minot has encountered some of the dramatic growth experienced by much of the western part of North Dakota. This is evident when viewing the historical and recent traffic volumes in and around Minot, as further discussed in the existing conditions chapter.

*Figure 1-2: Bakken Shale Formation Overview*



## STAKEHOLDER INVOLVEMENT PROCESS

Public participation and agency coordination was an important element in identifying issues and needs and in building support for the overall Transportation Plan. Transportation projects are major public investments that impact and serve residents of the greater Minot area and those traveling through the region. In order to build consensus and garner support for the Plan, a series of stakeholder meetings and open houses were conducted. Below is a summary of the key groups and their role in the Plan's Development.

### PROJECT MANAGEMENT TEAM

A Project Management Team (PMT) was established to actively guide the development of the Plan. The team was composed of City, Ward County, and NDDOT staff. Five PMT meetings were held at strategic intervals throughout the Plan process to review technical analyses and provide input on the Plan contents.

## FOCUS GROUP SESSIONS

Early in the planning process, focus group sessions were held with local stakeholder groups and included representatives from the following groups:

- Local Business Community and Developers
- Emergency Responders

The purpose of the focus group meetings was to establish a clear understanding of community issues and opportunities related to the transportation system. This input was supplemented with comments received during the first public open house meeting and ongoing PMT meetings.

## OPEN HOUSES

Three public open house meetings were held during the planning process. These meetings were conducted to provide stakeholders information on the Transportation Plan and to seek input on programming proposals or concepts. Display boards, presentations, surveys, and comment forms were used to engage the public at these meetings. Importantly, the open house format offered an informal venue for citizens, agency staff, and community leaders to ask questions, and give their thoughts on the Plan findings and recommendations.

## PROJECT WEBSITE AND SOCIAL MEDIA

A project website was established to communicate the project schedule, opportunities for public involvement, provide meeting materials, highlight project milestones, and present study products. The website provided an additional resource for citizens, agency staff, and community leaders so they could monitor ongoing progress throughout the planning process.

In addition to the project website, a Facebook page and Twitter account were incorporated to expand public engagement and reach community members who frequently use social media. These resources provided opportunities for stakeholders and citizens to stay more engaged with the project or provide additional input throughout the planning process.

## NDDOT MANAGEMENT MEETING

A meeting with NDDOT Central Office upper management officials was conducted to ensure compliance with NDDOT policies and standards. These meetings were also used to gain input from NDDOT management staff on the preliminary findings, recommendations, and proposed priorities, as identified during the planning process. Funding needs were also discussed based on a fiscally conscious approach that forecasted anticipated revenue streams, and then compared these against the Plan's project prioritization schedule to identify potential funding gaps.

## CITY COMMITTEE AND COUNCIL MEETINGS

The final Transportation Plan was presented to the Minot Public Works and Safety Committee to ensure their understanding of planning activities and to seek policy direction or feedback. Further, at the end of the planning process, the recommendation of the Public Works and Safety Committee was to adopt the Plan, and the recommendation was approved by the City Council.

## 2. EXISTING CONDITIONS



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## 2. EXISTING CONDITIONS



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## 2. EXISTING CONDITIONS



### OVERVIEW

This chapter summarizes Minot's existing demographics and land use, and assesses a wide-range of transportation system elements. This information identified and documented future growth and key transportation-related issues that affect the Minot area transportation system. This data also formed the foundation for the Plan's goals and objectives and provided important baseline information needed for critical system analyses, which established the basis for the future system recommendations.

## DEMOGRAPHICS

### POPULATION

Along with the western portion of the state, Minot has experienced unprecedented growth. The 2010 US Census recorded 40,888 people living in Minot. Similar to other oil impacted cities in western North Dakota, the actual population is likely greater than the Census count. Below are population estimates and projections that have been prepared over the last few years by various planning studies:

- 40,888 – 2010 population (U.S. Census)
- 42,515 – 2010 population estimate (Stantec, 2010)
- 44,154 – 2010 population estimate (Ondracek & Witwer, 2011)
- 43,916 – 2012 population estimate (U.S. Census Bureau)
- 46,321 – 2013 population estimate (U.S. Census Bureau)
- 53,000 – 60,000 – 2017 population estimate (The Impact Assessment Group, 2013)
- 47,400 – 2030 population low estimate (Stantec, 2010)
- 49,000 – 2030 population middle estimate (Stantec, 2010)
- 54,900 – 2030 population high estimate (Stantec, 2010)
- 54,438 – 2030 population estimate (Ondracek & Witwer, 2011)

The estimates vary for both the existing population of Minot as well as its projected population. The difficulty in estimating the population is the result of unique factors presently associated with the major Bakken Shale Oil play affecting North Dakota, as noted in the introduction. For example, it is difficult to estimate the populations of people living in and around Minot because they may be living in an unaddressed dwelling, not considered a permanent resident, frequently moving from one location to another, or living in an undocumented dwelling unit or in a recreational vehicle. This situation results in a significant underrepresentation of the population actually residing in and around Minot.

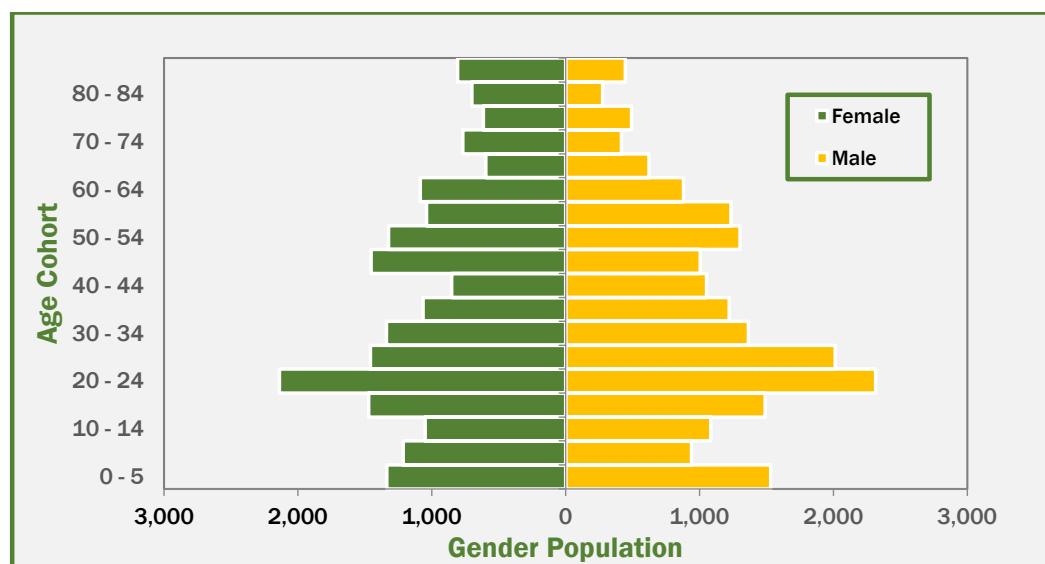
### AGE COHORTS

The age of the area population also plays a role in transportation, as different age groups use the transportation network in different ways. Younger populations tend to frequently use the bicycle and pedestrian amenities that are provided. Working-aged populations utilize the transportation system to commute to employment centers, or conduct various daily needs (shopping, recreation,

etc.). The elderly and low to moderate income populations tend to make up a larger percentage of those that need public transit (i.e., paratransit or dial-a-ride services). Further, the location of these age cohort populations can play an important role in the framework of a transportation network.

The age composition of Minot's population is evolving, primarily due to the new labor market in western North Dakota, and these local conditions are at variance with national trends. Nationally, the percentage of the population under 20 years of age is decreasing while the percentage of people between 50 and 65 is increasing. However, in Minot the older populations make up a smaller proportion of the general population (see Table 2-1), and there has been a dramatic increase in the "young adult" population (ages between 20 and 35). From year 2000 to 2010, this younger age group increased between 25 and 40 percent. This can be explained by the nature of the labor force needed for oil production and the expanding economy of North Dakota. A more detailed analysis of age demographics can be found in Minot's Comprehensive Plan, which was recently updated in year 2012.

*Table 2-1: Minot Age Breakdown*



Source: US Census, 2010.

## HOUSEHOLD AND HOUSING TYPE

According to the 2010 Census, one third of the households within Minot are unmarried singles, one quarter are married without children, one sixth are married with children, and the remainder consist of households classified as other. This data, with its relatively low percentage of families with children, indicates a very unique household demographic, as compared to most of North Dakota.

Over half of the residential units in Minot are single-family dwellings, one third consist of apartments or condos, and one tenth are mobile homes. The 2012 Minot Comprehensive Plan details the number of building permits for each housing type and provides an average of the number of housing units permitted each year starting in 1998. Since the resurgence in oil production in 2008, Minot has issued an average of 637 new housing permits per year.

## EMPLOYMENT

Most household trips are those going to and from places of employment, which is substantiated by the hours during which the highest traffic counts have been recorded (typically 7-9 a.m. and 4-6 p.m.). Understanding where major employers are located throughout the Minot area provides a good understanding of travel behavior, especially during morning and evening peak hours of travel.

Minot is a regional hub for both retail and health care, as Minot is one of the largest cities in not only the region, but in North Dakota. The biggest employers (see Table 2-2) are the Minot Air Force Base, Trinity Health, Minot Public Schools, Minot State University, Cognizant Minot Service Center, City and County government, and the retail sector. Each of these employment sectors has varying demands and impacts on the transportation network. The travel demand model developed as part of this transportation plan considered these employers, as well as employment centers, when forecasting future (year 2035) travel needs for the Minot area.

*Table 2-2: Major Employers - Minot Area*

MAJOR EMPLOYER	PRODUCT OR SERVICE	EMPLOYEES
Minot Air Force Base	Armed Services	7,500
Trinity Health	Health Care Facilities and Clinics	2,790
Minot Public Schools	Education	1,600
Cognizant Minot Service Center	Financial Services	934
Minot State University	Education	700
Minot Vocational Adjustment Workshop	Social Services	602
Miracle Mart	Grocery Stores	500
Wal-Mart Super Center	Discount Retail	455
MLT, INC	Hospitality	321
City of Minot	Local Government	311
Menards	Building Products	250
Ward County	Local Government	230
SRT Communications	Telecommunications	227
Dakota Boys & Girls Ranch	Social Services	188

*Source: MCDA, Minot Chamber of Commerce, City of Minot*

# LAND USE

## EXISTING LAND USE

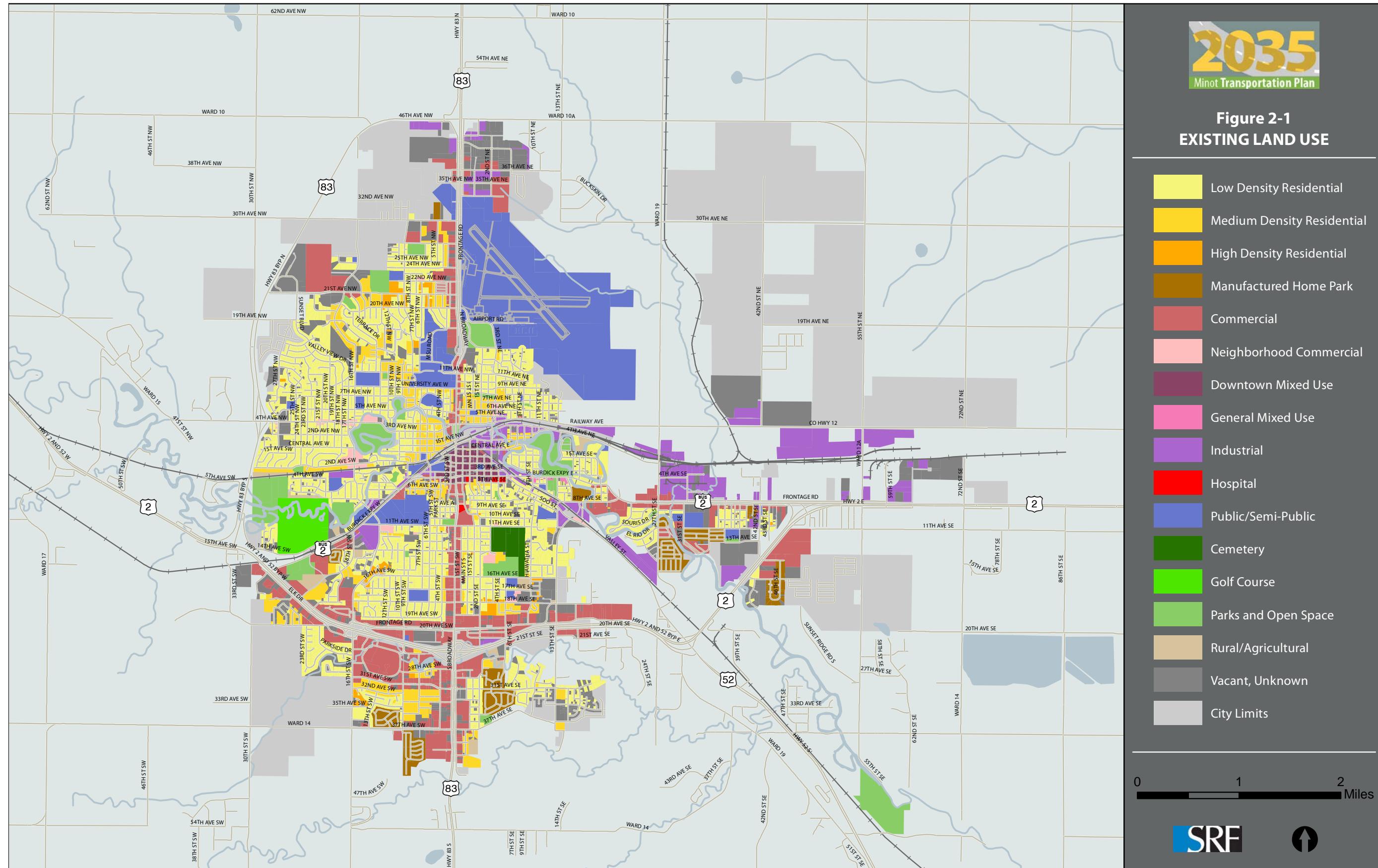
Land use and transportation are directly linked, such that travel behavior is determined by the spatial location of where people live in relation to where they work and consume goods and services. In order to evaluate the transportation system, a key component is an understanding of land uses within the City. Figure 2-1, taken from the City's Comprehensive Plan, illustrates the current City of Minot's land use. Table 2-3 provides a summary of the City's land use by type and acreage. It should be noted that this analysis represents a snapshot in time, as the City is rapidly expanding to accommodate growth, with land use patterns changing accordingly.

*Table 2-3: Minot Land Use Summary*

LAND USE	ACRES	PERCENT
Cemetery	64.8	0.5%
Commercial	1,191.0	9.9%
Downtown Mixed Use	55.3	0.5%
General Mixed Use	5.1	0.0%
Golf Course	134.8	1.1%
High Density Residential	72.7	0.6%
Hospital	8.0	0.1%
Industrial	654.3	5.5%
Low Density Residential	2,326.3	19.4%
Manufactured Home Park	293.5	2.4%
Medium Density Residential	548.5	4.6%
Neighborhood Commercial	58.4	0.5%
Parks and Open Space	381.9	3.2%
Public/Semi-Public	1,582.7	13.2%
Rural/Agricultural	2,018.5	16.8%
Open Water	208.8	1.7%
Wetlands	146.5	1.2%
Right-of-Way	2,243.9	18.7%
<b>Total</b>	<b>11,994.9</b>	

Source: City of Minot Comprehensive Plan, 2012

Figure 2-1: Existing Land Use



## Residential

Residential land uses comprise over half of the City's land use when public infrastructure, like the road network and airport, are not considered. The predominant form of housing in Minot is single-family.

The street network within existing residential neighborhoods is generally laid out in a grid pattern. However, newer subdivisions have gone away from a strict grid pattern to a suburban style layout with long sweeping curved streets and the integration of cul-de-sacs; these neighborhood layouts tend to be located on the fringe of the city.

## Commercial

Commercial uses comprise approximately 10 percent of the land area of Minot. Commercial areas rely heavily on the transportation network and as such are mostly located along roadways that carry high volumes of traffic. This is evident in Figure 2-1, which details the location of commercial zones within Minot. Access to these major roadways has a dramatic effect on the safety and functionality of the adjoining roadway.

A substantial investment is being made in Minot's hotel/motel market. Nearly 20 percent of the investment in new commercial/industrial properties has come in the form of hotel/motel development, according to the Minot Comprehensive Plan. A unique trend that has occurred in western North Dakota is that hotels have been leasing rooms to oil production workers for extended stay purposes due to the shortage of housing. Therefore, large populations are residing in these facilities for extended periods of time.

## Industrial and Office

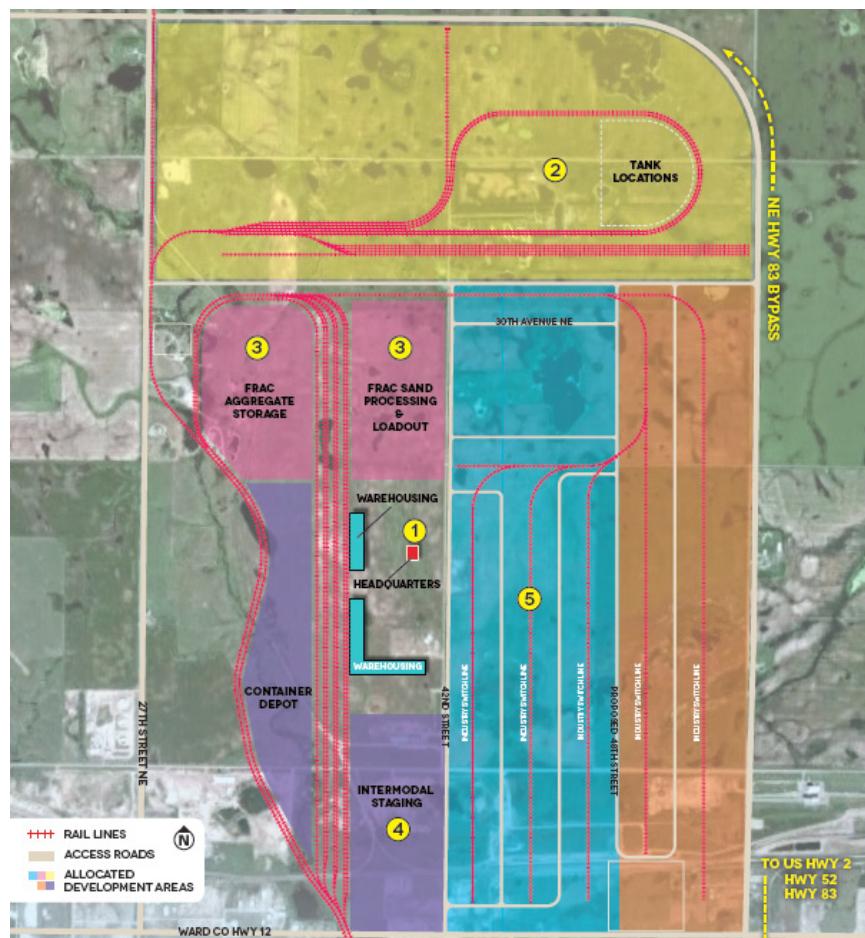
Industrial land uses make up approximately six percent of Minot's land area. Industrial uses are highly dependent upon the transportation network, but in different ways than commercial uses. Whereas commercial uses seek high traffic locations, industrial uses seek locations with easy access to interregional transportation facilities.

The transportation of goods throughout the region is a driving force for industry. Transportation networks play a vital role in bringing goods to market, supplying natural resources to companies, and providing just-in-time parts delivery for value-added manufacturing. The location of Minot along major US highways and rail lines makes this area a prime regional hub for the distribution/warehousing of goods for northern and northwestern North Dakota.

Nearly 50 percent of this new development has come in the form of industrial and manufacturing, with prime examples including customer services centers, warehouses, distribution centers and non-residential buildings. Many of these facilities are located on the fringe of Minot, along County Highway 10, County Highway 19, East Burdick Expressway, and 55th Street NE where large undeveloped land is available.

It is in this northeast section of Minot that the Port of North Dakota is located. This is a 3,200-acre industrial development with more than 45 miles of rail spur track, an intermodal facility, and the new 55th Street overpass over the BNSF mainline (Figure 2-2).

Figure 2-2: Port of North Dakota Expansion Plan



Source: Minot Area Development Corporation

Industrial uses typically attract higher truck volumes. Truck traffic in western North Dakota has increased dramatically with increased oil production activities. Trucks use more space, are slower, less maneuverable, and cause more wear to the roadway than a typical automobile. As such, pavement design and truck routing to minimize impacts on the system is critical when evaluating the transportation system.

Additionally, Minot makes a distinction between office uses and industrial uses. Office uses could generally fit into either category and elsewhere are usually allowed in both uses. However, office designations were included in this section because of the proximity to industrial zones and the impact on the transportation system. Office use accounted for approximately one percent of the current developed land area within the City. Office uses, along with industrial uses, are major employment centers drawing a large number of employee trips during peak hours.

### Public

Public land uses make up approximately 13 percent of the land area of the City of Minot (Table 2-3). Public uses include schools, public golf courses, parks, cemeteries, zoos, the international airport, and other publicly-owned places. Public areas are often destination points with high travel and tend to be areas where pedestrians frequent. Public uses such as schools and parks have special speed designations, pedestrian crossing points, and public parking (either on or off-street).

## Surrounding Communities

There are two small community areas that also influence land use and will impact traffic patterns in the future transportation network. These communities include Surrey and Burlington.

Surrey is located east of Minot on US Highway 2. Surrey is a small, but rapidly expanding community of approximately 1,100 residents. The City does not currently have the retailers and services needed to support most day-to-day needs of its residents. It can be considered a bedroom community with most households having at least one wage-earner who commutes into Minot for work. Future expansion plans for Surrey include the Silver Springs and Heartland Hills developments in the vicinity of US Highway 2, which would provide additional commercial and residential growth opportunities.

Burlington is located west of Minot's prime growth area along the north side of US Highway 2. The 2012 population estimate for Burlington was 1,200 residents. Similar to Surrey, Burlington residents are strongly dependent on Minot for retail, services, and jobs. This community is also growing, with at least four large developments (e.g., Harvest Heights, Highlands Ranch, Energy Park West, and Behm's) currently planned along the US Highway 2 corridor. These developments would provide additional residential, commercial, industrial, and retail employment sites, as well as a new government center with police, fire, City Hall, and community center.

According to a study prepared in coordination with the Minot Chamber of Commerce, year 2017 population projections for the Cities of Surrey and Burlington have been estimated at 4,650 and 6,650, respectively.

## ENVIRONMENTAL

Minot is located in an area of North Dakota that transitions from the prairie of the eastern part of the state to the buttes and badlands of the western portion of the state. As such, Minot's terrain is composed of mostly gently rolling hills, attenuated by steep grades forming coulees along the river basins. Much of Minot is located along the low Souris River Basin. Outside of this river valley, however, undulating terrain and other geologic formations become more prominent.

Similar to the rest of North Dakota, the Minot area has a very high water table. Depressed, or low areas, tend to fill with water quickly. The soil composition, which is mainly clay, makes it difficult for water to infiltrate into the ground, causing water to collect in low-lying areas and reducing the life cycle of roadways.

The terrain, drainage, and soil characteristic need to be recognized when designing and constructing future transportation projects.

## RIVERS AND STREAMS

The Souris River bisects Minot and creates a natural barrier for transportation facilities. For the most part, the river is a barrier for north/south movement of traffic, but the angled alignment of the river also creates barriers for east/west street connectivity in some areas of the City. The roadways below provide opportunities to cross the Souris River:

- 54th Street NW
- US Highway 83 Bypass
- 16th Street NW
- 2nd Avenue SW

- 3rd Avenue NW (in two locations)/4th Avenue NW
- 6th Street NW
- North Broadway (US 83)
- 3rd Street NE
- 7th Street NE
- Burdick Expressway
- 8th Avenue SE
- 27th Street SE
- US Highway 2 E
- 37th Avenue SE

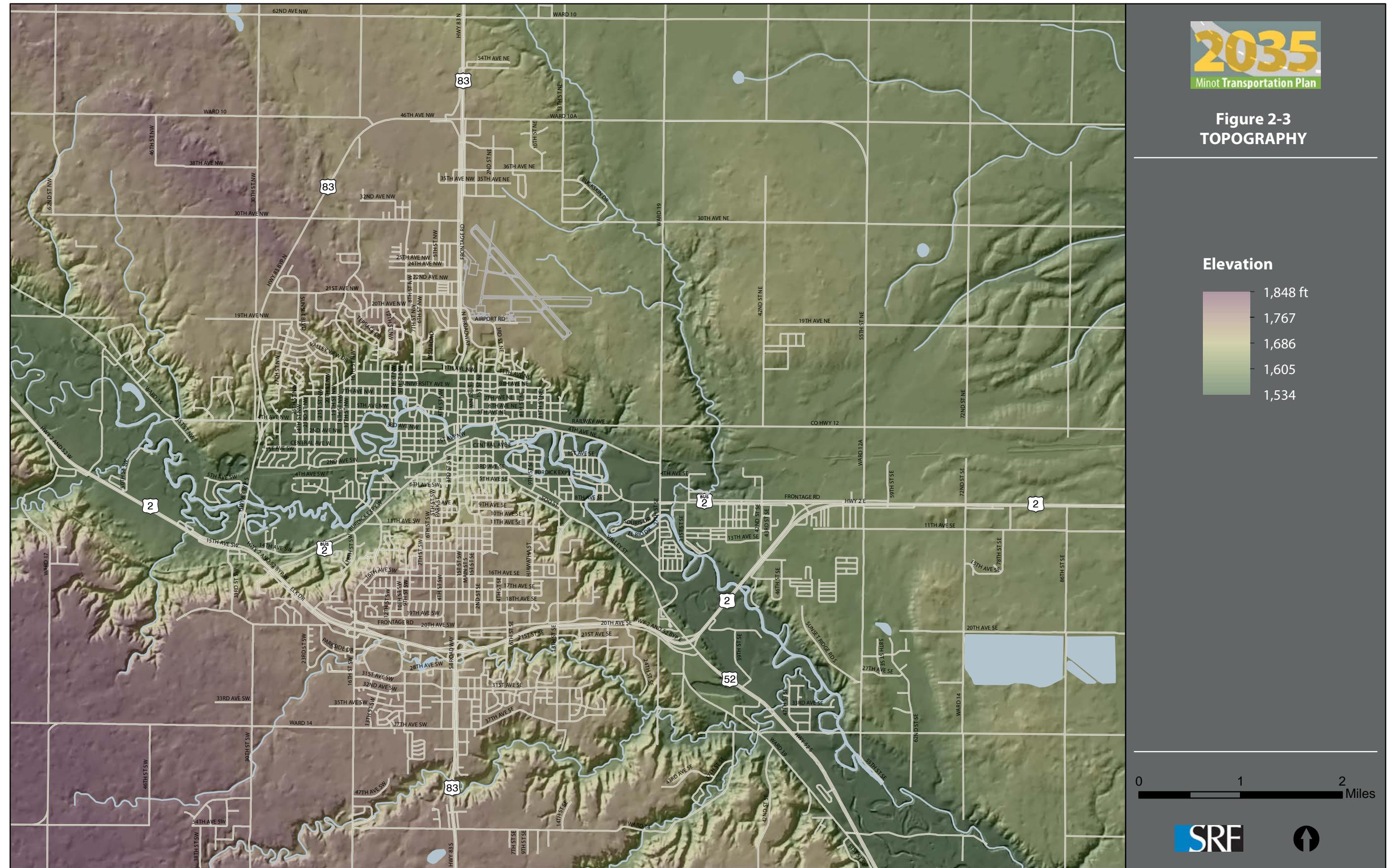
Because of their river crossings, these roads are particularly important as other roads funnel traffic onto these facilities. These streets are usually within a half mile from one another in the heart of the City. Directly outside of the urban core, bridges are spaced approximately one mile apart; in some areas, however, the travel distance to get to these crossings is much greater. This is especially true west of the City on US Highway 2, where there is only one opportunity to cross the Souris River, after passing the US Highway 83 Bypass.

## FLOODING

Since much of Minot was built within the Souris River basin, many of the key roadways servicing the heart of the City are prone to flooding, and, in fact, a significant portion of the valley and parts of downtown experienced a major flood in 2011. Minot has an intricate system of levees protecting the core of the City, and improvements to this system are currently being designed.

During flood conditions, as experienced by the major flood in 2011, alternative or evacuation routes must be relied upon. This is also true of overland flooding, which is common in many of the low-lying areas throughout Minot. Figure 2-3 depicts the topography of Minot, providing insight on which areas of the City are prone to possible flooding. When planning for and designing new roadways this must be taken into consideration.

Figure 2-3: Topography



# ROADWAY SYSTEM

## JURISDICTION

The management of roadways should be closely aligned with its function and the jurisdiction best suited to maintain it. The jurisdiction of roadways is an important component of the Plan because it defines the regulatory, maintenance, construction, and financial obligations of each governmental unit.

Jurisdictional classification documents these responsibilities among state, county, municipal, and township agencies. The hierarchy of jurisdictional classification is typically established so that higher-volume, regional corridors carrying inter-county traffic are maintained by NDDOT (e.g., interstates and state highways), while intermediate volume corridors that primarily carry more intra-county traffic are maintained by Ward County, and roadways serving local traffic are maintained by Minot and the surrounding townships. Figure 2-4 summarizes the typical characteristics for each jurisdiction that manages the roadways within the Minot region.

Figure 2-4: Jurisdictional Classification Characteristics

**STATE SYSTEM**

- Statewide function
- Multi-county facilities
- Regional Connectivity
- Higher Travel Speeds

**COUNTY ROAD SYSTEM**

- Regional connectivity
- Moderate traffic volumes
- Connect urban and outlying rural areas
- Paved or gravel routes

**CITY ROUTES**

- Short segments with small travelsheds
- Serve local land access needs
- Moderate traffic volumes
- Limited continuity with rural areas

**TOWNSHIP**

- Limited travelsheds
- Lack of continuity
- Low traffic volumes
- Provide access to adjacent property



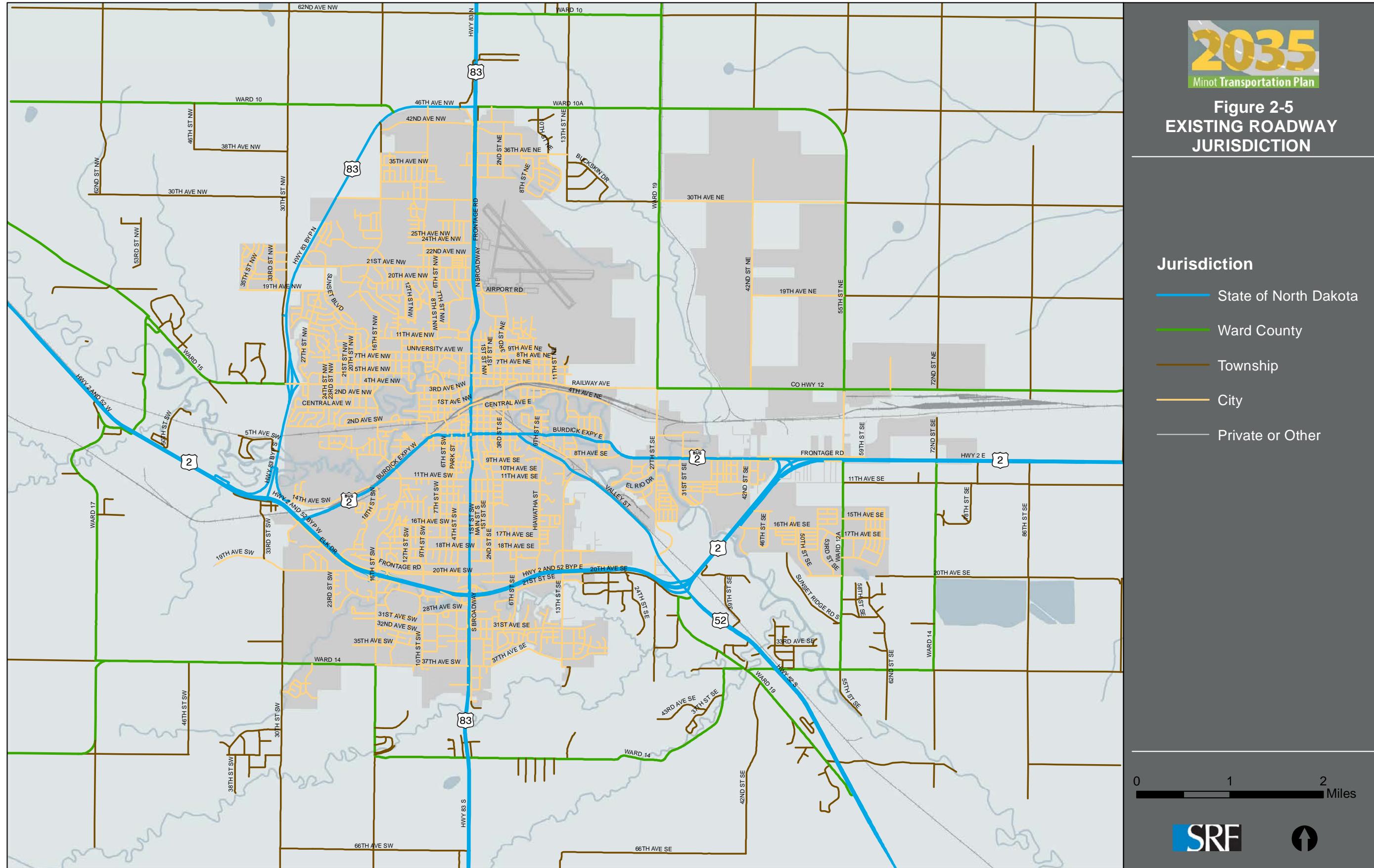
Table 2-4 below, provides a mileage summary of current roadway jurisdiction within Minot. Figure 2-5 illustrates, by map, the roadway jurisdiction in and around the City of Minot.

*Table 2-4: Minot Jurisdictional Roadway Summary*

JURISDICTIONAL CLASSIFICATION SYSTEM	MILES	SYSTEM %
State	50.3	9.6%
County	55.5	10.6%
Township	144.5	27.7%
Local	268.8	51.5%
Private	2.9	0.6%
Subtotal	521.8	100.0%

It should be noted, within Minot, due to some past roadway agreements, the City maintains some segments of the State roadway system.

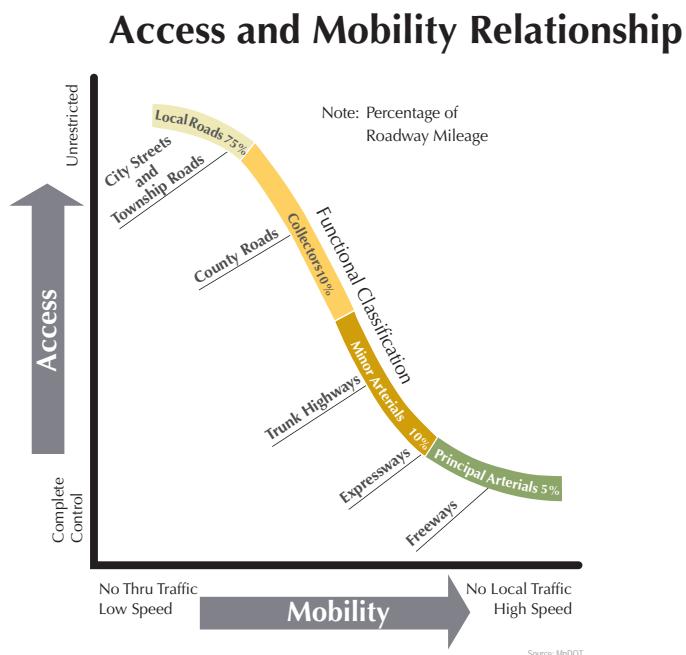
Figure 2-5: Existing Roadway Jurisdiction



## FUNCTIONAL CLASSIFICATION

The functional classification system defines both the function and role of a roadway within the hierarchy of an overall roadway system. This classification system is used to create a roadway network that collects and distributes traffic from neighborhoods and ultimately to the state highway system. A good functional classification system coordinates and manages mobility, roadway design, and alignment of routes. Functional classification also seeks to match current and future access and land use with the adjacent roadway's purpose, speeds, and spacing. Figure 2-6 illustrates the relationship between functional classification, access, and mobility.

*Figure 2-6: Access-Mobility Relationship*



By maintaining and periodically updating the City's functional classification system, local agencies and planning officials are able to manage access, promote mobility, and design roadways appropriately for their current and intended future function. The formal process of determining urban and rural functional classification is outlined by the FHWA's Manual, Highway Functional Classification – Concepts, Criteria and Practices, 2013.

An important element of this Plan is a review of the current functional classification system. The objective of this analysis is to achieve better performing and better alignment of routes, where functional classification designations match current and future land use and roadway purpose.

A roadway's functional classification is based on a number of factors including:

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

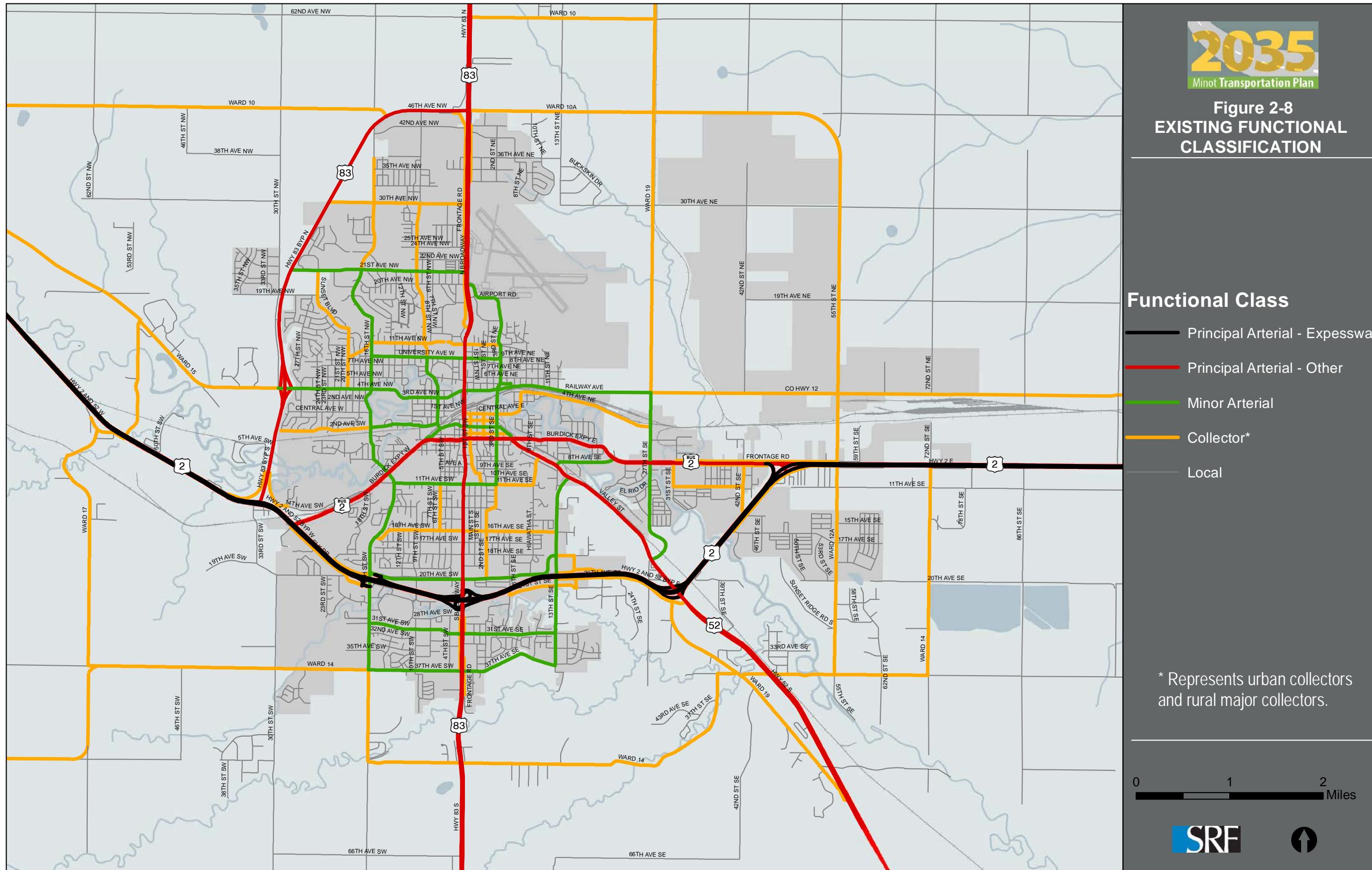
The City's functional classification system is broken down into four major categories: principal arterials, minor arterials, collectors, and local roadways. Figure 2-7 illustrates the typical functional characteristics of each of these four categories.

*Figure 2-7: Functional Classification Characteristics*

<p><b>PRINCIPAL ARTERIALS</b></p> <ul style="list-style-type: none"> <li>■ Connect major activity centers</li> <li>■ Provide significant continuity at a regional level</li> <li>■ Serve long distance trips</li> <li>■ Provide limited access and high speeds</li> <li>■ Serve regional or statewide travesheds</li> <li>■ Example:</li> </ul>	
<p><b>MINOR ARTERIALS</b></p> <ul style="list-style-type: none"> <li>■ Connect key activity center</li> <li>■ Provide continuity on a sub-regional level</li> <li>■ Serve medium to long distance trips</li> <li>■ Provide limited access and high speeds</li> <li>■ Serve regional travesheds</li> <li>■ Example:</li> </ul>	
<p><b>COLLECTORS</b></p> <ul style="list-style-type: none"> <li>■ Connect local activity centers to arterials</li> <li>■ Provide increased continuity at a local level</li> <li>■ Serve short to medium length trips</li> <li>■ Balance emphasis of access and mobility</li> <li>■ Provide access to localized areas</li> <li>■ Example:</li> </ul>	
<p><b>LOCAL ROUTES</b></p> <ul style="list-style-type: none"> <li>■ Connect neighborhoods, businesses and schools</li> <li>■ Provide access to higher-order roadways</li> <li>■ Provide lowest degree of continuity</li> <li>■ Allow closely spaced access points</li> <li>■ Provide direct access to property</li> <li>■ Serve limited travesheds</li> <li>■ Example: Township roads, city streets</li> </ul>	

Figure 2-8 displays the existing functional classification system for the City's roadways.

Figure 2-8: Existing Functional Classification



## Federal Functional Classification Guidance

The US Census Bureau considers municipalities with populations over 5,000 as “urban areas.” While established urban limits may not directly influence a route’s function, they may trigger a change in the functional classification terminology. The Federal Highway Administration’s (FHWA) new guidance now allows an upgrade by one classification when a roadway enters an urban area only if the function of the road changes at the boundary (e.g., collectors from the rural areas entering into an urban area may be upgraded to minor arterials only if the function actually changes. This is no longer an automatic practice).

FHWA has established functional classification guidelines that are commonly used by NDDOT and North Dakota cities and counties as a comparison tool. Table 2-5 provides the FHWA guidelines for the ideal ranges of system mileage for urban functional classification systems.

*Table 2-5: Guidelines Urban Area Functional Classification System*

FUNCTIONAL CLASSIFICATION SYSTEM		FHWA GUIDELINE	
Principal Arterial	Interstate	1 - 3 %	5 - 14%
	Other Freeways & Expressways	0 - 2 %	
	Other Principal Arterials	4 - 9 %	
Minor Arterial		7 - 14 %	
Major Collector	Major Collector	3 - 16 %	6 - 32 %
	Minor Collector	3 - 16 %	
Local		62 - 74 %	

Source: FHWA Functional Classification Guidelines – Concepts, Criteria and System Characteristics, 2013.

Table 2-6 summarizes the current Minot functional classification system by mileage and the deviation from FHWA standards. The City’s current functional classification system has not been stratified into urban major and minor collectors. Throughout the development of the Plan the NDDOT has provided guidance on how to implement the new FHWA guidelines, and it was decided that collectors would be further classified into urban major and minor subcategories for future functional classification.

*Table 2-6: Current Minot Urban Functional Classification Mileage and Deviation*

FUNCTIONAL CLASSIFICATION SYSTEM		MILES	SYSTEM %	FHWA GUIDELINE		RANGE	
Principal Arterial	Interstate	0	0%	1 - 3 %	5 - 14%	Within	
	Other Freeways & Expressways	13	2%	0 - 2 %			
	Other Principal Arterials	34	6%	4 - 9 %			
Minor Arterial		29	6%	7 - 14 %		Lower	
Major Collector		89	17%	3 - 16 %	6 - 32 %	Within	
Minor Collector		0	0%	3 - 16 %			
Local		358	69%	62 - 74 %		Within	
Subtotal		522	100%				

The City should attempt to be consistent with the FHWA guidelines, but since Minot is a rapidly growing urban area, it can expect to have some deviation from the provided guidance. The City is slightly lower in the minor arterial range, providing the City an opportunity to adjust its functional classification. This can be accomplished in the future functional classification plan by constructing new minor arterials or upgrading existing collectors to minor arterials.

## SYSTEM CONTINUITY AND CONNECTIVITY

Also noted earlier, the Minot transportation system is challenged by natural and physical barriers that limit roadway continuity and connectivity. Despite these challenges, the City and NDDOT have established several corridors that promote high speed travel and regional mobility. They include the US Highway 2, US Highway 83 (Broadway), as well as Burdick Expressway, the US 83 Bypass, 16th Street NW/SW and 46th Avenue NE/55th Street NE.

The roadways with the highest level of continuity and connectivity tend to be the roadways designated as principal arterials and minor arterials in the City's functional classification system. The Minot Comprehensive Plan generally proposed improvements to achieve better system connectivity and continuity in future growth areas. The traffic projections, traffic analysis, corridor studies, subarea studies, and future thoroughfare plan completed as part of the Plan more specifically identify system deficiencies, future road extensions, grade separations, river bridges, or parallel reliever routes, etc. to improve the City's transportation system (see Chapter 5 and Chapter 7).

## Roadway Geometrics

Travel throughout the City of Minot is heavily influenced by available roadway capacity (lane and intersection configurations) that provide the basis for mobility on the local transportation system. A summary of the City's current roadway geometry is provided in Figure 2-9.

## Signalized Intersections

All traffic signals within Minot are maintained and operated by the City, regardless of roadway jurisdiction. Figure 2-10 presents the current traffic signal locations within the City.

## Weight Restriction and Hazard Material System

The City has designated a system of weight restricted and hazardous cargo roadways. These roadways provide efficient freight movement in and around the City. The legal truck weight limit allowed on these roadways without an oversized/overweight permit, is 80,000 pounds or less. Freight carriers must stay on these designated roadways unless going directly to or from a delivery. Figure 2-11 provides a map of the roadway weight limits in Minot. Spring weight restrictions, one of the most basic limitations placed on a roadway, create periodic disruptions to system connectivity and continuity for freight movements.

Figure 2-9: Roadway Geometry

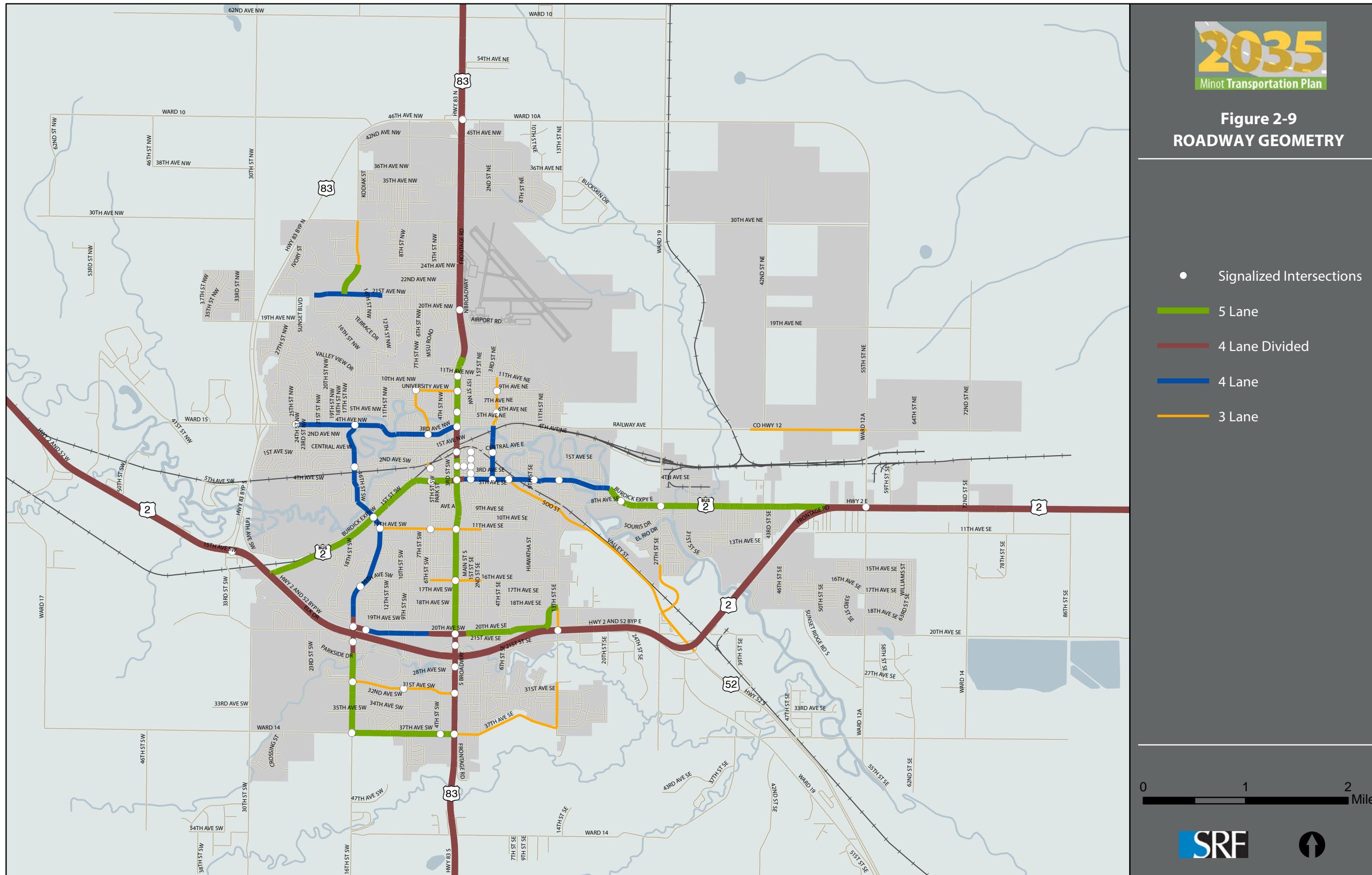


Figure 2-10: Signalized Intersections

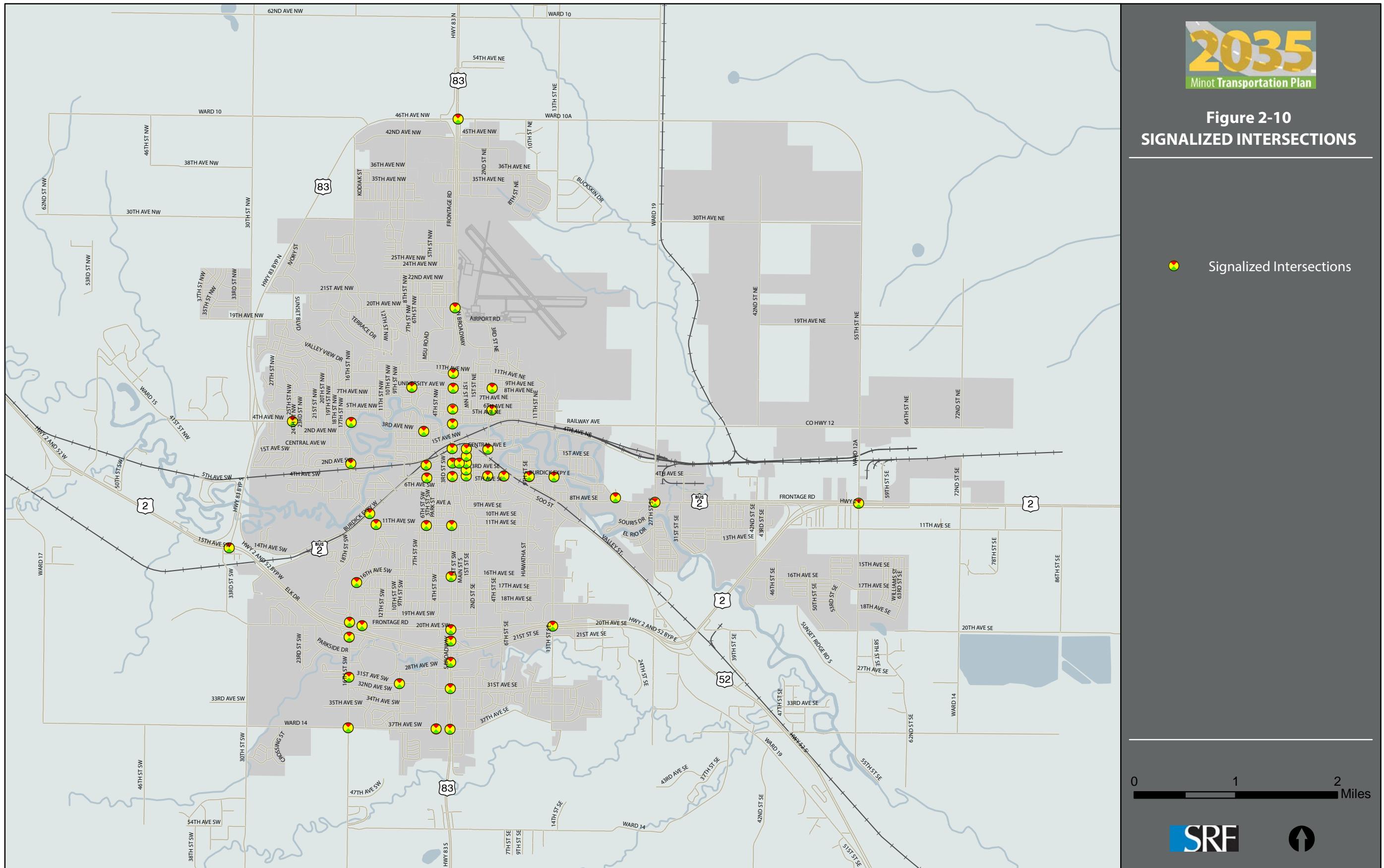
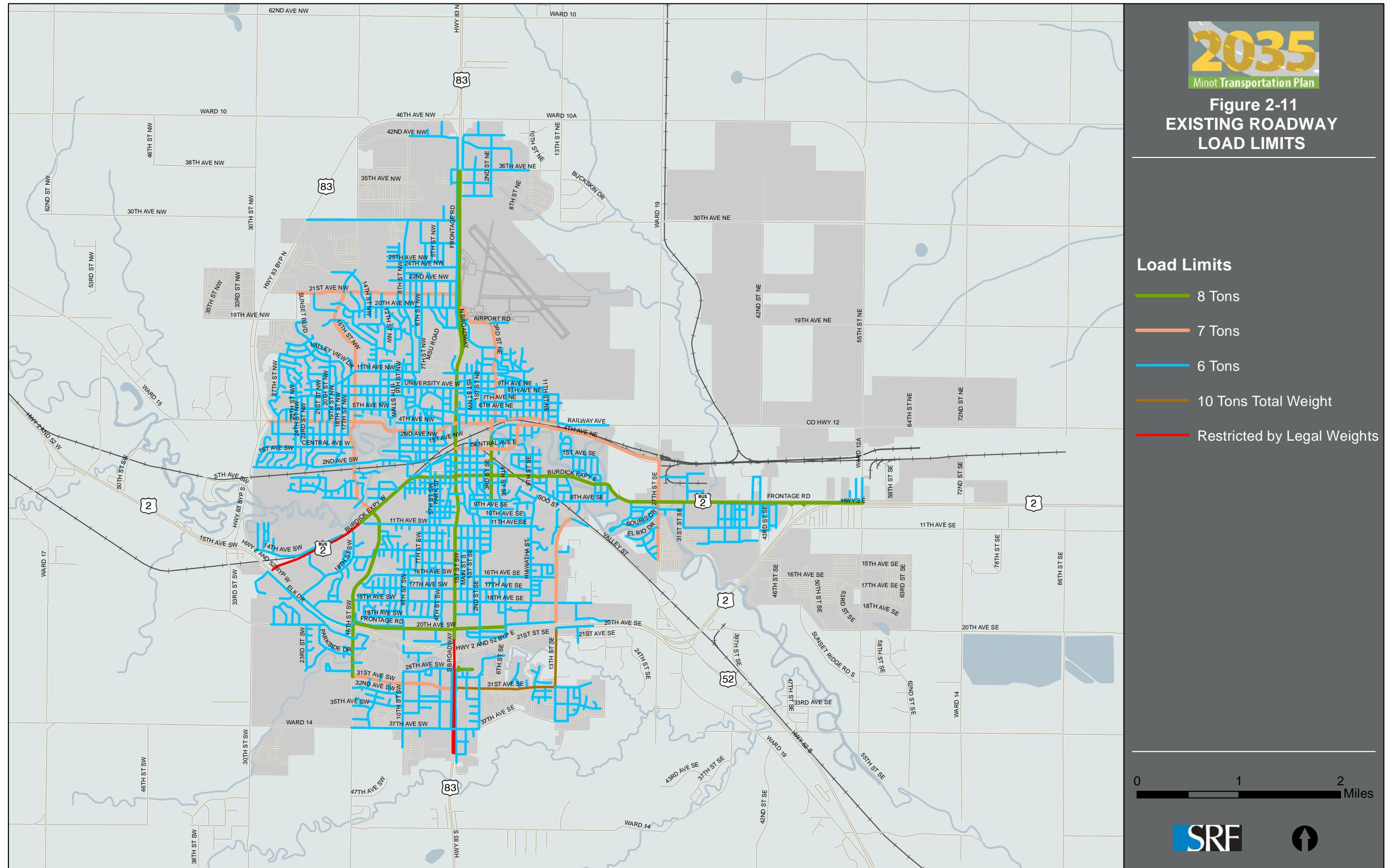


Figure 2-11: Existing Roadway Load Limits



There are other restrictions that are placed on roadways due to structure conditions. This is the case for overpasses in Minot that separate railroad tracks from vehicle traffic, as well as other grade-separated roadways. These locations have height and periodic width restrictions:

- 6th Street SW and 2nd Avenue – 12'-9"
- Hal Davies Interchange – eastbound 17' / westbound 19'-6"
- 16th Street SW and US 2 – eastbound 16'-7"
- 16th Street SW and US 2 – westbound 16'-3"
- 16th Street SW and 2nd Ave (Lamplighter) – 15'-7"
- 16th Street SW and West Burdick Expressway – 16'
- 4th Avenue NE and 3rd Street – eastbound 16'-8"

Semi-trucks carrying hazardous materials also have special routing requirements. The City of Minot addresses trucks carrying hazardous materials in its municipal code of ordinances.

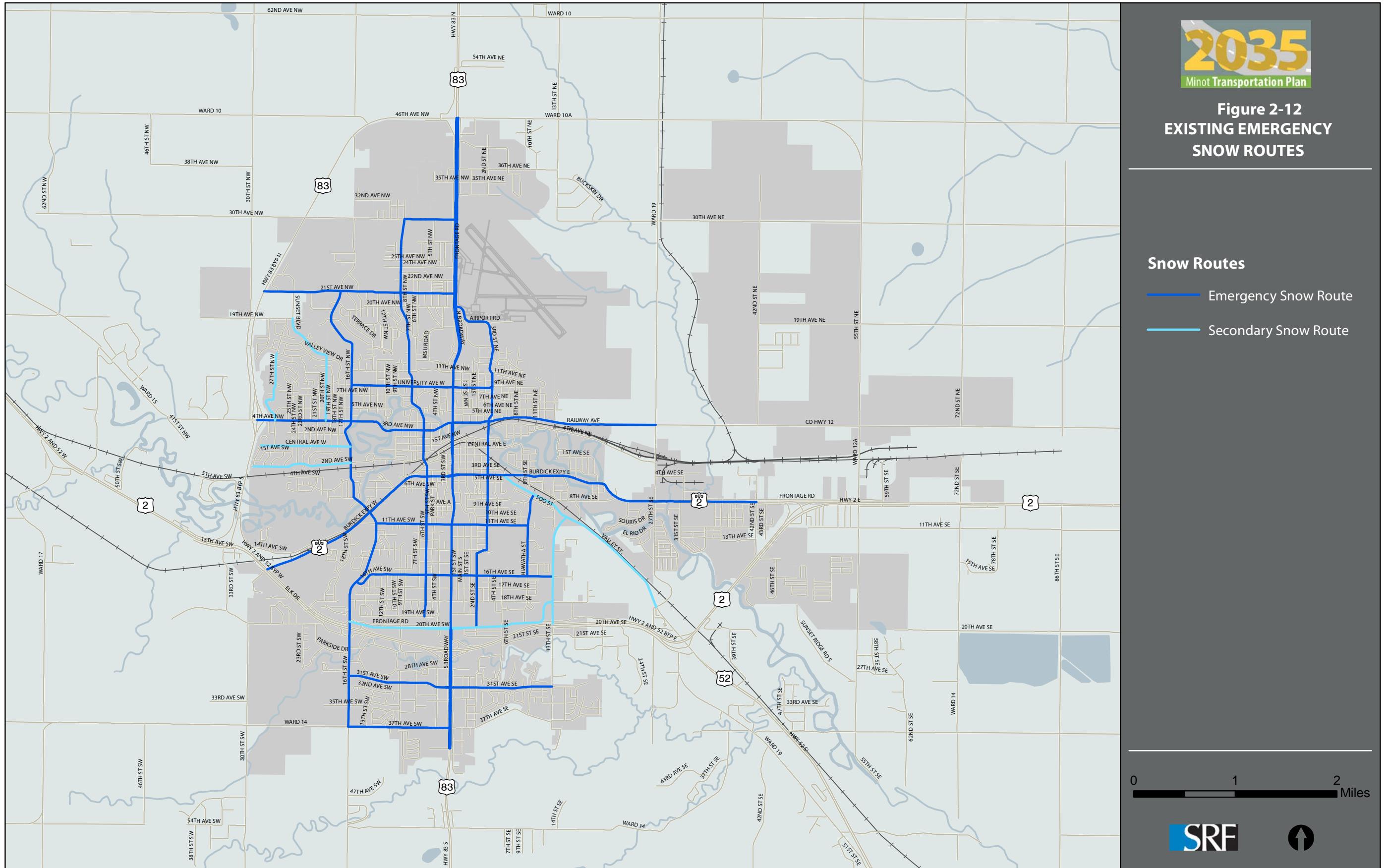
### **Snow Emergency Routes**

The only other special routes formally designated by the City of Minot are Emergency Snow Routes, which consist of a system of roads that have priority in the event of a major snowfall. These routes are the first to be plowed to allow emergency and other priority vehicles ways of responding to critical situations in various parts of the City. Figure 2-12 details both the emergency snow route and the secondary snow routes.

## **ACCESS MANAGEMENT**

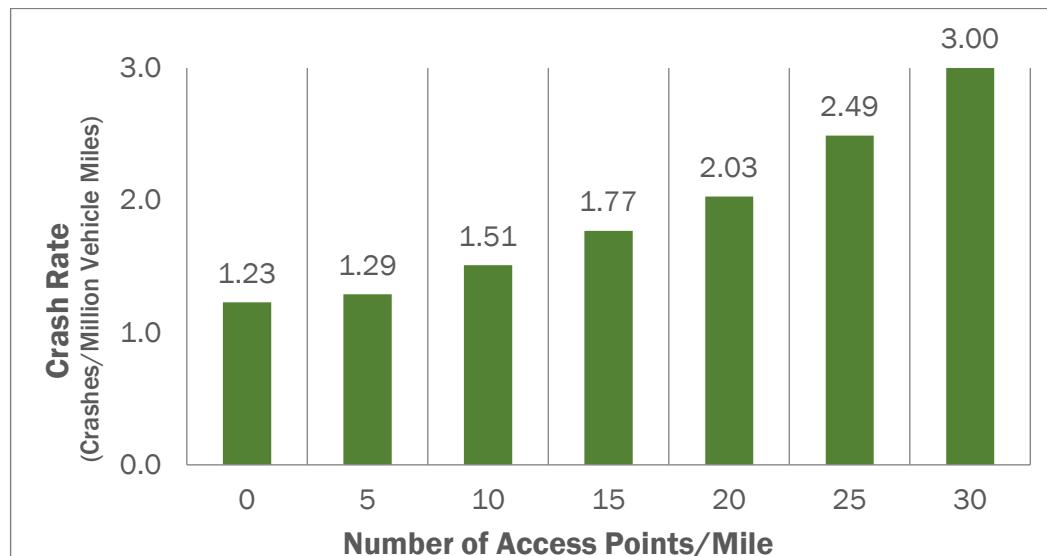
The number of intersections and access points along a roadway greatly affects its functionality. As previously displayed in Figure 2-6, more access generally equates to less mobility and vice versa. Roadways that have high degrees of access control allow for a higher level of mobility (i.e., efficiency and speed), and a lower level of crashes due to the reduced number of conflict points. Conversely, roads that have numerous access points, because their intended purpose is to allow the user to directly access a property, typically have lower travel speeds.

Figure 2-12: Existing Emergency Snow Routes



In general, roadways with a higher functional classification have higher levels of access management. Along corridors where the functional classification is not supported by adequate access control, efficiency and safety are often compromised. Several national studies, including one completed by the Federal Highway Administration, have documented a strong relationship between the number of access points per mile and crash rates. As shown in Figure 2-13, there are approximately twice as many crashes along two-lane roadways when the number of access points increase from 10 to 30 per mile. Thus, access management is particularly important along the principal and minor arterials within the Minot study area.

*Figure 2-13: Access/Crash Relationship*



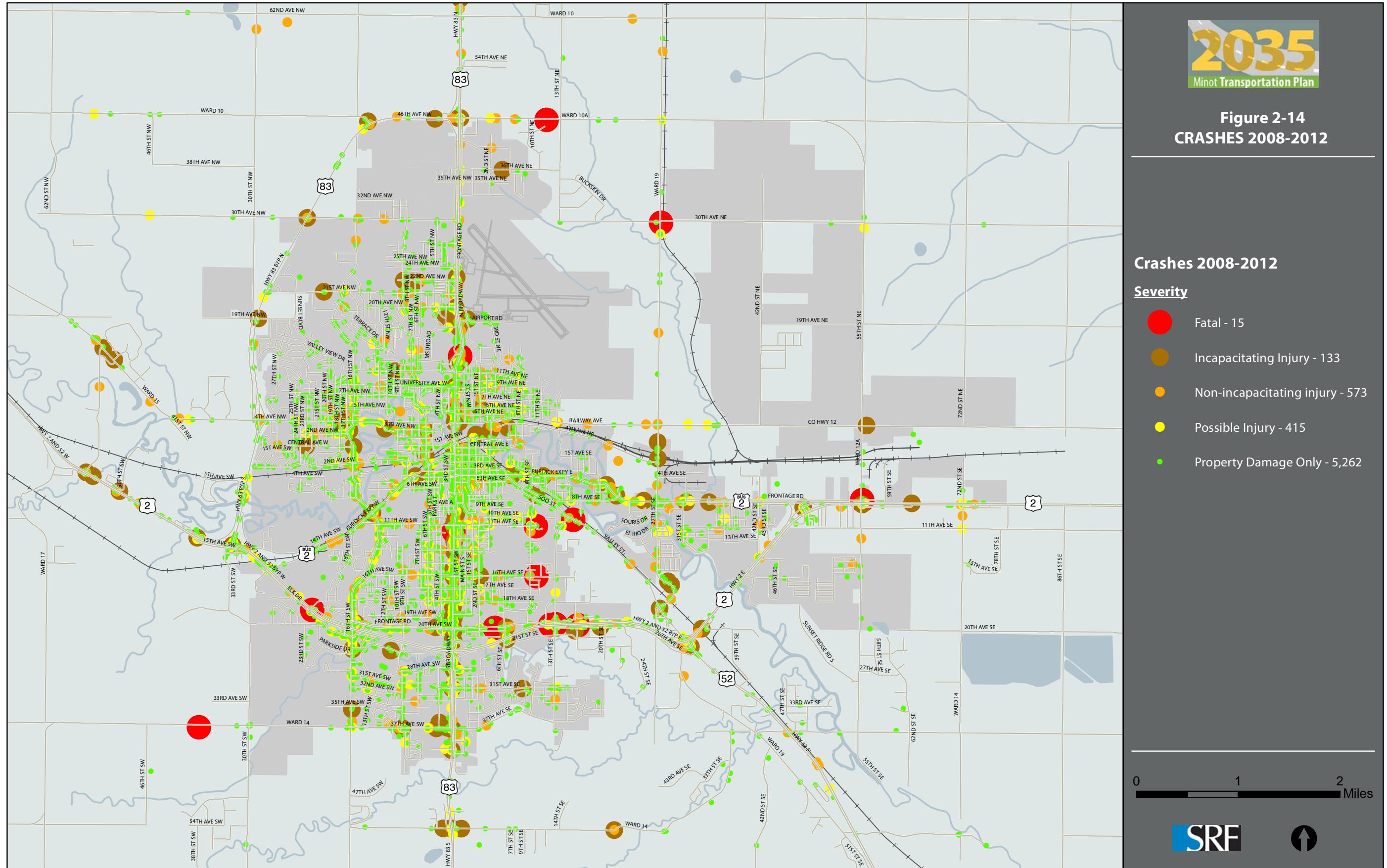
Source: FHWA Publication # FHWA-RD-91-044 (Nov. 1992), study from 2-Lane Minn. Highways

## SAFETY AND CRASH ANALYSIS

A crash analysis was performed for key intersections in the study area. This analysis was based on crash and average annual daily traffic (AADT) data obtained from the NDDOT for the five year period from January 2008 to December 2012. A crash frequency and severity map for the project study area is presented in Figure 2-14.

Table 2-7 documents total crashes by year, as well as the relative change in crashes and traffic volumes. The data indicates a general trend of increasing crashes over the past five year period. According to City staff, the 11 percent decline in year 2012 was the result of a mild winter, while the year 2011 spike was related to impacts from the major Souris River flood. The flooding also had a significant impact on local traffic operations, as portions of US 83 and the Burdick Expressway were shut down, resulting in traffic being re-routed to local streets.

Figure 2-14: Crashes 2008 - 2012



**Table 2-7: Minot Area Crash Summary**

YEAR	NUMBER OF CRASHES	PERCENT CHANGE FROM PREVIOUS YEAR (CRASHES)	PERCENT CHANGE FROM PREVIOUS YEAR (VOLUME)
2008	1,042	--	--
2009	1,158	11%	11%
2010	1,321	14%	5%
2011	1,525	15%	3%
2012	1,352	-11%	10%
<b>Average Growth (2008-2012)</b>		<b>5%</b>	<b>6%</b>

Table 2-8 summarizes the reported crashes that occurred at the key intersections within the City of Minot. Review of the types of reported crashes indicates that more than one-third of the crashes at the intersections were rear-end crashes and more than one-fourth were angle crashes. The rear-end and angle crashes appear to be associated with intersections that have significant approach queues, especially intersections along Broadway.

The high number of rear-end crashes along Broadway can be attributed to the fact that there are a high number of signalized intersections. It is typical of signalized intersections to have a higher incidence of rear-end collisions. This is sometimes caused by motorists not recognizing the back of the queue as they approach the signal or not identifying that vehicles are stopping in front of them at the traffic signal.

In addition to reviewing crash frequency and type, overall intersection crash rates were calculated. These intersection crash rates were compared to typical crash rates for intersections with similar characteristics. NDDOT does not maintain typical/average crash rate data; therefore, typical crash rates published by the Minnesota Department of Transportation (MnDOT) were used for comparison purposes. Furthermore, crash data for the greater Minnesota area was used for the purposes of this analysis since it represents similar conditions.

Intersection crash rates exceeding the typical crash rate does not necessarily indicate a significant issue, so critical crash rates were calculated to determine the statistical significance of those above average crash rates. If a calculated crash rate falls below the critical crash rate, it is then understood that these crashes were typically due to the random occurrence, and not a geometric design or traffic control issue.

Table 2-8: Minot Area Crash Summary – 2008 to 2012

INTERSECTION	ANGLE	RIGHT-ANGLE	REAR-END	SIDE-SWIPE	OTHER	TOTAL
16th St SW and 20th Ave SW	14	4	12	2	10	42
16th St SW and 21st Ave NW	4	2	1	0	2	9
16th St SW and 22nd Ave SW	14	7	14	3	14	52
16th St SW and 24th Ave SW	9	7	6	2	3	27
16th St SW and 30th Ave NW	0	1	0	1	1	3
16th St SW and 31st Ave SW	6	1	8	1	1	17
16th St SW and 35th Ave SW	1	0	0	0	0	1
16th St SW and 37th Ave SW	2	1	3	0	4	10
16th St SW and 4th Ave NW	15	9	2	2	5	33
16th St SW and Burdick Expy SW	13	8	14	0	7	42
21st Ave NW and 8th St NW	4	0	2	0	0	6
21st Ave NW and Broadway	7	4	4	0	3	18
3rd St NE and 6th Ave NE	2	2	4	0	1	9
3rd St NE and University Ave	2	0	4	0	1	7
3rd St NE and 2nd Ave SE	6	3	0	0	3	12
3rd St NE and Central Ave	10	3	7	4	4	28
Broadway and 11th Ave	21	8	25	5	6	65
Broadway and 16th Ave	18	8	59	4	9	98
Broadway and 20th Ave	28	8	41	7	13	97
Broadway and 31st Ave	15	14	21	5	2	57
Broadway and 37th Ave	0	1	6	4	10	21
Broadway and Burdick Expy	19	8	62	5	17	111
Broadway and University Ave	13	8	15	4	6	46
Burdick Expy and 3rd Street SE	26	14	19	4	8	71
Burdick Expy SE and 27th St	10	6	9	0	7	32
30th Ave NW and 8th St NW	1	0	0	0	0	1
US 83B and 19th Ave NW	0	0	0	1	1	2
US 83B and 21st Ave NW	1	0	4	0	0	5
US 83B and 30th Ave NW	2	0	1	0	1	4
US 83B and 46th Ave NW	0	0	2	0	0	2
US 83B and Broadway	2	2	3	1	13	21
US 2 and 42nd St NE	5	4	3	0	3	15
<b>Total</b>	<b>270</b>	<b>133</b>	<b>351</b>	<b>55</b>	<b>155</b>	<b>964</b>

Table 2-9 summarizes the corresponding crash rates that were calculated for the key intersections within Minot. Results show that there are 16 intersections with calculated crash rates higher than the critical crash rates, indicating locations where mitigation may be considered.

Figure 2-15 displays the results shown in Table 2-9 to provide a greater perspective on the location of intersections that were flagged for crash issues.

Lastly, the crash severity rate was calculated for all key intersections, which takes into account the number of crashes that occurred over a five year period, the amount of vehicle exposure, and the level of crash severity of each crash (Fatal; Injury Category A, B, or C; and Property Damage).

Results of the crash severity analysis are shown in Table 2-10. This analysis flagged 24 intersections that have a crash severity rate exceeding the typical for intersections with similar characteristic. Also, there are 15 intersections that have a crash severity rate higher than the critical severity rate, indicating that potential safety issues may require mitigation.

Table 2-9: Minot Area Crash Rate Summary – 2008 to 2012

INTERSECTION	CRASHES	CALCULATED CRASH RATES	TYPICAL CRASH RATE	Critical Crash Rate
16th St SW and 20th Ave SW	42	0.97	0.8	1.04
16th St SW and 21st Ave NW	9	1.02	0.4	0.81
16th St SW and 22nd Ave SW	52	1.12	0.8	1.03
16th St SW and 24th Ave SW	27	0.81	0.4	0.60
16th St SW and 30th Ave NW	3	1.26	0.4	1.29
16th St SW and 31st Ave SW	17	0.76	0.4	0.65
16th St SW and 35th Ave SW	1	0.08	0.4	0.73
16th St SW and 37th Ave SW	10	0.79	0.6	1.00
16th St SW and 4th Ave NW	33	0.98	0.8	1.07
16th St SW and Burdick Expy SW	42	1.08	0.8	1.05
21st Ave NW and 8th St NW	6	0.61	0.4	0.78
21st Ave NW and Broadway	18	0.64	0.4	0.62
3rd St NE and 6th Ave NE	9	0.53	0.6	0.94
3rd St NE and University Ave	7	0.46	0.6	0.96
3rd St NE and 2nd Ave SE	12	0.81	0.4	0.71
3rd St NE and Central Ave	28	1.26	0.6	0.90
Broadway and 11th Ave	65	0.96	0.8	0.99
Broadway and 16th Ave	98	1.47	0.8	0.99
Broadway and 20th Ave	97	1.33	0.8	0.98
Broadway and 31st Ave	57	0.89	0.8	1.00
Broadway and 37th Ave	21	0.51	0.8	1.05
Broadway and Burdick Expy	111	1.5	0.8	0.98
Broadway and University Ave	46	1.08	0.8	1.04
Burdick Expy and 3rd Street SE	71	2.24	0.8	1.08
Burdick Expy SE and 27th St	32	1.16	0.8	1.1
30th Ave NW and 8th St NW	1	0.41	0.4	1.27
US 83B and 19th Ave NW	2	0.17	0.4	0.74
US 83B and 21st Ave NW	5	0.43	0.4	0.75
US 83B and 30th Ave NW	4	0.47	0.4	0.82
US 83B and 46th Ave NW	2	0.27	0.4	0.85
US 83B and Broadway	21	0.91	0.6	0.89
US 2 and 42nd St NE	15	0.72	0.4	0.66

 Exceeds Critical Crash Rate
  Exceeds Typical Crash Rate  
(Does not exceed Critical Crash Rate)
  Mitigation may be considered

Figure 2-15: Intersection Crash and Severity Rates

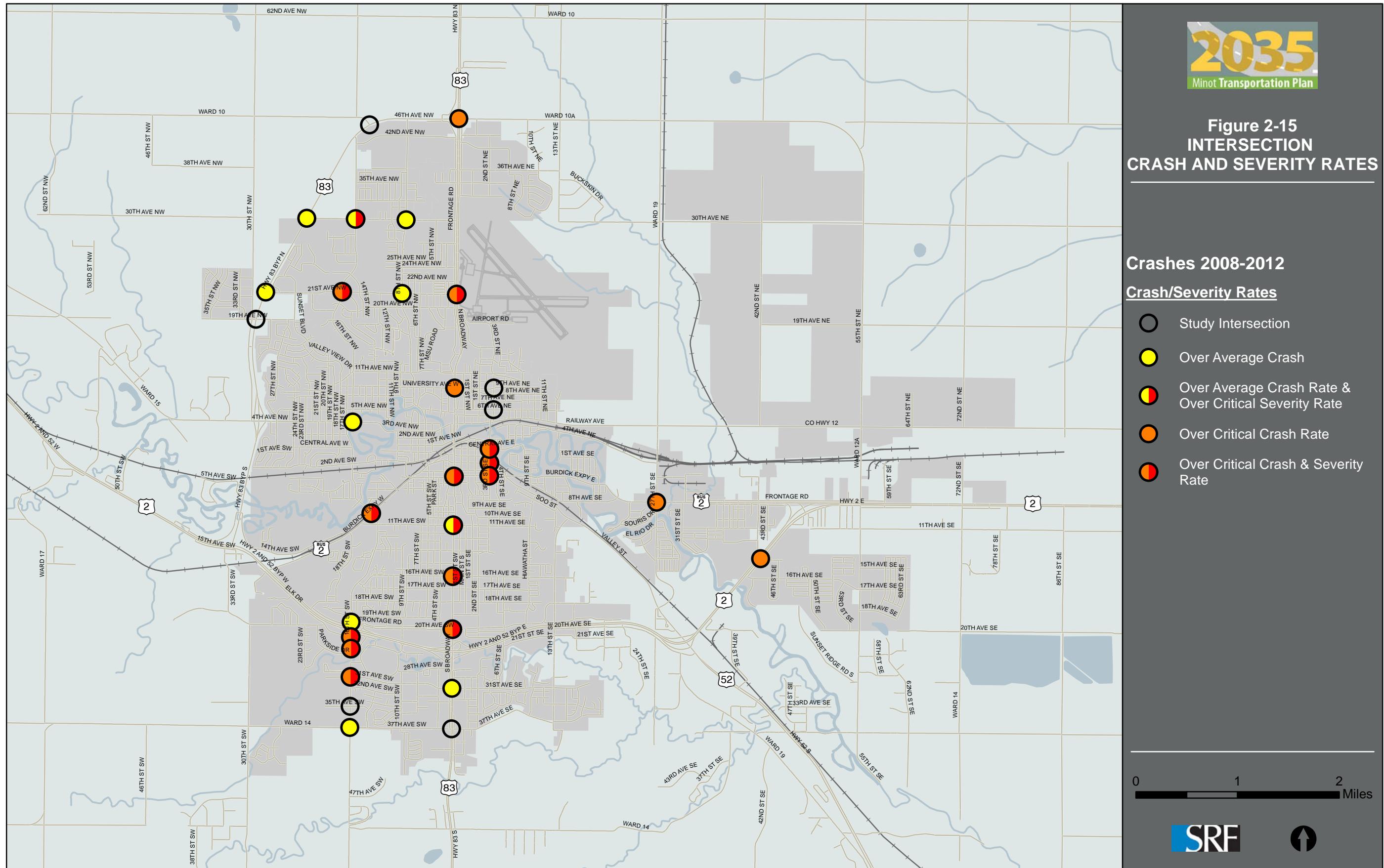


Table 2-10: Minot Area Crash Severity Analysis – 2008 to 2012

INTERSECTION	CRASHES	CALCULATED SEVERITY RATES	TYPICAL SEVERITY RATE	CRITICAL SEVERITY RATE
16th St SW and 20th Ave SW	42	1.33	1.1	1.38
16th St SW and 21st Ave NW	9	1.81	0.5	0.95
16th St SW and 22nd Ave SW	52	1.46	1.1	1.37
16th St SW and 24th Ave SW	27	1.22	0.5	0.72
16th St SW and 30th Ave NW	3	2.09	0.5	1.47
16th St SW and 31st Ave SW	17	1.02	0.5	0.77
16th St SW and 35th Ave SW	1	0.08	0.5	0.87
16th St SW and 37th Ave SW	10	0.94	0.8	1.26
16th St SW and 4th Ave NW	33	1.07	1.1	1.42
16th St SW and Burdick Expy SW	42	1.80	1.1	1.39
21st Ave NW and 8th St NW	6	0.80	0.5	0.92
21st Ave NW and Broadway	18	0.82	0.5	0.74
3rd St NE and 6th Ave NE	9	0.58	0.8	1.19
3rd St NE and University Ave	7	0.71	0.8	1.21
3rd St NE and 2nd Ave SE	12	0.94	0.5	0.84
3rd St NE and Central Ave	28	1.52	0.8	1.14
Broadway and 11th Ave	65	1.39	1.1	1.32
Broadway and 16th Ave	98	2.13	1.1	1.32
Broadway and 20th Ave	97	1.96	1.1	1.31
Broadway and 31st Ave	57	1.20	1.1	1.33
Broadway and 37th Ave	21	0.78	1.1	1.39
Broadway and Burdick Expy	111	1.79	1.1	1.31
Broadway and University Ave	46	1.38	1.1	1.38
Burdick Expy and 3rd Street SE	71	3.27	1.1	1.43
Burdick Expy SE and 27th St	32	1.30	1.1	1.45
30th Ave NW and 8th St NW	1	0.41	0.5	1.45
US 83B and 19th Ave NW	2	0.40	0.5	1.07
US 83B and 21st Ave NW	5	0.42	0.5	1.30
US 83B and 30th Ave NW	4	1.06	0.5	1.69
US 83B and 46th Ave NW	2	0.54	0.5	2.03
US 83B and Broadway	21	1.59	1.2	2.73
US 2 and 42nd St NE	15	1.29	0.6	1.75

 Exceeds Critical Severity Rate
  Exceeds Typical Severity Rate  
(Does not exceed Critical Severity Rate)
  Mitigation may be considered

## TRAFFIC VOLUMES

It is critical to understand existing traffic volumes and patterns on major City roadways in order to evaluate traffic operations throughout and within its extraterritorial area. Figure 2-16 provides the range of current average daily traffic (ADT) volumes for the major roadways within the planning area.

ADT's for city, county and state highways were obtained from the NDDOT's 2012 local traffic count database. The highest traffic volumes in the City are found on Broadway, US 2, and 16th Street SW. These traffic volumes were consistent with the functional classification system, as principal arterials and minor arterials are intended to carry higher traffic volumes on regional corridors.

## ROADWAY CAPACITY

Planning-level capacity thresholds were used to evaluate current roadway capacity for all facility types within the study area. A majority of the roadway facilities in Minot are two-lane, undivided rural and two-lane undivided urban roads.

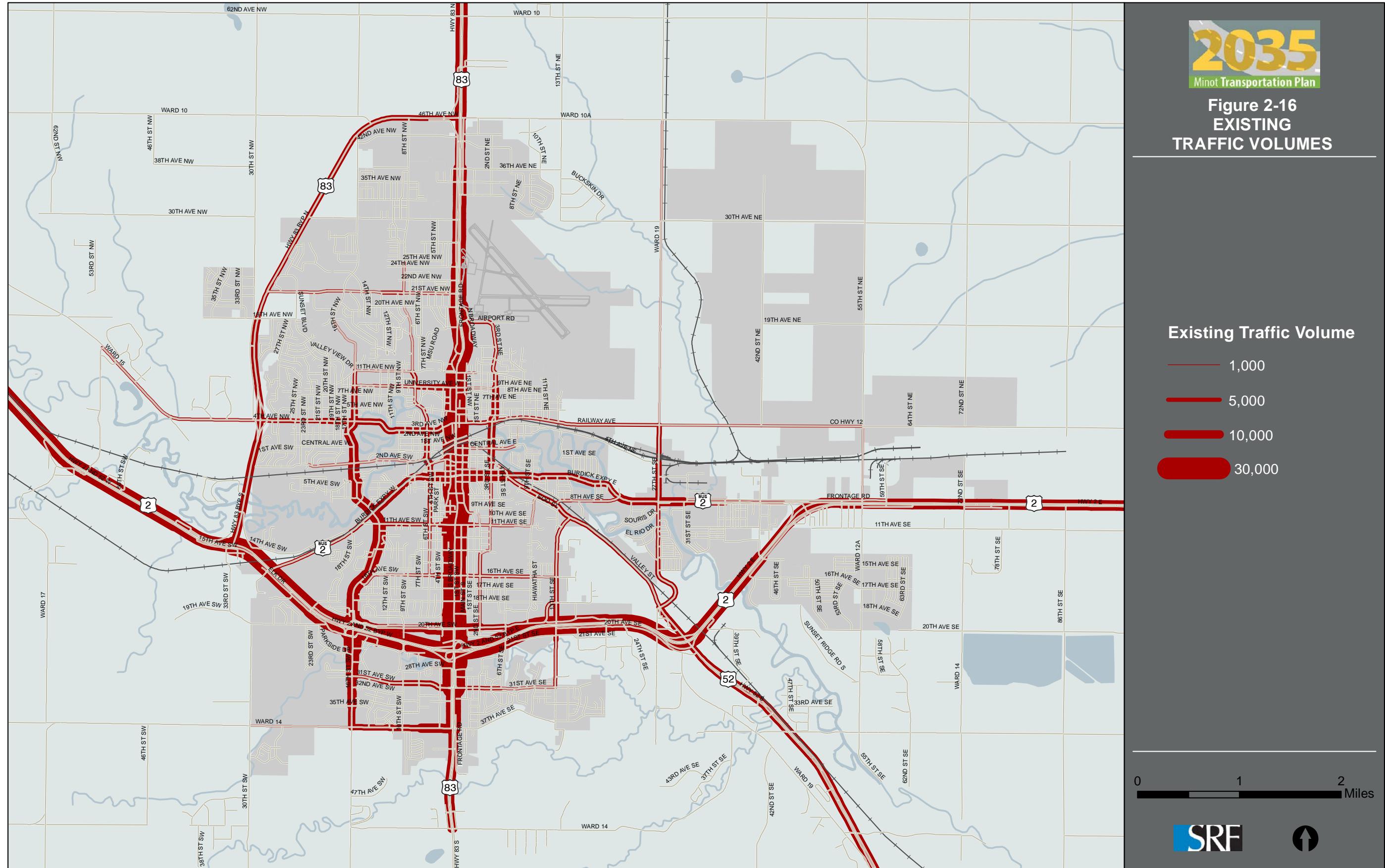
Table 2-11 lists the typical planning-level traffic volume ranges used in determining congestion levels for specific facility types. The volume ranges and capacity thresholds are based on guidance from the Highway Capacity Manual, professional engineering judgment, and input from the PMT. ADT ranges are used to estimate the maximum capacity of roadway designs, since a capacity threshold is a theoretical measure that can be affected by functional classification, peak traffic flows, access spacing, speed, and other roadway characteristics.

*Table 2-11: Minot Area Planning Level Capacity Thresholds*

FACILITY TYPE *	APPROACHING CONGESTION (V/C = 0.85)	LIGHT CONGESTION* (V/C = 1.00)	MODERATE CONGESTION (V/C = 1.15)	SEVERE CONGESTION (V/C = 1.30)
Two-Lane undivided urban	8,500	10,000	11,500	13,000
Two-Lane undivided rural	12,800	15,000	17,300	19,500
Two-Lane divided urban (Three-Lane)	14,500	17,000	19,600	22,100
Four-Lane undivided urban	18,700	22,000	25,300	28,600
Four-Lane undivided rural	23,800	28,000	32,200	36,400
Four-Lane divided urban (Five-Lane)	25,500	30,000	34,500	39,000
Four-Lane divided rural (Five-Lane)	32,300	38,000	43,700	49,400
Two-Lane expressway	19,100	22,500	25,900	29,300
Four-Lane expressway	38,300	45,000	51,700	58,500

\* Represents the daily planning-level capacity for the facility.

Figure 2-16: Existing Traffic Volumes



## ROADWAY CONGESTION

An analysis of roadway segments with congestion or operational problems is critical to the identification of system needs and/or future roadway improvements. Measuring congestion can aid the process of determining implementation strategies for roadway improvements, access management, transit services, or demand management strategies. However, it should be noted that the planning-level capacity thresholds do not provide a basis for design decisions for specific intersection improvements. For instance, traffic conditions that do not fit the average daily traffic criteria (e.g., weekend thru traffic, holiday travel periods, fall agricultural volumes, or special events) are likely to produce different levels of congestion. Additionally, factors such as access and roadway geometrics may influence the capacity of a roadway.

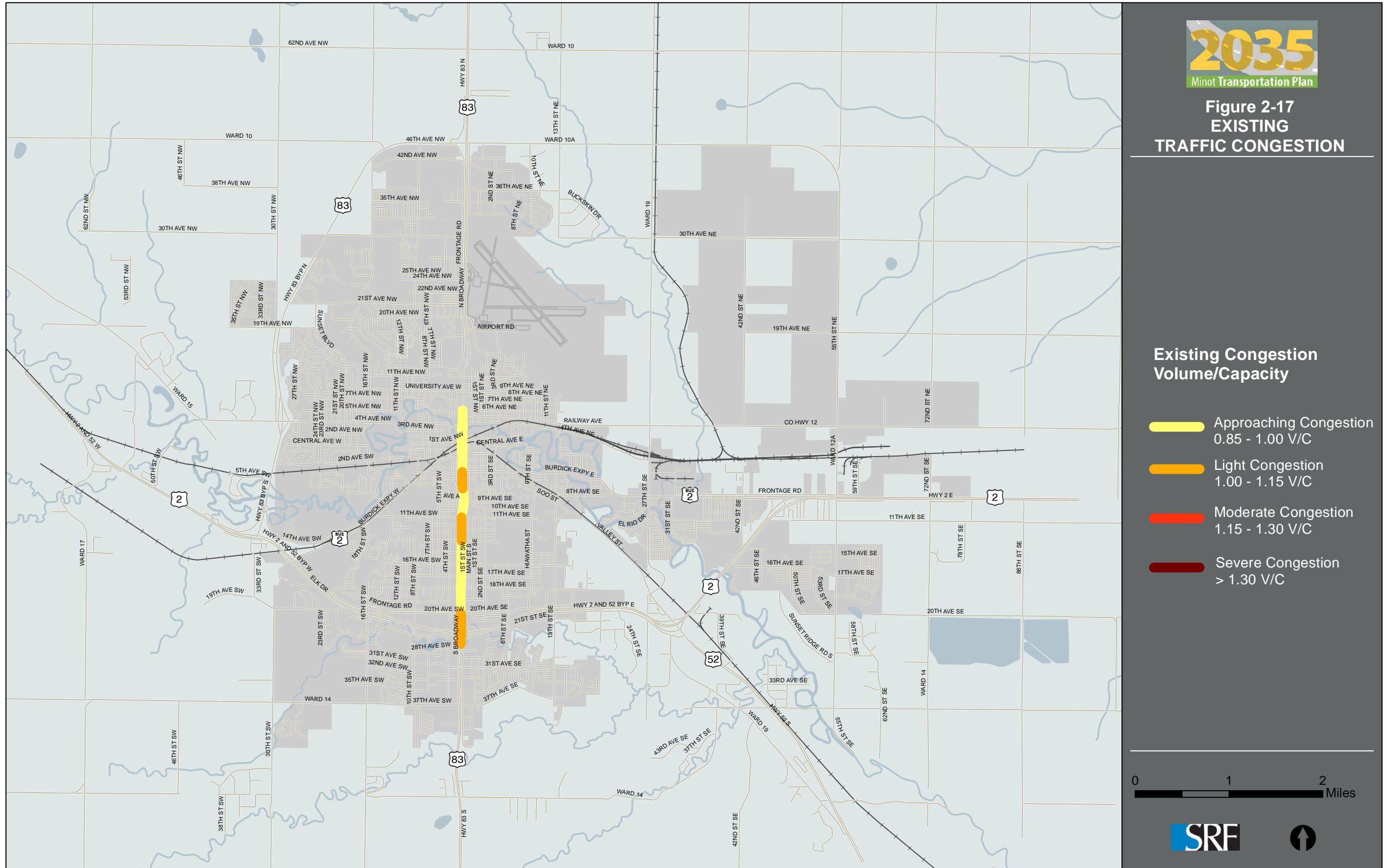
Congestion and operational problems were first evaluated by determining the ratio of current traffic volume to roadway capacity (v/c ratio). The v/c ratio analysis provided a measure of congestion along roadways, flagging existing or potential operational problems if the v/c ratio was approaching or exceeding 1.0. While roadway segments that were identified as approaching capacity may not currently be exceeding the capacity, users may perceive the roadway as congested. Capacity issues were summarized into the following categories:

- Approaching Congestion – Volumes between 85 and 100 percent of the daily capacity (v/c = 0.85 – 1.00)
- Light Congestion – Volumes between 100 and 115 percent of the daily capacity (v/c = 1.00 – 1.15)
- Moderate Congestion – Volumes between 115 and 130 percent of the daily capacity (v/c = 1.15 – 1.30)
- Severe Congestion – Volumes exceeding 130 percent of the daily capacity (v/c > 1.30)

Figure 2-17 presents the existing congestion in the Minot area.

Based on the planning-level capacity thresholds and current traffic volumes, all of the segments currently exhibiting congestion were along Broadway between the US 2/52 Bypass and Minot State University.

Figure 2-17: Existing Traffic Congestion



## Intersection Operations

Beyond the planning-level v/c ratio analysis, detailed intersection operations analysis was conducted for 26 key intersections throughout the City of Minot. Peak hour turning movement counts were collected at each of the key intersections in May 2013. An operations analysis was conducted for the a.m. and p.m. peak hours at the key intersections to determine current traffic operations. Signalized intersections were analyzed using the Synchro/SimTraffic software, while unsignalized intersections were analyzed using a combination of Synchro/SimTraffic software and the HCM. It should be noted that where unsignalized intersections are in close proximity to signalized intersections, the signalized intersections have a significant impact on the overall operations of the unsignalized intersections. To account for this situation, Synchro/SimTraffic results were reported for the unsignalized intersections as well as the signalized.

Capacity analysis results identify a Level of Service (LOS) which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. The LOS results are based on average delay per vehicle. The delay threshold values are shown in Table 2-12. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. LOS A through C is considered acceptable by drivers in the Minot area. For purposes of this analysis LOS A-B is considered under capacity, LOS C is considered approaching capacity, LOS D is considered over capacity, and LOS E-F is considered significantly over capacity.

*Table 2-12: Level of Service Criteria for Signalized and Unsignalized Intersections \**

LOS DESIGNATION	SIGNALIZED INTERSECTION AVERAGE DELAY/VEHICLE (SECONDS)	UN SIGNALIZED INTERSECTION AVERAGE DELAY/VEHICLE (SECONDS)
LOS A	< 10	< 10
LOS B	10-20	10-15
LOS C	20-35	15-25
LOS D	35-55	25-35
LOS E	55-80	35-50
LOS F	80 <	50 <

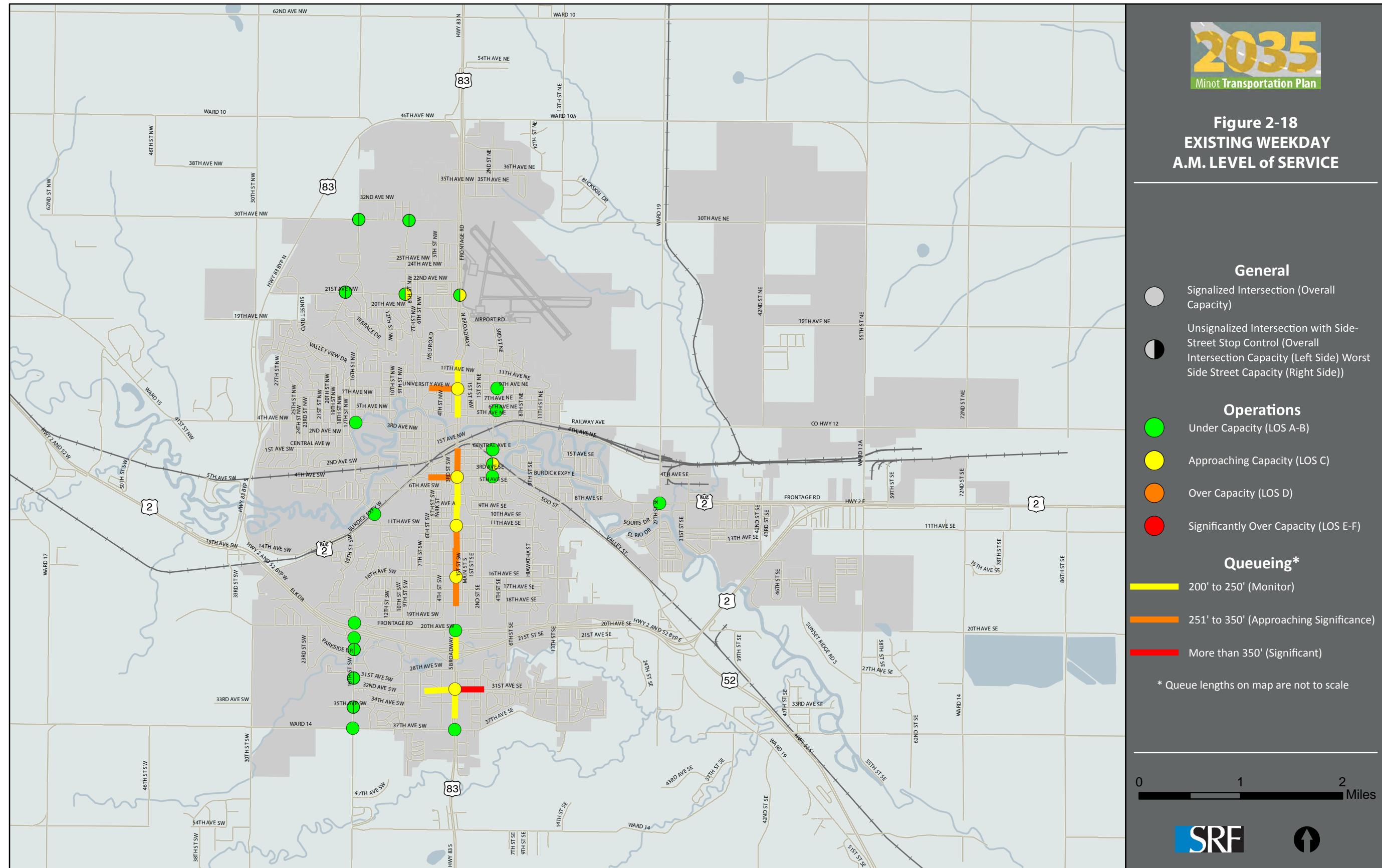
*\*HCM 2010 – Interrupted Flow Chapters*

For side-street stop controlled intersections, special emphasis is given to providing an estimate for the LOS of the minor approach. The traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection LOS. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support those volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches.

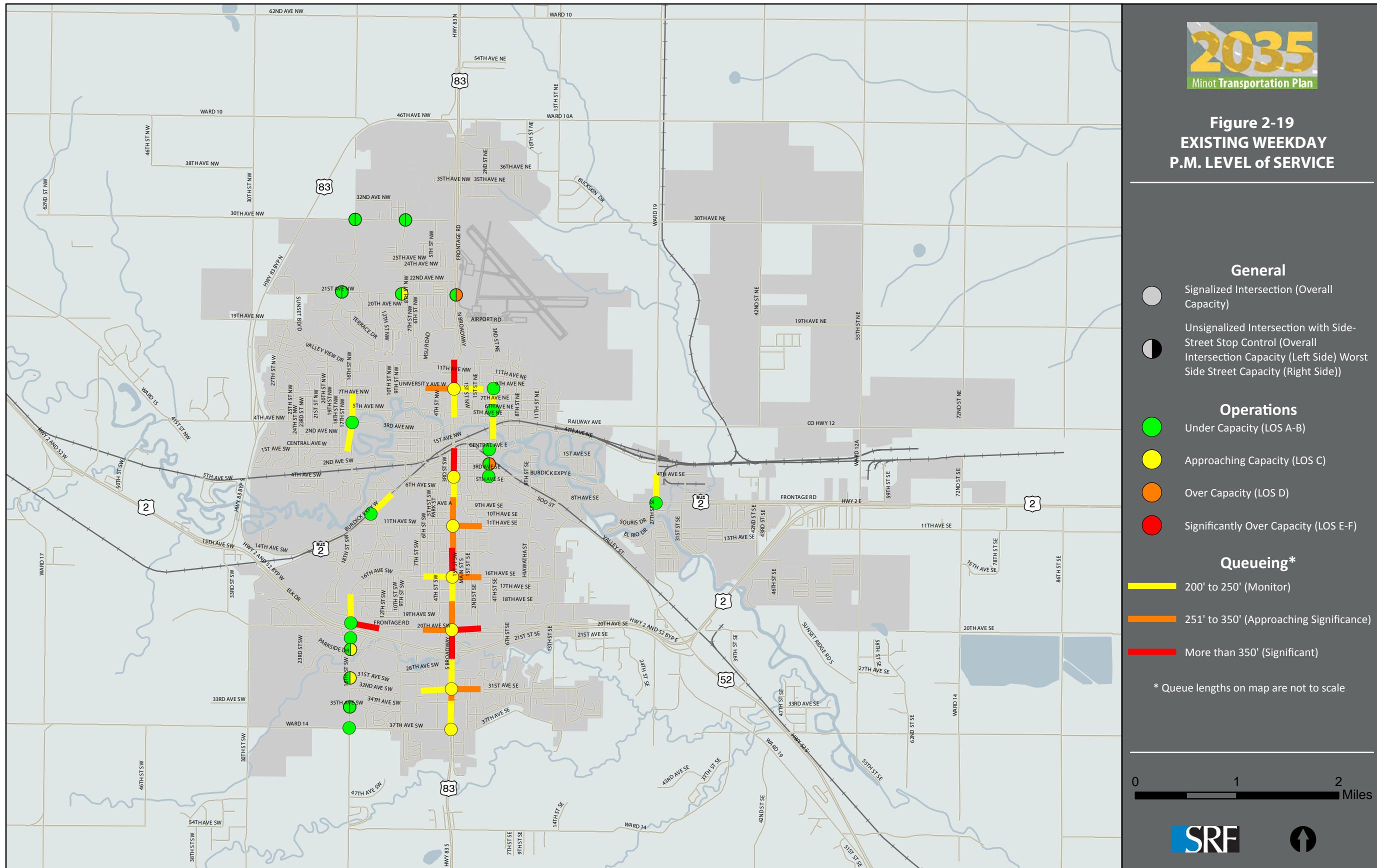
Results of the existing operations analysis indicate that all key intersections within the City currently operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hour, with existing traffic controls and geometric layout. The only intersections operating with an “approaching capacity” LOS C are along Broadway. There are a number of individual traffic movements at the various intersections that operate with a LOS D or worse (LOS E-F). Most of the traffic movements that operate with lower LOS are at side-street stop intersections, where the side-street delay in general is greater.

However, there were a number of queuing issues observed during the a.m. and p.m. peak hours. Based on discussions with the Plan’s PMT, the queuing issues are characterized in three ways: queues between 200 – 250 feet are of concern and should be monitored, queues between 250 – 350 feet are approaching significance, and queues greater than 350 feet are already significant. All queues (and operations analysis results) are graphically depicted for the a.m. and p.m. peaks in Figure 2-18 and Figure 2-19.

**Figure 2-18: Existing Weekday A.M. Level of Service**



**Figure 2-19: Existing Weekday P.M. Level of Service**



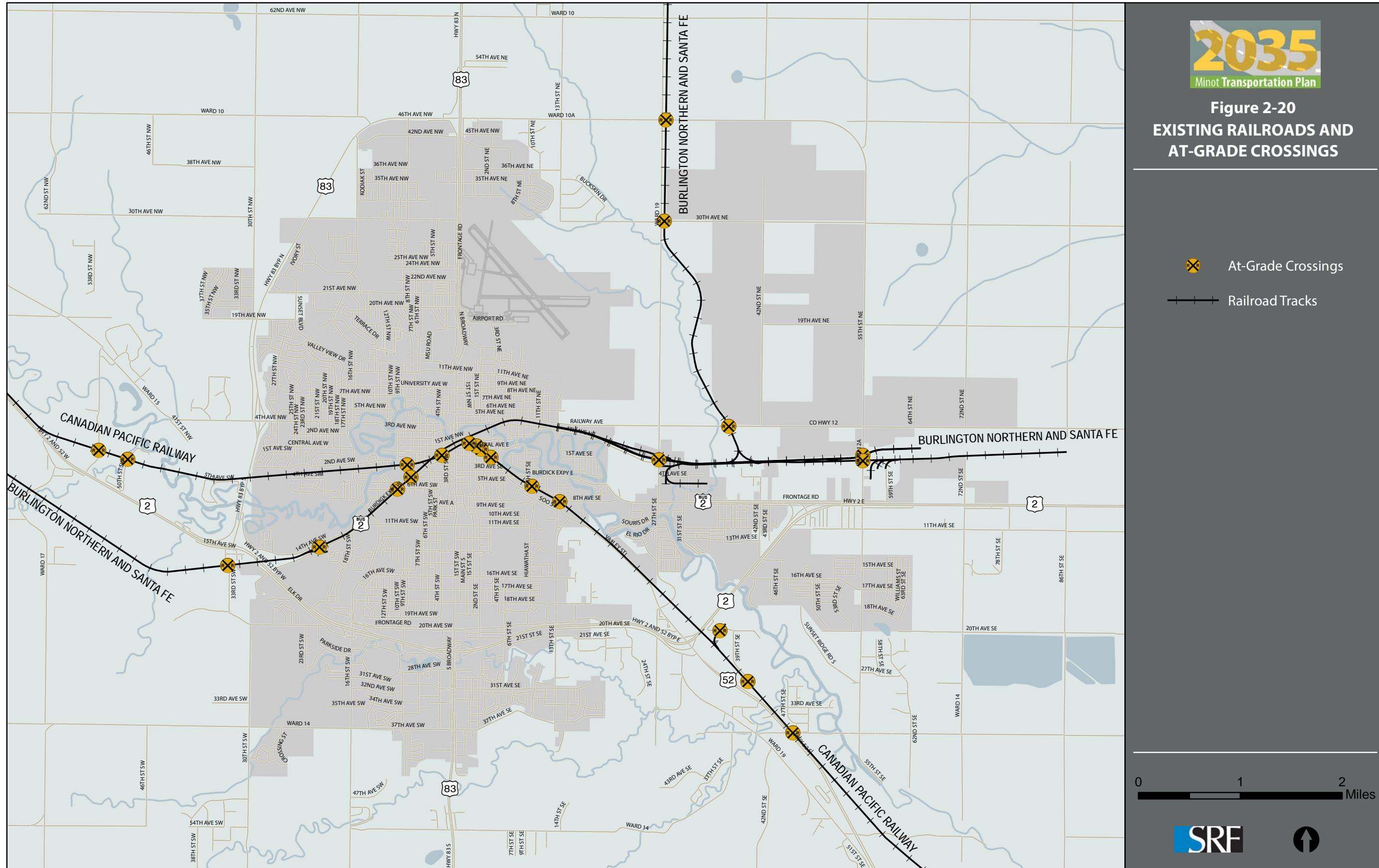
# MULTI-MODAL TRANSPORTATION

## RAIL

Two railways operate in Minot, the Burlington Northern and Santa Fe (BNSF) and the Canadian Pacific Railway (CPR). BNSF has a switching yard in the industrial area of the eastern portion of Minot along US Hwy 2. This facility allows for trains to be routed on the multiple BNSF lines that come into the City from the southeast, east, north, and west. The CPR line comes from the southeast and continues through the City exiting and continuing to the northwest. The CPR has multiple siding locations and spur lines that service rail users. The current at-grade highway/rail crossings are identified in Figure 2-20.

These two lines run through the heart of downtown Minot. Auto/rail conflicts have required construction of numerous at-grade crossings, as the rail lines intersect the grid pattern of the street network. Also, the BNSF railway is double tracked; however, in some cases, along rail corridors there are areas that have crossing points with as many as four tracks that have to be crossed by auto traffic.

Figure 2-20: Existing Railroads and At-Grade Crossings



Most of the City's major functionally classified roadways have auto/rail grade-separated crossings. Below is a listing of grade separated crossings:

### **BNSF Crossings**

- 62nd Street NW (train trestle - underpass)
- US Hwy 2/52/83 Bypass (overpass)
- 16th Street SW (underpass)
- 6th Street SW (underpass)
- US Hwy 83 (overpass)
- 3rd Street NE (overpass)

### **CPRS Crossings**

- 6th Street SW (underpass)
- US Hwy 83 Bypass S (overpass)
- 16th Street SW (underpass)
- North Broadway/US Hwy 83 (overpass)
- Burdick Expressway (overpass)
- 27th Street SE/County Road 19 (overpass)
- US Hwy 2 (overpass)

However, at-grade crossings exist at the following locations:

### **BNSF Crossings**

- Golf Course Road
- 33rd Street SW
- 5th Avenue SW
- Maple Street
- 27th Street SE/County Rd 19 (4 tracks)
- 4th Avenue NE/County Road 12
- 55th Street NE (4 tracks) – overpass under construction 30th Avenue NE
- 46th Avenue NE/County Road 10A
- 62nd Avenue NE

### **CPRS Crossings**

- 72nd Street NW
- 65th Street NW
- Delnor Drive
- 62nd Street SW
- 54th Street NW /County Rd 17
- 50th Street SW
- Maple Street

- Frontage Road
- Main Street N
- 1st Street NE
- Central Avenue E
- 3rd Street NE
- 9th Street SE
- 8th Avenue SE
- 20th Avenue SE (spur line)
- 39th St SE
- 37th Avenue SE
- 54th Avenue SE

There are several businesses that utilize rail shipping in Minot. These businesses consist of grain elevators, metal recycling and scrapping yards, concrete mixing facilities, and stockyards. These uses are located in areas with concentrated industrial activity outside of the urban core, in locations with lower traffic volumes. To mitigate growing freight/automobile conflicts and increase mobility along the NE bypass near the major intermodal facility along 55th Street, a new grade-separation was recently constructed north of Highway 2 along 55th Street NE.

## AMTRAK

Amtrak provides passenger rail service to Minot via its Empire Builder. This route has become extremely popular since oil production in western North Dakota has exploded. It is one of the only routes outside of New England that is increasing in ridership and turning a profit. Currently, one train a day runs westbound and one train a day runs eastbound. The westbound train departs at 9:06 a.m. and the eastbound train departs at 9:42 p.m. Within four hours a passenger can be in either the western-most (Williston) or eastern-most (Fargo) part of the state. The Amtrak station is located in Downtown Minot. Passengers arriving in Minot have walking access to all the amenities of the downtown area. However, pedestrian access improvements are needed. Such access amenities are crucial in providing the connection from this station to the physical and cultural center of the City.

## PUBLIC TRANSIT

Public transit is a critical element of the overall transportation network. Public transit can assist in relieving congestion on roadways by providing an alternate mode of transportation. Transit can also provide mobility options for portions of the general public that do not have access to an individual vehicle. Finally, public transit plays a key role in providing an environmentally and economically sustainable form of transportation for those who desire a non-automobile lifestyle.

### Minot City Bus

The Minot City Bus system consists of nine fixed routes, which run from 6:55 a.m. to 4:55 p.m. Monday through Saturday. The City recently updated its Transit Development Plan, which reviewed the need for expanded services and routes, and proposed methods to better integrate bus needs into the roadway system. Accessible transportation (dial-a-ride service) is provided by the Minot Commission on Aging.

With the expressed desire for a more accessible community of walking and biking and fewer automobile trips, and the likely development of new neighborhoods at a sufficient density to support public transit, Minot's transit system will become more important in coming years. Figure 2-21 displays the a.m. bus routes, and Figure 2-22 displays the mid-day transit routes.

### **Souris Basin Transportation**

Souris Basin Transportation (SBT) is a non-profit corporation that provides rural public transit within Minot and in the surrounding seven-county area. Both on-demand trips and scheduled routes are provided. At this time, SBT operates 14 different routes. Connections to all commercial bus lines, airlines, and Amtrak are provided. The system is open to the general public, but focuses much of its services on the elderly and people with special needs. The agency has a transit storage and office building at the corner of Burdick Expressway and 31st Street SE. It currently has 12 buses equipped with wheelchair lifts and two vans.

Figure 2-21: A.M. Transit Routes

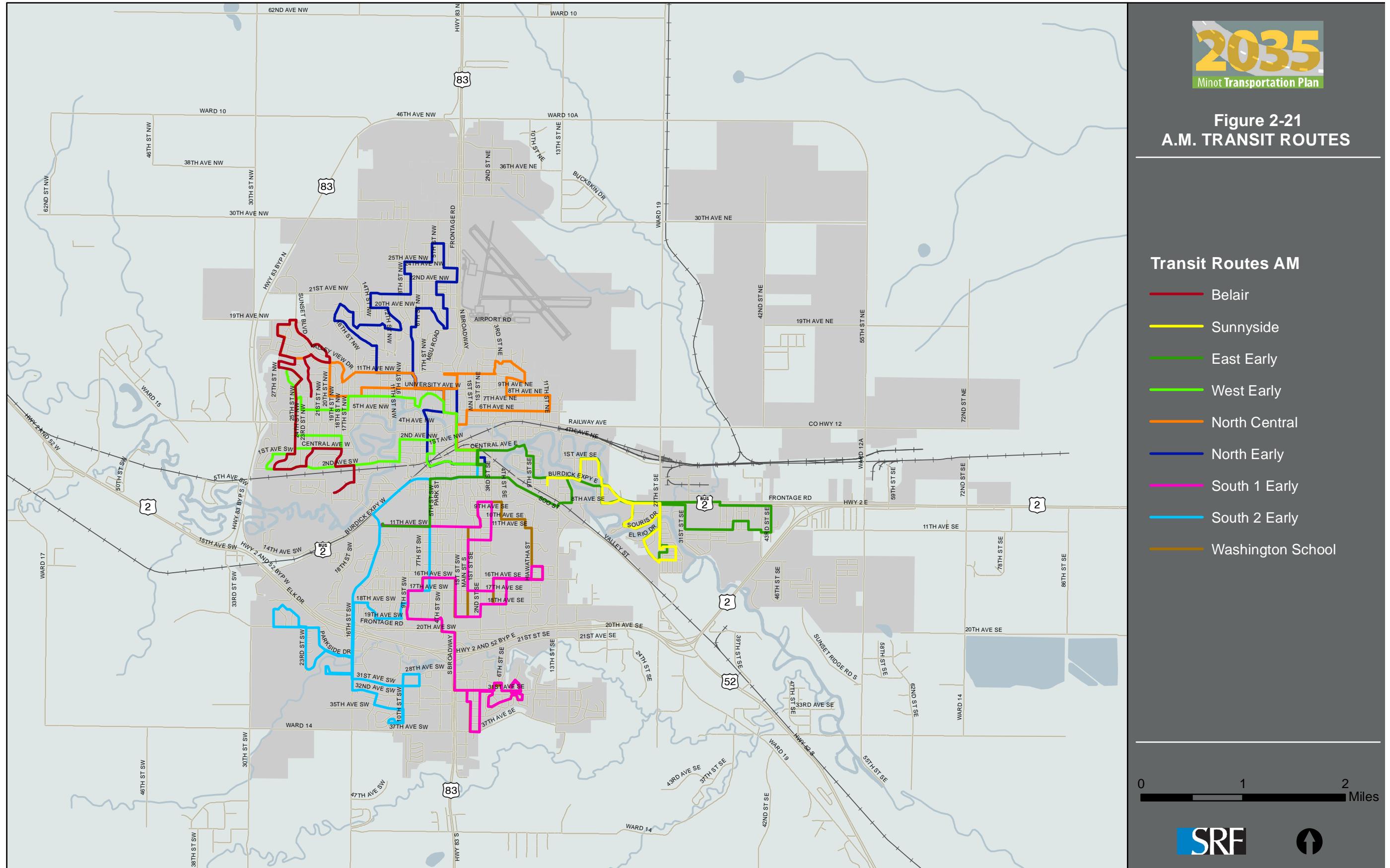
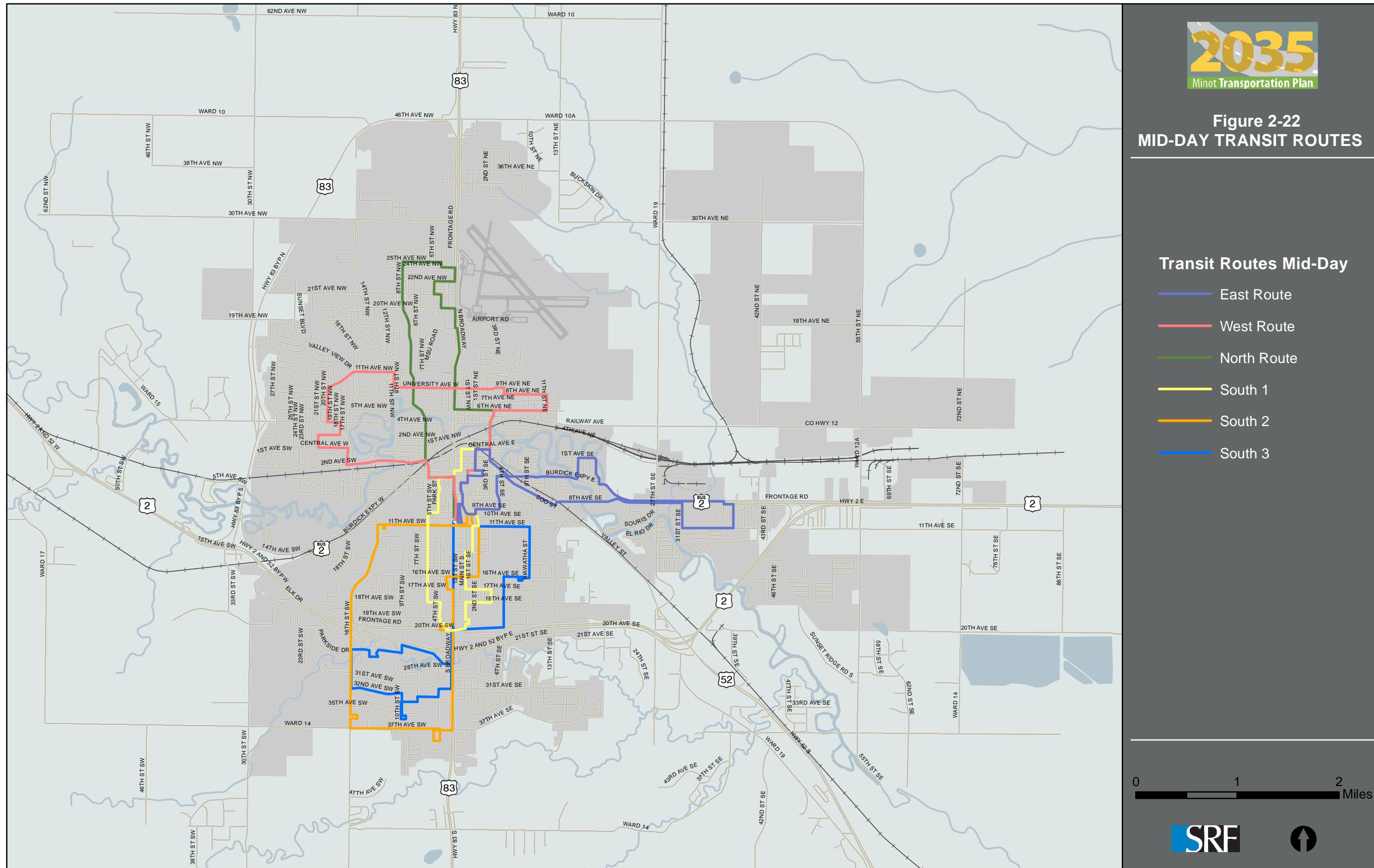


Figure 2-22: Mid-Day Transit Routes



## INTERCITY BUS

Jefferson Lines provides commercial bus service to and from Minot. The depot is located at 300 18th Avenue SW in Minot. Jefferson Lines provides connections to cities along US 2 throughout North Dakota.

## AVIATION

### Minot International Airport

Minot International Airport (MOT) is a public airport located two miles northeast of downtown. According to the FAA's Air Carrier Activity Information System (ACAIR), the airport had more than 220,000 passenger boarding's in year 2012, an increase of nearly 50 percent from year 2011. There are daily flights to/from Minneapolis-St Paul on Delta Airlines, between Minot and Denver served by United, and between Minot and Las Vegas served by Allegiant. Recently flights to and from Mesa, Arizona and Houston, Texas have been added. The airport is under considerable strain due to the increase in traffic over the last couple years. This usage only stands to increase, as oil-related businesses use the Minot Airport to get to and from the oil fields and ancillary businesses in the region.

The Airport's infrastructure includes a passenger terminal, a general aviation terminal building, three aprons, two lighted runways, and a number of hangers, offices, and other support buildings and equipment. Primary Runway 13-31 is 7,700 feet in length by 150 feet in width, and crosswind Runway 8-26 is 6,350 feet in length by 100 feet in width. Plans have been created and construction has commenced for the expansion of the terminal and parking at the airport.

Delta Airlines, UPS, Federal Express, and DHL provide cargo services. Federal Express leases a building and has two flights per day. DHL leases an office from the airport and has one flight per day. UPS is located off property and sends delivery trucks to meet the cargo aircraft. UPS sends two flights daily.

Airport Road is a two-lane roadway that provides access to the passenger terminal area from North Broadway at the 20th Avenue NW signalized intersection. 19th Avenue NW also serves as access between Broadway and Airport Road. The general aviation terminal area is accessed from driveways on Broadway located at 22nd Avenue NW and 24th Avenue NW.

### Minot Air Force Base

Minot Air Force Base Airport is located 13 miles north of Minot. It has one runway and serves 30,000 military operations per year.

### Flying S Ranch Airport

Flying S Ranch Airport is a privately-owned airport located five miles southwest of the City. It has one runway and serves 1,000 itinerant and local operations per year.

### Trinity Medical Center Heliport

The Trinity Medical Center Heliport is located at the Trinity Medical Center and is used for emergency medical purposes. Trinity Medical has discussed the possibility of moving its main facility to new buildings in southwest Minot. If and when they do, the heliport would move there too.

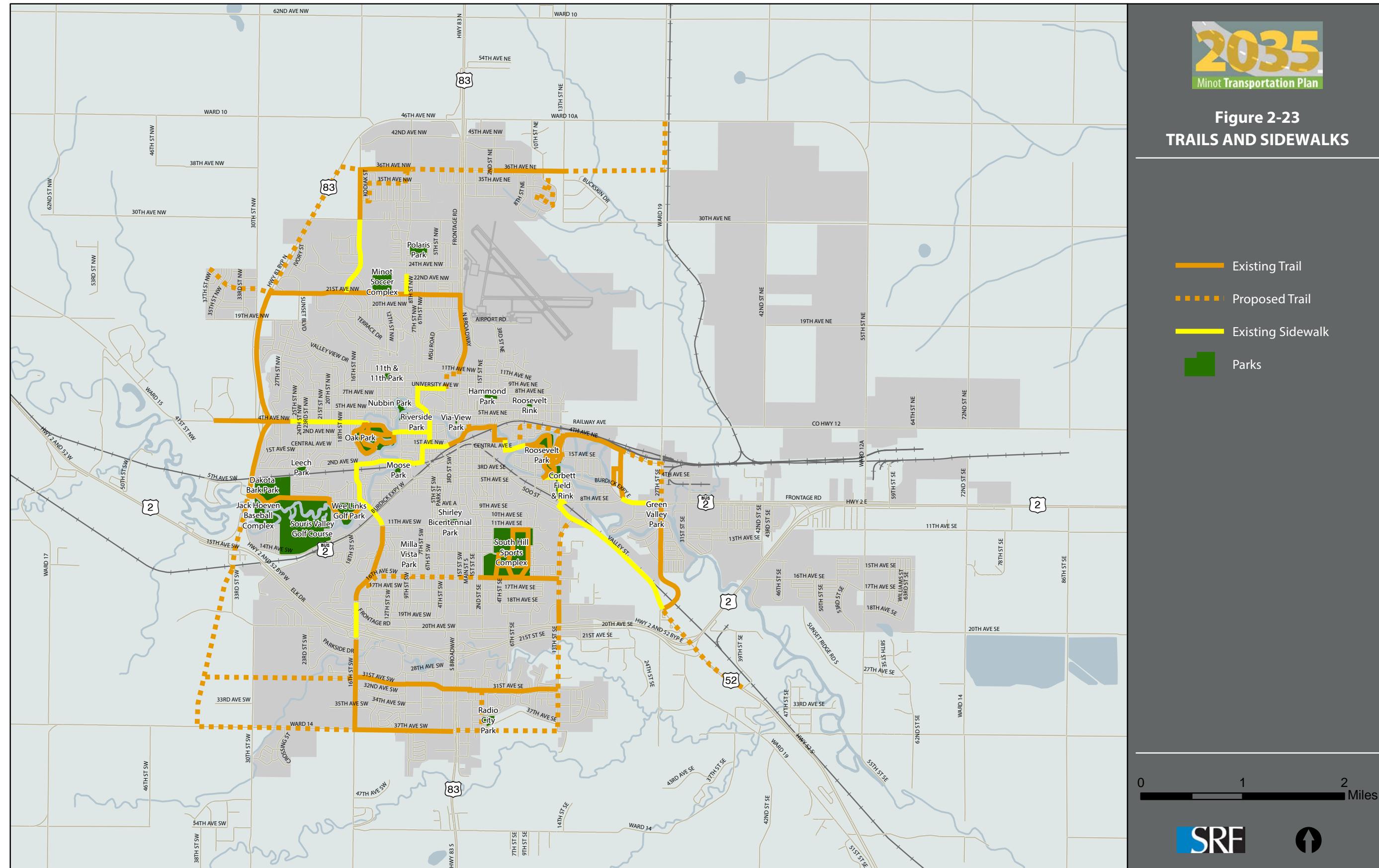
## PEDESTRIAN AND BICYCLE

Most residential subdivisions within Minot have sidewalk facilities integrated into their design. The sidewalks lead to the trail network (see Figure 2-23), which is fairly extensive, with an active Park District in Minot. The trail system mainly consists of off-street, shared-use paths. City staff supports inclusion of bicycle paths along all arterial roadways, over time.

Typically in cities with high amounts of bicycles and pedestrians, a mix of on-street and off-street facilities, combined with signed routes, make up the entire bike and pedestrian system. Such a comprehensive system can be integrated into existing neighborhood areas, at limited expense, and provide access to trail facilities that connect major urban area destinations.

Another initiative that is gaining support in Minot, based on Comprehensive Plan input, is the development of "complete streets." Complete street concepts seek to more fully integrate pedestrian and bicyclist needs into the design of roadways. This concept is explained more thoroughly in Chapter 6 - System Management.

Figure 2-23: Trails and Sidewalks



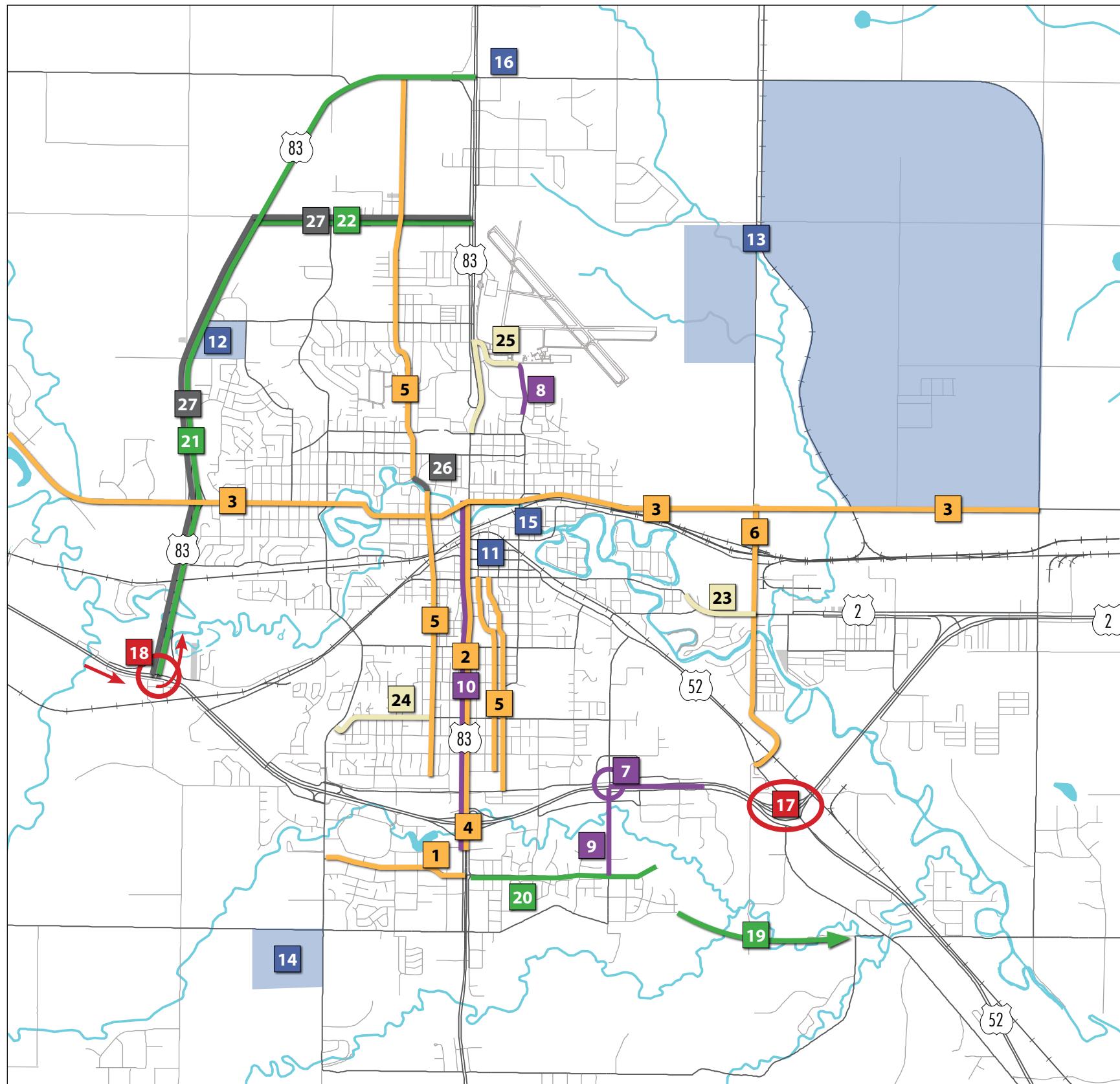
## ISSUES AND OPPORTUNITIES

The identification and confirmation of transportation-related issues was an early focal point in the development of the Plan.

In addition to the existing conditions analysis, outreach and coordination efforts were made with elected officials, agency staff, residents, business owners, modal interests, and public safety officials. This input added context to the issues, needs, and opportunities affecting the transportation system.

Figure 2-24 geographically highlights the major issues and opportunities identified from this process.

**Figure 2-24: Transportation Issues and Opportunities**



#### # Congestion

1. Minot rural fire department station (MRFD) – congestion makes it difficult to leave station
2. Peak hour congestion from 16th Ave SW to North Viaduct
3. Concern about the capacity of 4th St NE/Railway Ave/County Hwy 12 with new development
4. Closely spaced intersections at interchanges causes gridlock
5. Local traffic diverting onto minor streets to avoid congestion: 16th Ave SW, 3rd St SE, 6th St SW/NW, 8th St NW, 2nd St SE
6. Intersection of Railway Ave and 27th St NE will be impacted by Surrey's growth and Port Authority

#### # Access

7. Direction options are limited at US 2 and 13th St NE
8. Airport access modifications on 3rd St NE
9. 31st Ave SE to 13th St SE route to connect to US 2
10. Broadway congestion is partially due to lack of access management

#### # Development

11. Trinity Hospital – Ambulances and daily trips
12. Development of sites along bypass require impact analyses for access spacing along intersecting roadways. Critical to provide adequate spacing of intersections closest to US 83 Bypass.
13. Cargo related businesses located on the east side of the airport property, closer to 27th St NE
14. Trinity Hospital is planning construction of a new hospital and medical office building southwest of 37th Ave SW and 16th St SW
15. Grain handling facilities would be best relocated to areas outside of downtown, possible redevelopment
16. A sizeable new gas station is being considered north of 46th Ave NE with access to both US Hwy 83 and 46th Ave NE (County Highway 10A)

#### # Safety

17. MRFD indicated that the interchange of US 2 and US 52 is problematic
18. US 83 Bypass and US 2 intersection – respond to a lot of crashes here

#### # Roadway Improvements

19. 37th Ave E extension to US 52 would be desirable
20. 31st Ave SE in need of improvement
21. Concern about the two-lane capacity of US Hwy 83 Bypass – Desire a four-lane facility
22. Concern that the roadway design and capacity of 30th Ave NW will not meet the development activity

#### # Pedestrian/Bicycle

23. 27th St SE north of US 52 is used for access to fair grounds – on-street parking, pedestrian activity

24. 16th Ave SW lacking bike/ped facilities
25. Pedestrian access and a bus route to the airport is needed

#### # Other

26. 6th Ave NW is unusable during heavy rains
27. The airport would prefer that drivers access the airport from the US Hwy 83 Bypass

#### General Concerns

- Road system lacks continuity in order to loop transit routes causing service delay and duplication
- Consider fire department access when annexing and developing rural subdivisions
- Emergency response times have gone up due to congestion
- Emergency calls have tripled
- Congestion has made it difficult for Souris Basin Transit to serve riders efficiently
- Signal pre-emption should be employed on all traffic signals
- National retailers are making investments in areas adjacent where investments are being made in the transportation network
- Concern about safety given the rise in traffic
- Funding for the rehabilitation of roadways due to impacts from development
- Many of the trail connections were destroyed by flooding and need to be rebuilt
- Railroad crossing opportunities are limited on both the east and west sides of town
- New housing being developed north of the airport
- The Minot Air Force Base is incentivizing off base housing causing traffic volumes to rise between Minot and the Base
- There needs to be a balance between moving traffic and providing access to developments
- Quality of life is important to attract people to Minot
- Minot is lacking an easy-to-use bike network
- Consideration should be given to the amount of truck traffic there is in Minot
- Military operations periodically impact traffic flow on US 83 and US 83 Bypass especially when moving nuclear missiles
- Farm and implement traffic conflicts with urban growth. A rural beltway would help to handle agricultural activity
  - a. There are times when a large grain drill or other type of oversized agricultural equipment is traveling from fields west of Minot to fields north of Minot via the US 83 Bypass, and it takes up the entire width of the roadway, especially over narrow structures. This brings traffic to a gridlock on the affected roadways

### 3. GOALS, OBJECTIVES, AND PERFORMANCE MEASURE FRAMEWORK



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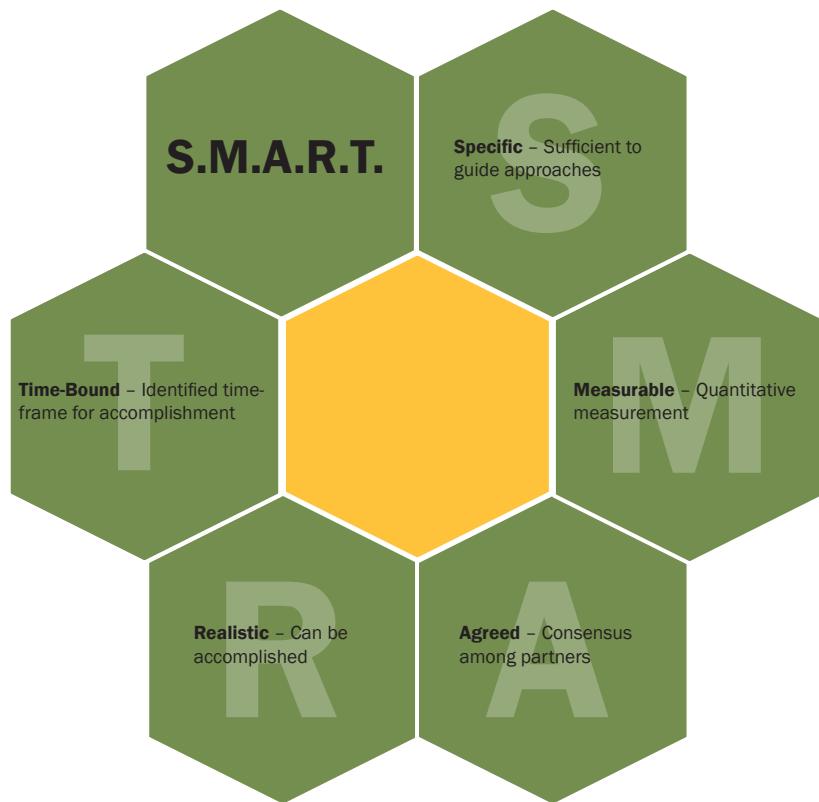
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# 3. GOALS, OBJECTIVES, AND PERFORMANCE MEASURE FRAMEWORK



## OVERVIEW

A key element of the Plan's development was the establishment of goals, objectives, and performance measures. These elements provide direction and guidance that aid in achieving a shared transportation vision with elected officials, city staff, and the community. In essence, these elements strive for a safe, efficient, and accessible transportation system that meets the mobility needs of the community. More importantly, each goal, objective, and performance check applied "S.M.A.R.T." principles. S.M.A.R.T. principles are defined below:

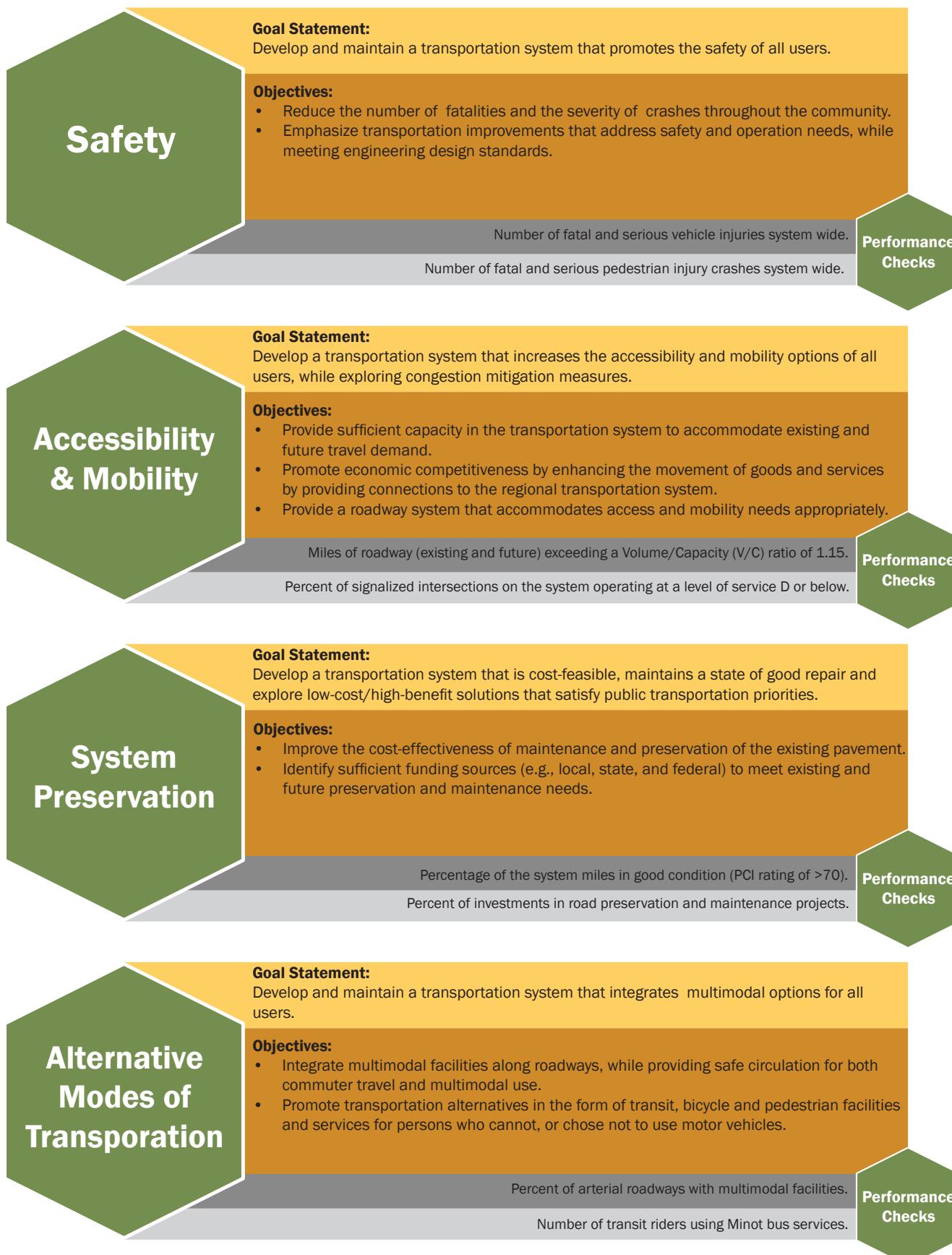


The Plan's goals, objectives, and performance checks were evaluated over the study process, based on stakeholder input and technical analysis.

## GOALS

Goals are defined as broad statements of desired accomplishment or direction, representing broader ideas and visions for the City of Minot. Minot's transportation system consists of multiple modes of transportation (e.g., roads, rails, trails, freight routes, and air services) and facility types. In order to encompass the scope of the transportation system, four transportation goal areas and goal statements regarding safety, accessibility, mobility, system preservation, and multimodal alternatives were established to achieve a long-term vision for the community (see Figure 3-1).

Figure 3-1: Goals and Objectives



A key component in developing the Plan's goals included a priority towards a safe and efficient transportation system for all users. This was achieved by applying greater emphasis on all modes of transportation, such as automobiles, trucks, rail, air, bicycle, pedestrian, and transit facilities. More importantly, the Plan's goals strive to integrate these multimodal features into future new construction, reconstruction, rehabilitation, and pavement maintenance projects that seek to maintain these features in a "state of good repair" undertaken by or on behalf of the City. These goals will also seek to increase mobility and accessibility opportunities for all users throughout the community. Overall, the four defined goals work towards creating a safe, accessible, and multimodal transportation system that is well maintained and cost-effective.

## OBJECTIVES

Objectives are specific statements of action that help to accomplish the goals, and can often be measured (quantitatively and/or qualitatively) over time. The decision-making process and actions that affect the transportation system should maintain consistency with the Plan's objectives. City staff, along with members of the PMT, worked together to identify objectives among the four key goals; to guide policies, investments, and decisions in the direction of fulfilling the City's goals (see Figure 1).

## PERFORMANCE MEASURES AND TARGETS

The purpose of creating and implementing performance measures is to improve the transportation system by monitoring and assessing the effectiveness of transportation investments, while measuring progress towards the Plan's goals. Performance measures are also designed to serve as a benchmark to evaluate and quantify progress over time. Furthermore, a performance-based approach is valuable in assessing asset management risks associated with different performance levels, and can be very useful in increasing decision-making transparency to the public.

This planning-based approach is becoming a standard planning practice at many government levels. For example, the federal Moving Ahead for Progress in the 21st Century (MAP-21) legislation requires the development of performance measures by all states, as well as some measures for Metropolitan Planning Organizations (MPOs). Over time, it is expected that these policies will affect local agencies and counties.

The City of Minot has chosen to initiate a performance-based approach by applying "performance checks" to monitor the success of this Plan (see Figure 1). Over time, new performance checks will be added as staff becomes comfortable with data collection methods, setting targets, and the reporting process.

To help guide this process, the following steps have been developed to assist the City build a performance-based framework. This framework is designed to give the City a step-by-step process over time to develop meaningful performance measures – establishing data collection methods, setting targets, and reporting results to the public and elected leaders.

## BUILDING A PERFORMANCE-BASED FRAMEWORK

### Step 1: Start Simple

Developing a meaningful set of performance measures can be a challenging process if initial efforts are too ambitious. Therefore, City staff decided to start by selecting a manageable list of measures that have readily available data, which can easily be tracked in the first few years. Over time, this list will evolve and new measures will be added.

## Step 2: Align Performance Measures with Goals

Goals and objectives were established (as detailed above) so City staff could effectively select meaningful performance measures. The goals and objectives to a large extent defined the “course of community” over time. Thus, City staff needed to ensure that the performance measures were aligned with the Plan’s goals and objectives.

## Step 3: Apply Guiding Principles & Best Management Practices

As noted earlier, “true” performance measures are measurable, time-bound, and realistic. City staff will apply the following guiding principles when developing performance measures:

- Performance measures will incorporate quantitative and measurable rates for the City.
- Each performance measure will provide specific direction on how to measure the criteria, including performance targets.
- Performance measures will include a list of monitoring activities and schedules in order to record achievements and goal attainments, and data should be collected and evaluated on a regular basis to document level of goals achievement.

City staff agreed that certain guiding principles will also work in tandem with the following best management practices:

1. Performance measures will be created in a format that is fairly automated (i.e., it can easily be updated and reported on an annual basis).
2. Performance measures, where applicable and feasible, will be connected to Geographical Information Systems (GIS).
3. Where possible, performance measures will use existing systems to collect and/or assemble the data. (e.g., GIS and pavement management software)
4. Where possible, the measures will be aligned with performance measures that are being used by other public agencies, so that peer comparisons can be made.
5. Performance measures are only as good as the data that is being collected; therefore, care will be taken to make sure that the methods being used to collect and analyze the data are consistent and repeatable year to year.
6. The performance measures will maintain some flexibility as they are adjusted and refined over time.
7. Staff or departments must easily be able to report the progress of a measure without it being burden.

## Step 4: Identify Data

Building off these best management practices, the development process should recognize known data sets. Conducting a data inventory early on in the performance measure process will help establish an understanding of what can be measured today and if any data gaps exist. More importantly, historical data is often needed to identify performance targets and trends. For example, evaluating the last ten years of pavement data will help provide a stronger baseline for establishing a reasonable target, and provide better information to determine pavement investments.

## Step 5: Establish a Framework

Information collected through steps one and four will help shape the City’s performance measurement framework. In essence, such a framework will be a simple worksheet (e.g., developed in Microsoft Excel) that communicates a performance measure’s goals, targets, and responsible

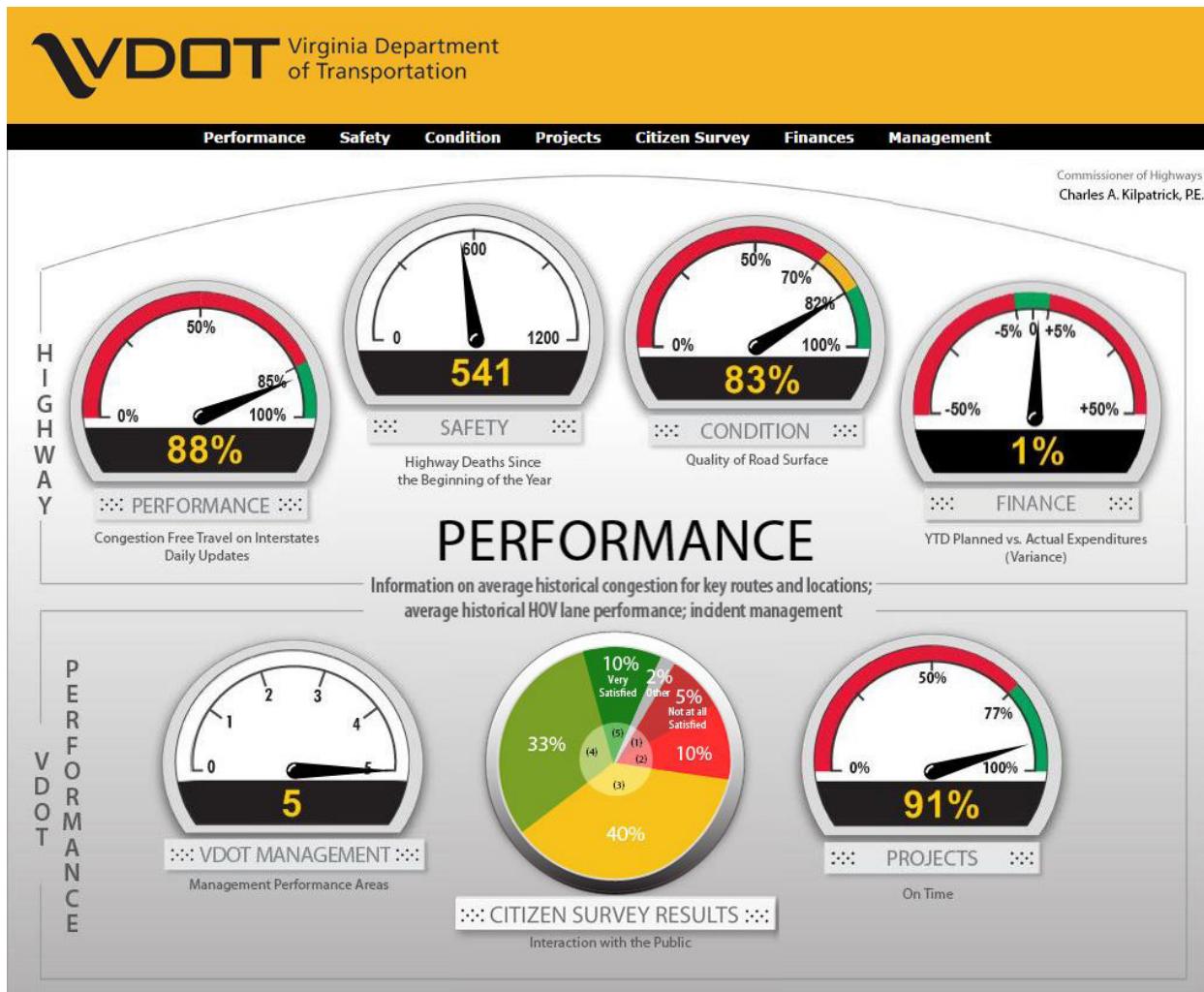
roles for tracking and monitoring measures. The framework will also be utilized as a tool to help organize performance-based planning efforts internally. Developing the framework will include the following attributes:

- Goal Areas – Identifies the performance measure's linkage to the City's goal, objective, policy, or program (see Step 2).
- Asset/Element – Identifies what type of asset or element the performance measure is measuring (e.g., pavement, bridges, safety, or funding).
- Measure – States the performance measure to be evaluated; it will relate to the guiding principles described in Step 3 and align with established goals and objectives.
- Target – Identifies the performance measures target. The target will be set using historical data sets.
- Data Availability - Identifies if data is available, or if data gaps exists.
- Data Source – Identifies the data source and where one can obtain the data.
- Monitoring Schedule – Identifies how often the performance measure will be measured and reported on.
- Monitoring Party – Identifies the responsible staff or department for tracking and monitoring the performance measure.
- Implementation Plan – Identifies when a performance measure can come online to be tracked. In some cases, data may not be available at this time; however, the measure is something the City wants to track in the future.

### **Step 6: Document Performance and Report Card**

Performance measures, as noted earlier are designed to increase transparency between the public and elected leaders. Therefore, one of the most important steps is the reporting process. The reporting process includes the documentation of a performance measure's outcomes and achievements. Secondly, this documentation needs to be available to the public, which creates the transparency between the public and elected leaders. This information needs to be accessible to all members of the community (e.g., printed brochures and websites) and conveyed in an easy to read format. For example, the Virginia Department of Transportation (VDOT) publishes performance measure results. This report uses a scoring system, that graphically depicts targets, historical trends, and achievements (see Figure 3-2).

Figure 3-2: Virginia Department of Transportation Performance Reporting System



## 4. TRAFFIC FORECASTS AND FUTURE TRAFFIC OPERATIONS



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# 4. TRAFFIC FORECASTS AND FUTURE TRAFFIC OPERATIONS



## OVERVIEW

This section summarizes the traffic forecasts and future traffic operations analysis that was completed to evaluate future traffic conditions within the Minot region. Traffic forecasts were generated using a travel demand forecast model updated specifically for the Transportation Plan. This forecast model generated estimates of future travel using the household and employment projections prepared in conjunction with the City's 2012 Comprehensive Plan. Forecasted traffic volumes were used to evaluate levels of roadway congestion, generate turning movement volumes for use in the future traffic operations analysis, and identify future system deficiencies.

## TRAFFIC FORECASTS

### MODEL DEVELOPMENT

The existing model was reviewed, and it was determined that new socio-economic datasets and a refined transportation network were required to develop year 2025 and year 2035 average daily traffic forecasts. The following information provides the updates that were incorporated into the new Minot travel demand forecast model.

#### Socio-economic Data

Socio-economic data provides the basis for estimating the number of trips made within a region, as well as their origin and destinations. Updating the socio-economic data for the Minot travel demand forecast model involved compiling and spatially allocating land use data across all of the Traffic Analysis Zones (TAZ) defined by the Census Bureau within the model boundaries. A model's socio-economic data represents a snapshot of the land use present during the regional travel demand model's base and future years. The primary demographic sources for the updates consisted of block-level Census data and the Census' Longitudinal Employer-Household Dynamics (LEHD) employment data.

#### Traffic Analysis Zones

Traffic analysis zones (TAZs) are geographic subareas used to summarize land use, demographic, and other travel data. TAZs typically consist of aggregations of block groups as defined by the Census Bureau. When reviewing the original Minot travel demand forecast model, prepared as part of the 2012 Comprehensive Plan, it was determined that zonal boundary adjustments were necessary. This process was vital to reflect localized traffic patterns and to develop the data for the future operational analysis. Figure 4-1 documents the new Minot travel demand forecast model's traffic analysis zones.

#### Base Year Assumptions

The base year socio-economic data for the Minot travel demand forecast model was updated by summarizing and allocating year 2010 land use data to the updated TAZs. As noted earlier, this process primarily utilized US Census data and LEHD employment data. Household and population data was derived by allocating block-level Census data for all TAZs, whereas employment data was allocated to individual TAZs using the LEHD "On the Map" tool.

Due to the nature of the employment data, City staff aided in the verification of a majority of the employer locations (notably the largest employers) and employee estimates. This verification

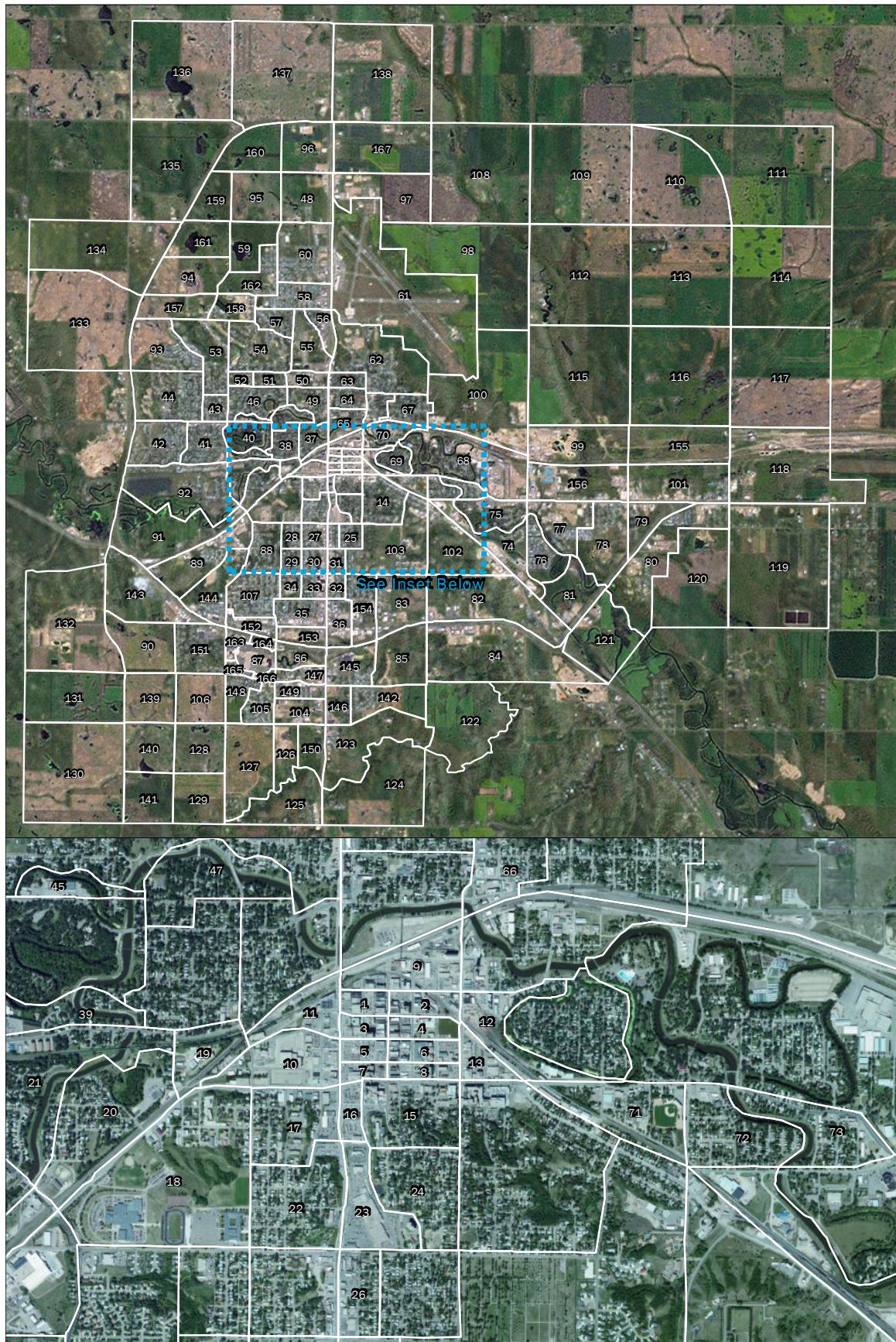
incorporated local knowledge, wherever possible, and was cross-checked against the Minot Chamber of Commerce's list of major employers.

A summary of the Minot socio-economic data totals for year 2010, as compared to the original model data, is provided in Table 4-1.

*Table 4-1: Minot Year 2010 Socio-economic Data Assumptions*

VERSION	HOUSEHOLDS			EMPLOYMENT				
	MULTI-FAMILY	SINGLE-FAMILY	TOTAL	COMM.	INDUS.	OFFICE	SERVICE	TOTAL
Original	6,290	11,609	17,899	9,086	4,015	1,450	8,976	23,530
Updated	5,634	12,258	17,892	6,723	3,962	4,563	8,124	23,372

**Figure 4-1: Minot Transportation Analysis Zones**



### Future Year Assumptions

The future year socio-economic data for the Minot travel demand forecast model was updated by establishing regional control totals and maintaining consistency with the City's 2012 Comprehensive Plan. In its current state the Minot travel demand forecast model uses a forecast year of 2030, whereas the current Transportation Plan, at the request of City officials, generated year 2025 and 2035 average daily traffic forecasts.

In order to develop the future socio-economic datasets, future year household and employment control totals were established and adhered to. The process of establishing these regional control totals involved the review of a population report prepared for the City. This report provided regional control totals that were developed using household and employment build-out models, with supporting data related to the western North Dakota petroleum-related activity. Based upon the population and household estimates presented in the report, City staff recommended that the model's year 2030 socio-economic estimates were suited to represent the year 2035. This recommendation allowed for the control totals to remain consistent with the previous control totals, but now representing year 2035 conditions, as opposed to year 2030. Year 2025 control totals were established by evaluating recent development proposals and estimating build-out potential for the next 10 years. This process was conducted in coordination with City staff and resulted in the assumption that year 2025 conditions would be represented as 90 percent of the total growth estimated for year 2035.

After establishing the regional control totals, the household and employment growth assumptions were reviewed by City staff to verify allocation of household and employment growth throughout the Minot area. Future year employment and household totals were derived by adding the estimated growth to the revised base year socio-economic dataset.

A summary of the Minot socio-economic data totals for year 2025 and 2035 are provided in Table 4-2.

*Table 4-2: Minot Year 2025 and 2035 Socio-economic Data Assumptions*

YEAR	HOUSEHOLDS			EMPLOYMENT				
	MULTI-FAMILY	SINGLE-FAMILY	TOTAL	COMM.	IND.	OFFICE	SERVICE	TOTAL
2025	17,002	16,561	33,563	12,170	12,263	5,957	8,746	39,136
2035	19,018	18,274	37,292	13,519	17,075	6,617	8,972	46,183

### Transportation Network

The roadway system is represented in the travel demand model by a highway network. This network serves as a digital representation of the roadway system within the Minot study area with detailed attributes containing a summary of each roadway's functional class, travel speed, lanes, and capacity. In order to develop year 2025 and 2035 forecasts for use in more detailed operational analyses, it was determined that the transportation network needed significant revisions.

Revisions to the network included review of local connectivity, access, lane designations, and the functional classification system, in an effort to have the transportation network represent year 2010 conditions. The next step in the revision process involved developing new planning-level capacities and travel speeds, which were based upon the functional classification system and location (e.g., dense urban, urban, and rural). The model's functional classification scheme was consistent with the NDDOT's defined classification for the City of Minot; however, principal arterials were further classified as freeways or expressways in compliance with new FHWA classification

guidelines (2013) to more accurately capture the true operational characteristics of the roadway (i.e., access, travel speed and roadway capacity). Additional detail was incorporated based upon a list of local traffic controls, speed limits, and access restrictions provided by the City.

#### No Build Network

Background roadway assumptions (those assumed in all alternatives) were consistent with the NDDOT and local improvement plans. The projects explicitly documented in this section are only those projects that significantly influence the capacity and operations of the transportation system. Local roadway connections that expand the local street grid/system were not included because they do not significantly impact the travel demand modeling and subsequent traffic forecasts. Preservation and maintenance projects are not shown, because it is assumed they will not influence traffic volumes either. Table 4-3 provides a list of the roadway improvements that were used as part of the model's no build network. These improvements will have an impact on the future travel demand in the study area and were represented in the year 2025 and year 2035 no build traffic forecasts.

*Table 4-3: Programmed and Planned Roadway Improvements*

ROAD	DESCRIPTION	LOCATION	CIP YEAR *
37th Ave SE	Urban Reconstruct	Broadway - 13th St SE	2014
13th St SE	Urban Reconstruct	20th Ave SE - 37th Ave SE	2013
36th Ave NW	Urban Reconstruct	16th St NW - 8th St NW	2013
31st Ave SE	Expand to 3-Lane	Broadway - 13th St SE	2016
21st Ave NW	Urban Construct	30th St - US 83 Bypass	2015
36th Ave NW	Urban Construct	8th St NW - Broadway	2015
36th Ave NW	Urban Construct	16th St NW – Ward Co. 10	Planned

\* CIP represents the Capital Improvement Program year

#### External Traffic

External traffic assumptions were also reviewed to identify long-term growth trends for the major highway corridors entering and exiting the Minot study area. These major highway growth trends were incorporated into the traffic forecasts for the Minot Transportation Plan.

External traffic is defined as vehicle trips that have an origin and/or destination outside of the limits of a travel demand forecast model. This type of vehicle traffic is pre-defined during the model development process and is not part of the trip generation process. As such, the model's external traffic assumptions were updated to represent year 2025 and 2035 conditions based on feedback from City, County, and NDDOT staff, and a review of Burlington and Surrey development trends. Table 4-4 represents the external station locations for the major highways and county roads in the Minot study area.

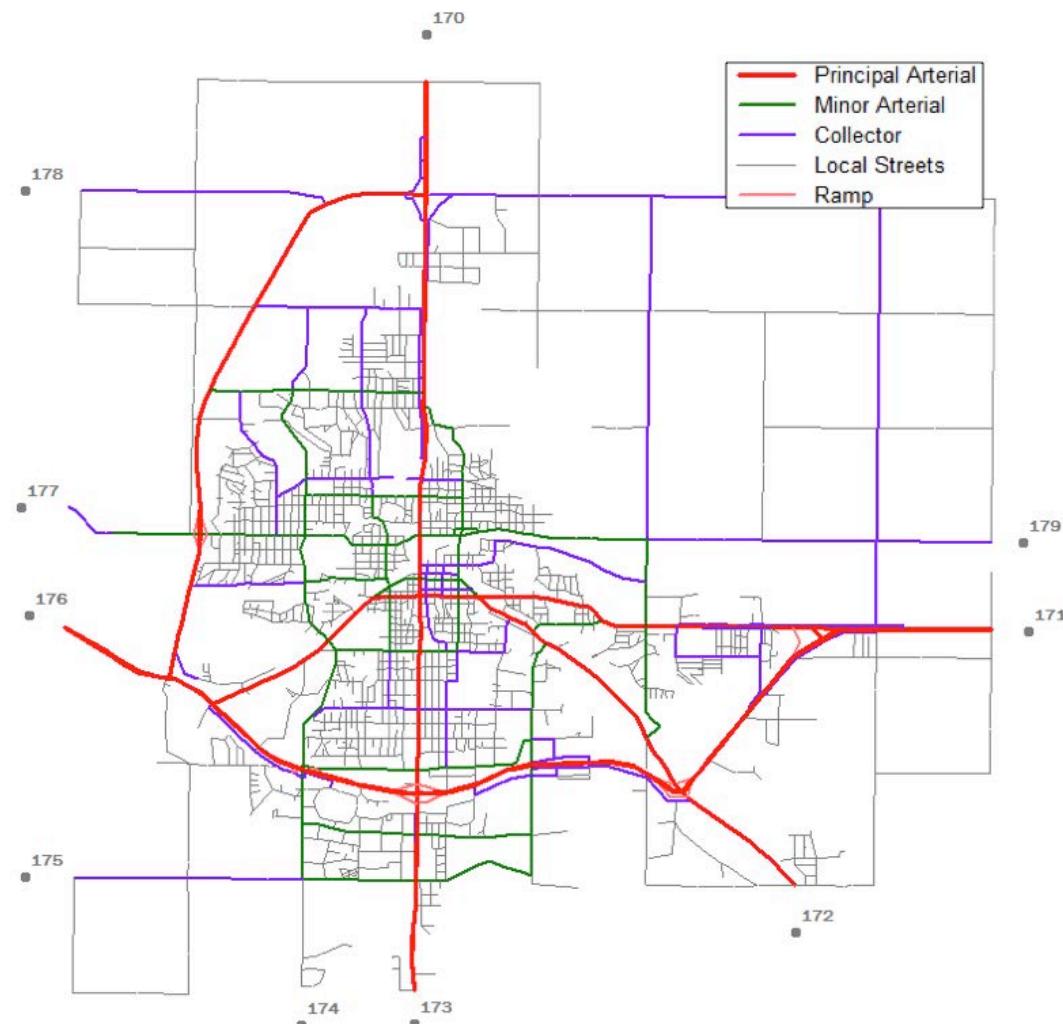
Figure 4-2 provides the year 2010, year 2025, and year 2035 external traffic assumptions for the Minot travel demand forecast model.

Table 4-4: External Traffic Assumptions

EXTERNAL ID	ROADWAY*	YEAR 2010	YEAR 2025	YEAR 2035
170	US 83 (North)	11,200	17,730	20,800
171	US 2 (East)	7,000	12,080	14,700
172	US 52	7,400	11,915	13,700
173	US 83 (South)	7,400	11,730	13,700
174	16th St SW	600	900	1,000
175	37th Ave SW	1,400	2,350	2,600
176	US 2 (West)	11,600	20,020	24,300
177	4th Ave NW	3,600	6,750	7,500
178	46th Ave NW	600	1,000	1,100
179	4th Ave NE	1,200	6,750	7,500

\* Parenthetical statement indicates the external ID boundary

Figure 4-2: External Station Overview



## MODEL VALIDATION

Model validation is the process of comparing model traffic assignments to real-world conditions, using known input and computer-generated output (traffic) data. For travel demand forecasting, the known input data include the existing transportation network, traffic counts, and land use information. Validation results and statistics were developed and compared against the procedures and standards documented in the 2010 FHWA report, Travel Model Validation and Reasonableness Checking Manual.

The results of model validation often lead to model adjustments that improve model performance. Existing average daily traffic (ADT) volumes were obtained for the study area from NDDOT traffic count maps for years 2010, 2011, and 2012.

### Correlation

A correlation of 0.84 was achieved. This was considered reasonable (according to FHWA's report) given the zone sizes in the model, which is a function of the scope of the project and the availability of data in the area.

### Root Mean Square Error

The average error of the model was calculated using the measure called Root Mean Squared Error (RMSE) and is summarized in Table 4-5. This measure differs from the arithmetic measure of calculating the average modeled volume against the average count volume, which can often lead to too-high volume to be averaged and offset against a too-low volume. This measure places more weight on and allows for greater error on higher volume facilities. For the Minot travel demand forecast model an RMSE of 46 percent was achieved. This value was considered reasonable, since over half of the count values that were included were for count locations less than 5,000 and the limited amount of counts was within the 20,000 – 30,000 range. The greater error at the low volume locations, which were included to increase the level of detail in the model, resulted in a greater RMSE. Lower volume count locations can be more difficult to validate to the level of detail required to model lower function streets. Also of note, the Souris River flood (2011) and recent growth related to the oil-related activity has resulted in counts that have fluctuated greatly throughout the region, which greatly influenced the model validation results.

*Table 4-5: Root Mean Square Error Summary*

ADT RANGE	COUNT	MODEL RMSE %	ACCEPTABLE RMSE %
0 – 5,000	269	71.09	45 – 55
5,000 – 10,000	126	37.63	35 – 45
10,000 – 20,000	80	27.70	27 – 35
20,000 – 30,000	24	34.44	24 – 27
All Ranges	499	46.72	32 – 39

### Link Deviation from Count

Differences between modeled volumes and ground counts are expected in a model. The significance of any difference depends on whether the variance affects roadway requirements (such as the number of lanes) and differs significantly from known traffic counts. The Minot travel demand forecast model's volumes were compared against ground counts for ADT ranges, which are summarized in Table 4-6. Greater error is expected at locations with low ADT volumes, which is why

the error at locations with ADT's less than 2,500 is not of much concern. The error for ADT's greater than 2,500 was generally less than 10 percent, which was considered acceptable.

*Table 4-6: Deviation from Count Summary by ADT Range*

ADT RANGE	COUNT	MODEL ESTIMATE	NDOT COUNT	PERCENT DIFFERENCE
0 – 1,000	14	9,661	5,045	91.5
1,000 – 2,500	87	86,344	67,835	27.28
2,500 – 5,000	168	330,214	316,400	4.37
5,000 - 10,000	126	431,971	453,940	-4.84
10,000 - 20,000	80	531,037	553,700	-4.09
> 20,000	24	394,784	303,150	30.23 *
All Ranges	499	1,784,011	1,700,070	4.94

\* The larger percent difference associated with these ADT ranges is due to limitations in the data available due to recent flooding and oil-related activity spikes.

## MODEL ADJUSTMENT

Despite validation efforts to improve performance of any regional travel demand model, the model will have some level of recurrent error. To account for these discrepancies, forecast year volumes were adjusted on a link-by-link basis (i.e., post-processing). Three calculations were used in making adjustments to the link volumes produced by the model. This practice is consistent with the methods described in NCHRP 255 (Highway Traffic Data for Urbanized Area Project Planning and Design). These are the Ratio Method, the Difference Method, and the Average Method. The calculations for each of these are given below.

- Ratio Method:  $\text{Adj. Vol.} = \text{Future Model Vol.} \times \frac{\text{Base Count}}{\text{Base Model Volume}}$
- Difference Method:  $\text{Adj. Vol.} = \text{Future Model Vol.} + (\text{Base Count} - \text{Base Model Vol.})$
- Average Method: Ave. of Ratio Method and Difference Method

Generally, the ratio method provides potentially volatile and unstable adjustments where the travel demand model is extremely different than the counts, or where growth is proportionately high. Consequently, it is never used on its own. In most cases, the average method is appropriate for such adjustments. There may be cases where none of the methods are appropriate. Examples would include a new facility or a facility experiencing a major change in future capacity. In these cases, a different adjustment method must be applied to satisfy the individual forecast. Reasonable judgment was used for the adjustment techniques applied in this study for both the base and future conditions, as well as across all scenarios.

## No Build Forecast Results

Traffic growth within the Minot region is largely a function of the local and regional development, most of which is expected on the edge of the urban area. In addition to the development-related traffic growth, major roadway corridors providing regional access to, from, and through the region are expected to experience consistent growth over the course of the planning horizon. Traffic growth attributed to local development and the regional movements is greatly influenced by the City's proximity to the Bakken oil fields, which are expected to maintain strong oil production over the next 20 years.

Figure 4-3 displays the year 2025 ADT forecasts and Figure 4-4 displays the year 2035 ADT forecasts. Below is a summary of the major traffic growth areas:

- Development in northwest Minot (e.g., Prairie Wynd, Northern Lights, Bolton Heights, etc.) attributes for a majority of the traffic growth and congestion along US 83 NW Bypass, 16th Street NW, and N Broadway.
- Development in southwest Minot (e.g., Highlander Estates, Magic Meadows, and Southgate) contributes to the traffic growth and congestion along 37th Avenue SW, 16th Street SW, and S Broadway.
- Trinity Hospital is also planning construction of a new hospital and medical office building southwest of 37th Avenue SW and 16th Street SW, attributing to major traffic growth and congestion.
- The Port of North Dakota site in northeast Minot accounts for a majority of the traffic growth and congestion along 55th Street NE, Railway Avenue, and 27th Street NE. The year 2035 ADT forecasts were used to develop intersection turning movement volumes for use in the detailed year 2035 no build operations analysis; the year 2025 ADT forecasts were developed to gain a better understanding of the interim traffic growth patterns and help identify how roadway improvement projects should be implemented over time – no detailed traffic operations were conducted for this time horizon.

**Figure 4-3: Year 2025 Daily Traffic Forecasts – No Build Network**

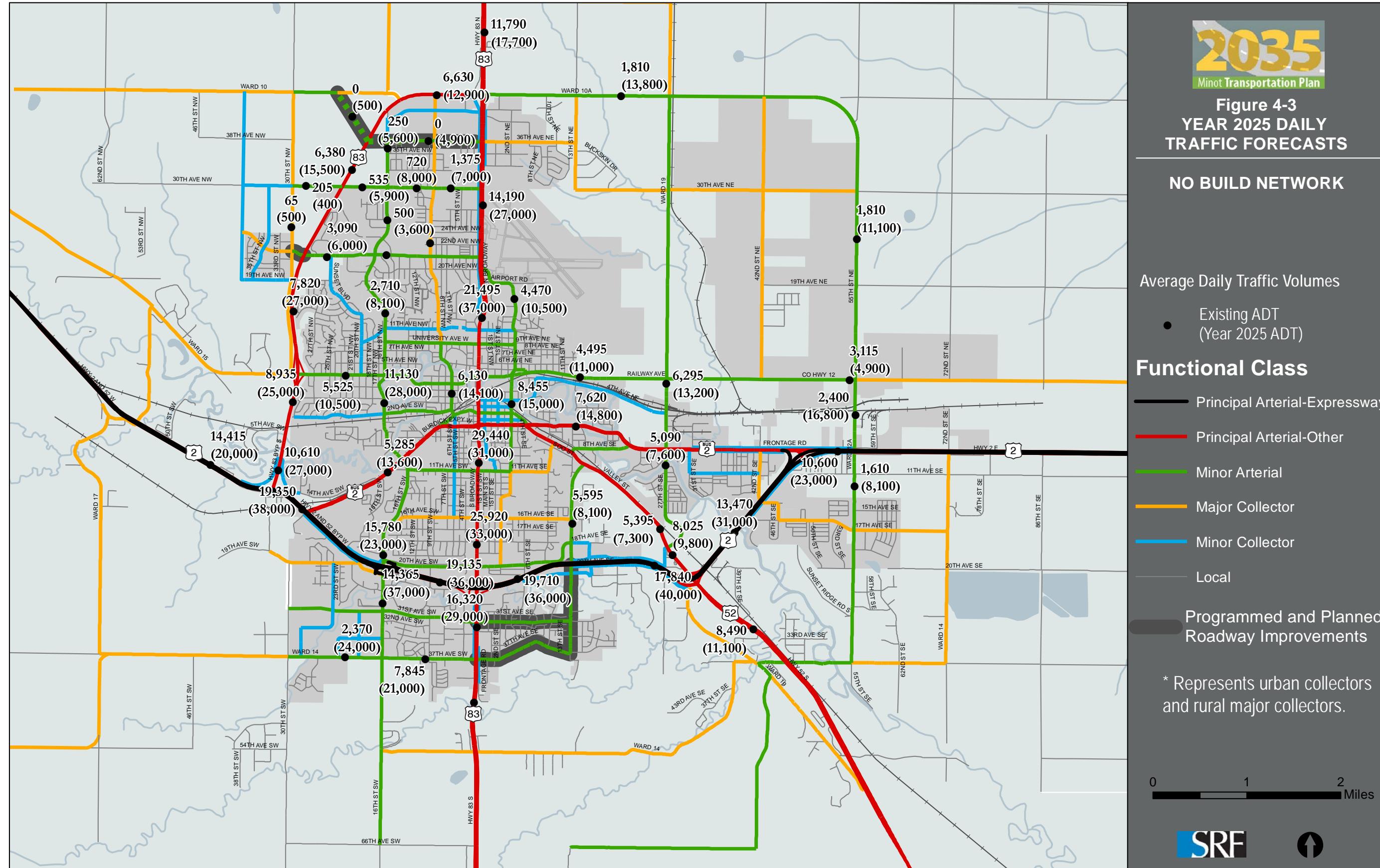
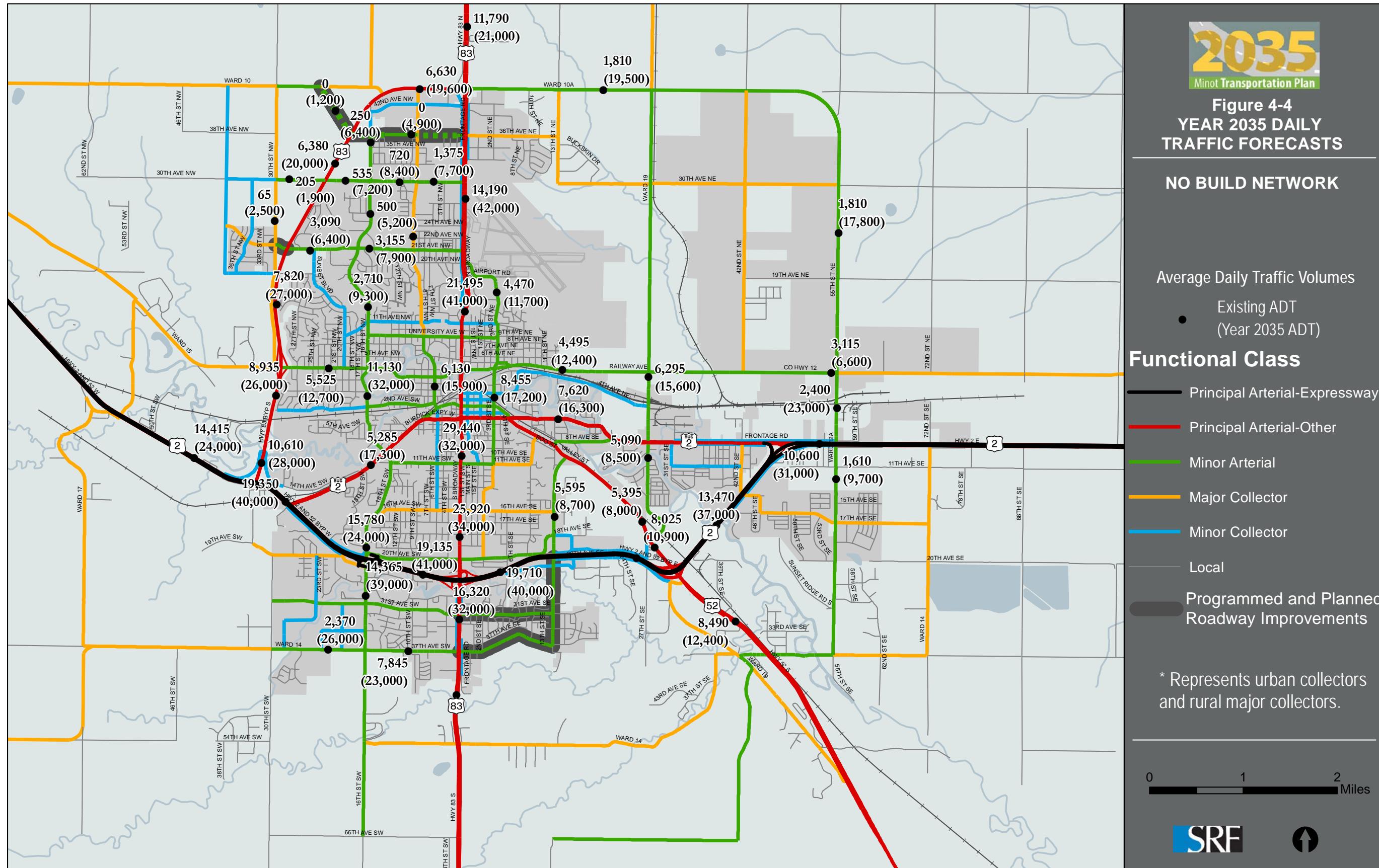


Figure 4-4: Year 2035 Daily Traffic Forecasts – No Build Network



## FUTURE TRAFFIC OPERATIONS

The future traffic operations analysis was completed by evaluating the year 2025 and year 2035 daily traffic forecasts relative to the current roadway network. From this analysis, corridor and intersection operational deficiencies were identified. The specific methodology to complete the analysis is presented below, including additional detail and steps taken to arrive upon detailed intersection operations analyses.

Similar to the analysis performed for the existing traffic operations (see Chapter 2), the planning-level capacity thresholds were again used as a measure to evaluate future daily roadway congestion by facility type (Table 4-7). Again, it is worth noting that special traffic conditions or roadway characteristics not meeting the definition of average daily traffic may result in different levels of congestion. Additionally, factors such as intersection design, access, and roadway geometrics may alter the capacity of the roadway.

*Table 4-7: Minot Area Planning Level Capacity Thresholds*

FACILITY TYPE *	APPROACHING CONGESTION (V/C = 0.85)	LIGHT CONGESTION* (V/C = 1.00)	MODERATE CONGESTION (V/C = 1.15)	SEVERE CONGESTION (V/C = 1.30)
Two-Lane undivided urban	8,500	10,000	11,500	13,000
Two-Lane undivided rural	12,800	15,000	17,300	19,500
Two-Lane divided urban (Three-Lane)	14,500	17,000	19,600	22,100
Four-Lane undivided urban	18,700	22,000	25,300	28,600
Four-Lane undivided rural	23,800	28,000	32,200	36,400
Four-Lane divided urban (Five-Lane)	25,500	30,000	34,500	39,000
Four-Lane divided rural (Five-Lane)	32,300	38,000	43,700	49,400
Two-Lane expressway	19,100	22,500	25,900	29,300
Four-Lane expressway	38,300	45,000	51,700	58,500

\* Represents the daily planning-level capacity for the facility.

Figure 4-5 illustrates the anticipated year 2025 corridor congestion and Figure 4-6 highlights the anticipated year 2035 corridor congestion. As shown, the year 2025 and year 2035 no build conditions are expected to experience “significant” and “moderate” congestion on numerous roadways. This indicates that the current roadway configurations are insufficient to handle the forecast volumes on a corridor basis. Further investigation is needed to understand how poorly intersections will operate; however, it can be determined at this level that significant improvements will be needed to mitigate this amount of congestion – which will be costly, impactful, and difficult.

An operations analysis was conducted for the a.m. and p.m. peak hours at the key intersections to determine how traffic is expected to operate under year 2035 no build conditions. Once again, signalized intersections were analyzed using the Synchro/SimTraffic software, while unsignalized intersections were analyzed using a combination of Synchro/SimTraffic software and the HCM. It should be noted that where unsignalized intersections are in close proximity to signalized intersections, the signalized intersections have a significant impact on the overall operations of the unsignalized intersections. To account for this situation, Synchro/SimTraffic results were reported for the unsignalized and signalized intersections.

Results of the year 2035 no build operations analysis indicate that the majority of the key intersections are expected to operate at an unacceptable overall LOS E or worse during the a.m. and p.m. peak hours with the existing traffic controls and geometric layout. Several other intersections operate at a level of service that is near capacity (i.e., LOS D). It should be noted that LOS A through C is typically considered acceptable in the Minot area. However, based on the results of the future operations analysis, a change in the acceptable level of service criteria may be necessary to maintain a functional system without significant fiscal costs (i.e., LOS D considered acceptable). Further, changing the level of service criteria and failing threshold will better align with the anticipated system decline and improvements needed to maintain the system at LOS D or better. This situation was discussed with the City and PMT, where it was determined that future year 2035 conditions will be assessed based on a LOS E or worse threshold (LOS D or better considered acceptable).

Improvements will be recommended only for intersections operating at LOS E or worse – where possible. As can be expected, many of the individual traffic movements also operate poorly from a level of service perspective. Traffic queues are a significant contributing factor – queues observed under existing conditions degrade further under year 2035 conditions. Several of these queues impact adjacent intersections resulting in additional congestion and system failure. The expected level of service and queuing issues are illustrated in Figure 4-7 and Figure 4-8.

As a result of the network-wide congestion and associated operational issues, significant roadway modifications are necessary to mitigate the poor operations and queuing issues expected under year 2035 no build conditions. The 16th Street SW and Broadway corridors are not expected to be mitigated with individual intersection improvements due to either ROW constraints and/or feasibility. These corridors require large scale, network-wide improvements, in order to mitigate the poor operations and congestion, which include capacity improvements along the Northwest US Highway 83 Bypass, a new southwest bypass/arterial, additional local roadway connections to provide relief, and access modifications.

Figure 4-5: Year 2025 No Build Roadway Congestion

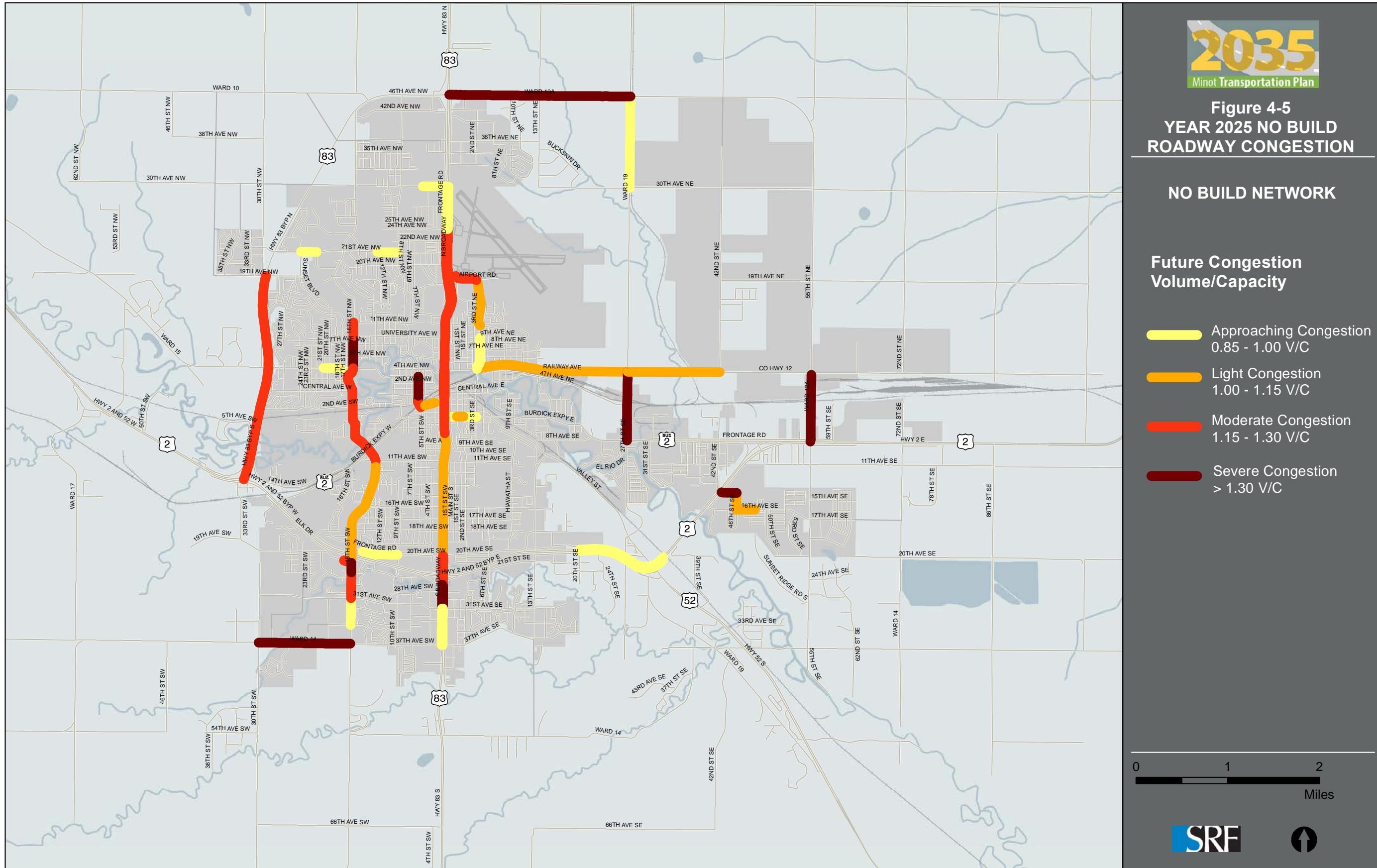


Figure 4-6: Year 2035 No Build Roadway Congestion

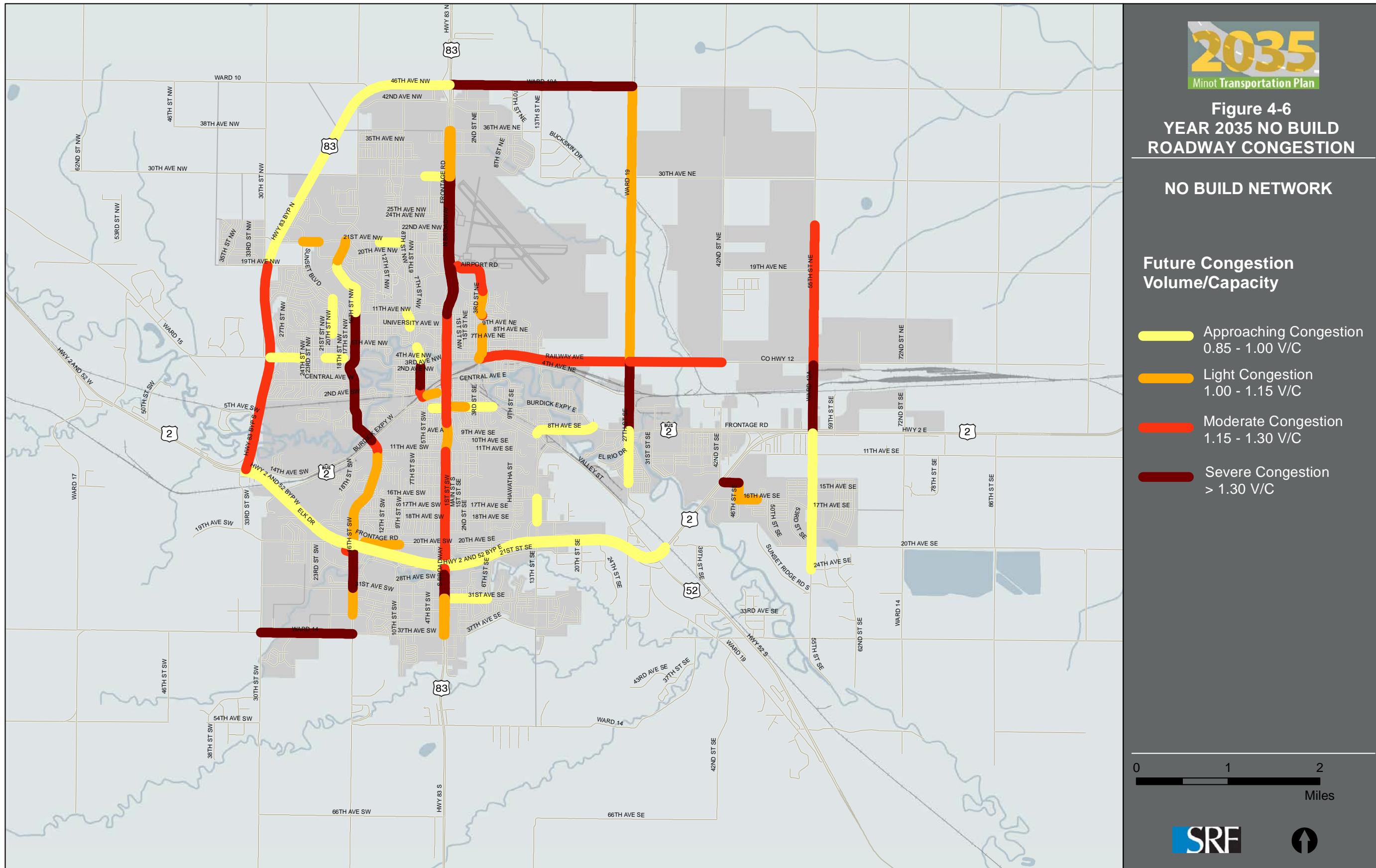


Figure 4-7: 2035 No Build Weekday A.M. Level of Service

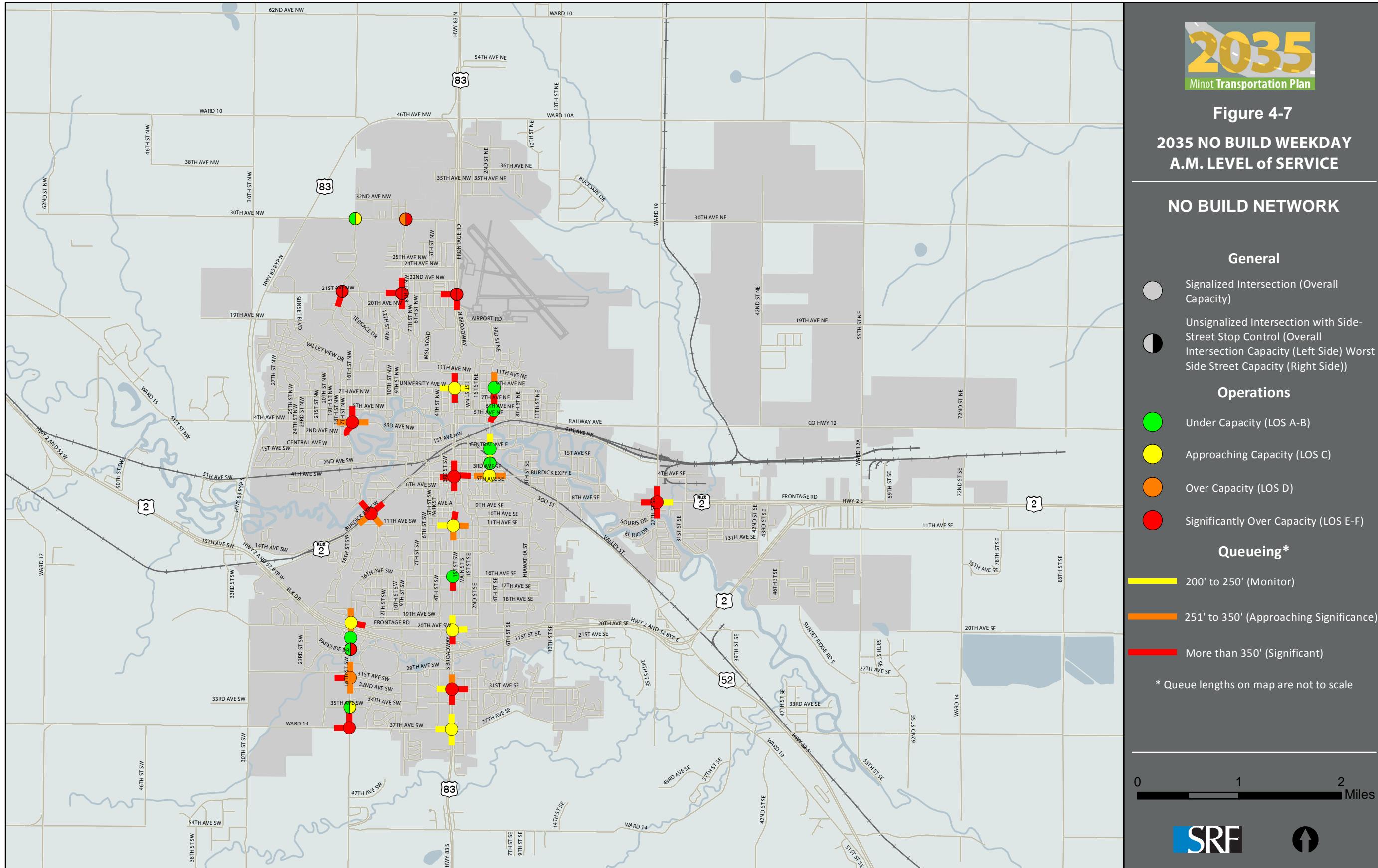
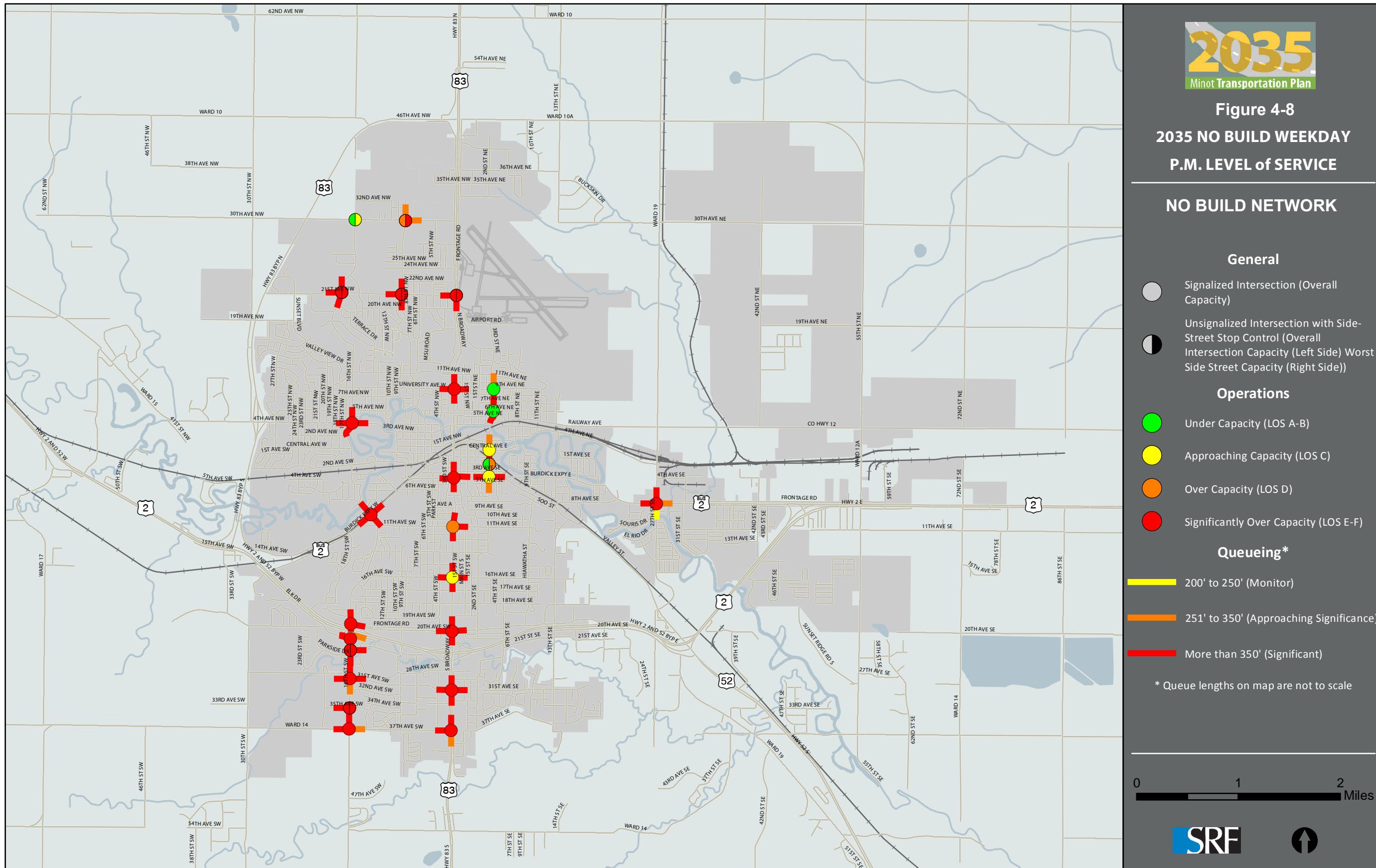


Figure 4-8: 2035 No Build Weekday P.M. Level of Service



## MODIFIED NETWORK ANALYSIS

In order to account for the expected traffic growth and resulting congestion, major system improvements were reviewed that address future congestion or operational issues that cannot be mitigated with system management solutions (i.e., access management, turn lane, or signal improvements). This resultant modified network considers not only year 2035 deficiencies, but also existing issues and needs, planned developments, future deficiencies, and travel patterns through the area. The intent is to develop a modified network scenario that incorporates larger scale improvements that not only address local issues and needs (immediately adjacent to the respective large scale improvements), but also broader regional issues and needs (major regional system deficiencies such as North Broadway).

The improvements identified as part of the modified network scenario do not represent projects that are currently planned or programmed, but represent a comprehensive approach to address the City's long-term transportation needs. System alternatives were identified in a manner that will provide for a cohesive transportation system to enhance mobility and promote safe, efficient travel for all users.

### US 83 NORTHWEST BYPASS

The US 83 Northwest (NW) Bypass serves as a primary regional north-south route in Minot. As a limited-access two-lane highway, this facility provides a regional bypass route around the west side of the City between Broadway and US 2. Planned developments along the corridor are expected to result in significant increases in traffic volume. Without capacity improvements, the corridor is expected to experience congestion that will decrease its functionality as a regional bypass route.

Currently, the primary local north-south route within Minot is Broadway, but ROW limitations, multiple access points, and the abundance of signals along the corridor limit its ability to accommodate anticipated traffic volumes. The other primary north-south route within Minot is 16th Street NW/SW; however, this route has ROW limitations and provides a significant amount of access to residential and commercial properties.

In order to understand the traffic demand along the US 83 NW Bypass and identify users along the corridor, a travelshed analysis was conducted. This analysis consisted of using the travel demand forecast model to identify users of the roadway and their travel patterns (e.g., origin and destinations). The travelshed analysis summarizes the major travel demand contributions to significant areas surrounding the NW Bypass; other users not identified (approximately 10 percent of overall Bypass travel) are bypass users that are traveling west along US 2. Results from this analysis indicate this facility serves both regional and local trips, including much of the traffic generated from the planned developments in northwest Minot.

Figure 4-9 illustrates the results of the travelshed analysis for the US 83 NW Bypass. This graphic displays the general travelshed for users of the US 83 NW Bypass, such that the green bubbles represent northern travelshed users, orange represent southern travelshed users, and purple indicates the non-local users (regional through trips).

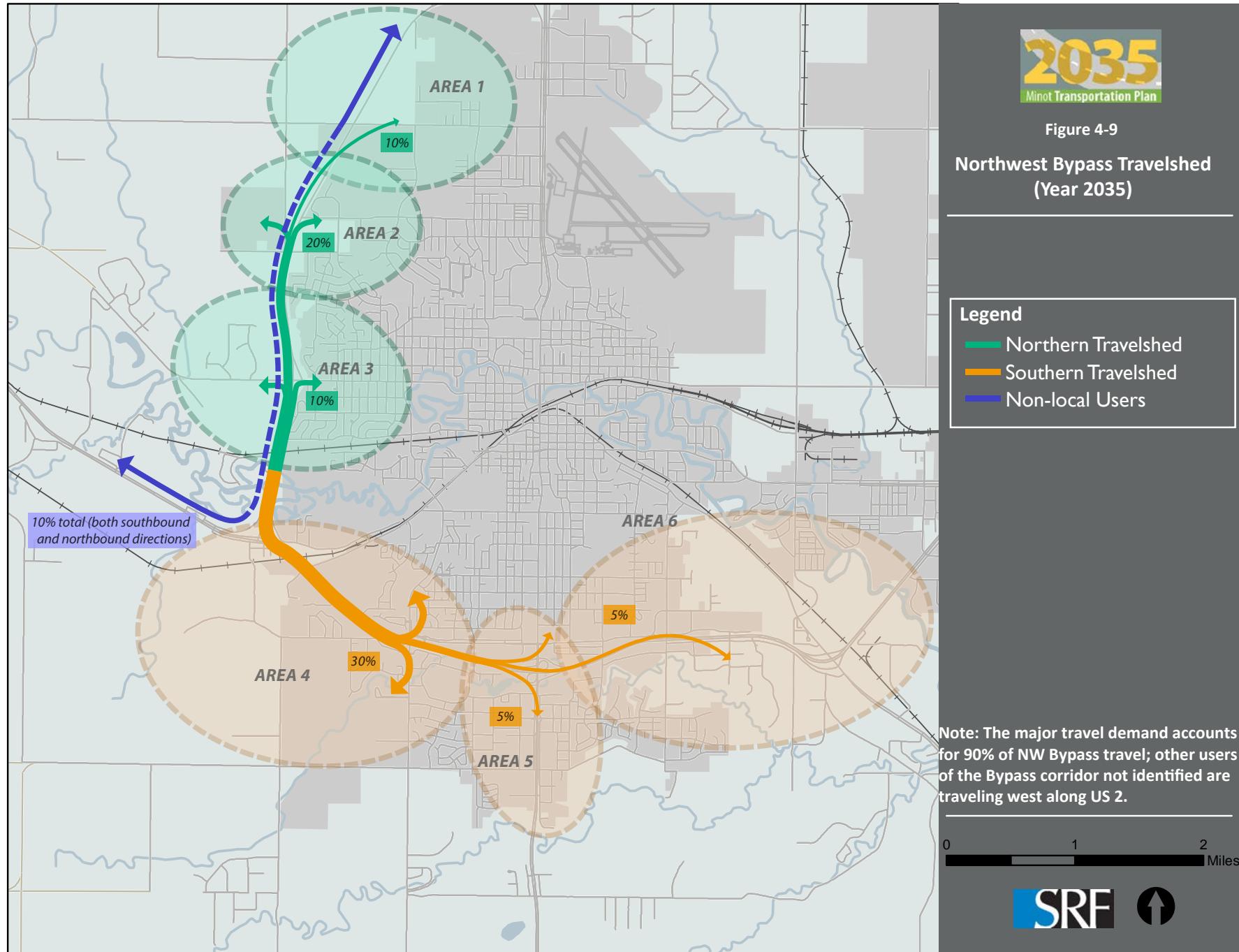
In order to address the growth forecasted through this corridor, the following improvements were identified and assumed along the US 83 Northwest Bypass:

- Expand to four-lane roadway between Broadway and US 2
- Limit access to grade-separated interchanges at major intersecting roadways (potentially 21st Avenue, 30th Avenue, and/or 36th Avenue)

- Chapter 7 – Implementation Plan further describes the process and sequencing of traffic control needs at these locations
- Incorporate overpasses at all other major intersecting roadways

A more in-depth summary of the corridor improvements and access configurations considered is presented in the next chapter. This summary also includes a planning-level analysis aimed at identifying potential social, environmental, and transportation impacts of such improvements.

Figure 4-9: Northwest Bypass Travelshed (Year 2035)



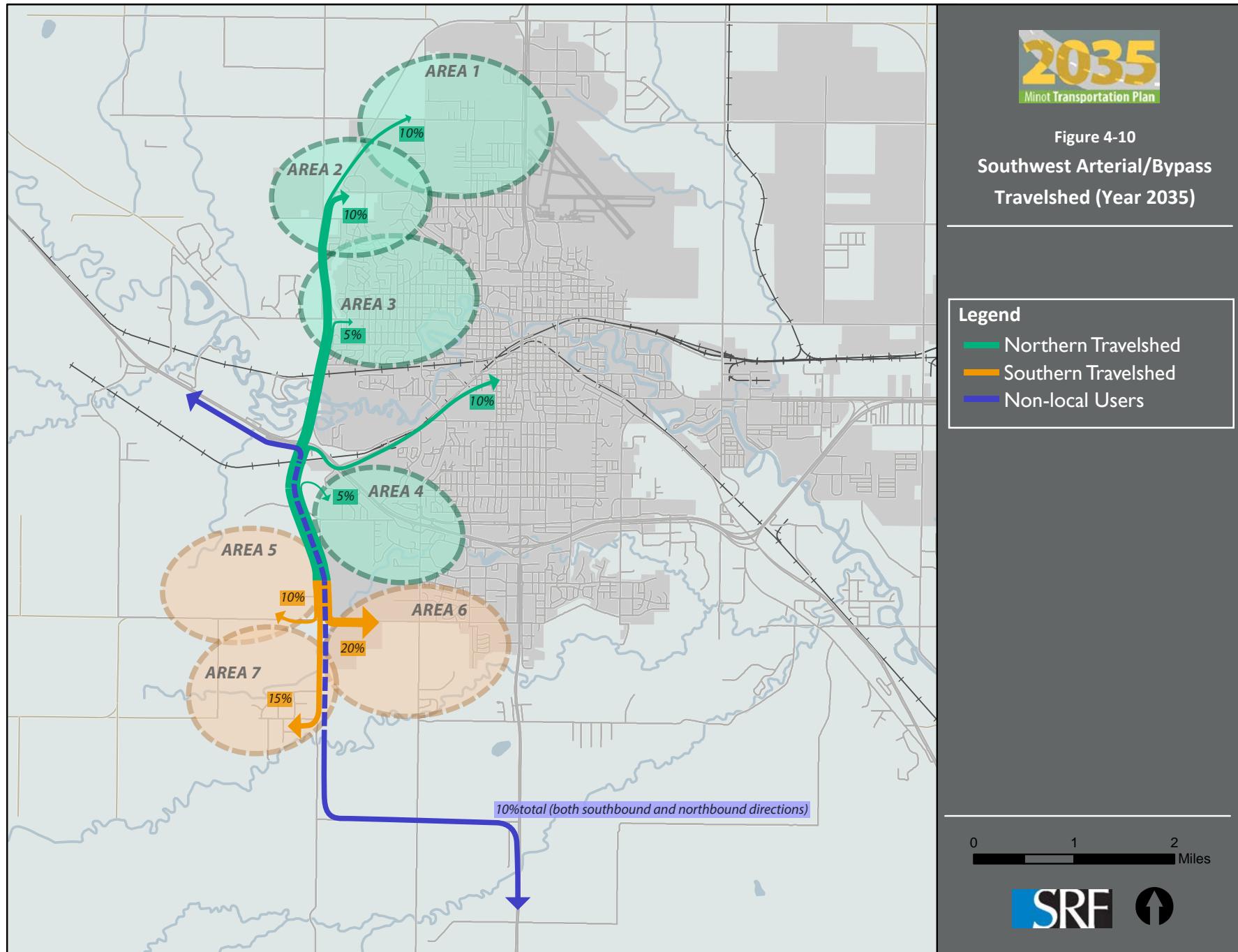
## SOUTHWEST ARTERIAL/BYPASS

North-south travel in the southwest area of Minot is primarily served by 16th Street SW, which is currently a five-lane urban roadway from US 2 to 37th Avenue SW. This roadway provides access to the Dakota Square Mall and three major developments (e.g., Southgate, Magic Meadows and Highlander Estates); it will experience a significant amount of commercial and residential growth in the future.

In order to understand the traffic demand in the southwest area of Minot and identify potential users of a future Southwest Arterial/Bypass, a travelshed analysis similar to the US 83 NW Bypass was conducted. Results from this analysis indicated that a new connection in the southwest area of Minot will contribute positively to serving the demand between the southwest and northwest area of Minot. Figure 4-10 illustrates the results of the travelshed analysis for the Southwest Arterial/Bypass. This graphic displays the general travelshed for users of the Southwest Arterial/Bypass, such that the green bubbles represent northern travelshed users, orange represent southern travelshed users, and purple indicates the non-local users (regional through trips).

With limited opportunities for expansion along the 16th Street SW corridor, due to potential ROW limitations and/or impacts, a new corridor alignment was identified to better serve future travel demand in the area. The Southwest Arterial/Bypass corridor was identified to increase connectivity and mobility between the northwest and southwest areas of Minot, both of which are experiencing rapid commercial and residential growth. Currently the primary route between these two locations is the US 83 NW Bypass, US 2, and 16th Street SW; however, this new corridor could act as an extension of the US 83 NW Bypass to provide better access between the northwest and southwest areas.

Figure 4-10: Southwest Arterial/Bypass Travelshed (Year 2035)



In order to address the growth forecasted in the southwest area of Minot, the following improvements were identified and assumed along the Southwest Arterial/Bypass:

- Construct a four-lane divided urban roadway (potential five-lane) between US 2 and approximately 37th Avenue SW;
- Construct a two-lane rural roadway between approximately 37th Avenue SW and US 83 (via 66th Avenue SW);
- Preserve ROW for an expanded four-lane rural roadway in the future

A more in-depth summary of the corridor improvements and alignments considered is presented in the next chapter. This summary also includes a planning-level analysis aimed at identifying potential social, environmental, and transportation impacts of each improvement.

## MODIFIED NETWORK TRAFFIC FORECASTS

The modified network includes the expansion of the US 83 NW Bypass to a four-lane facility (modeled with interchanges at 21st Avenue NW and 36th Avenue NW and an overpass at 30th Avenue NW) and construction of the Southwest Arterial as a four-lane divided urban roadway from US 2 to 37th Avenue SW and a two-lane rural roadway from 37th Avenue to US 83 (via 66th Avenue SW). This is in addition to the existing and committed projects that were identified and accounted for as part of the no build network previously discussed. In order to determine the system benefit these two improvements would have on the transportation system at a regional level, traffic forecasts were prepared for year 2025 and year 2035 conditions – applying the same methodology previously discussed.

Figure 4-11 displays the year 2025 forecasts for the modified network condition, with Figure 4-12 highlighting the anticipated corresponding corridor congestion. Figure 4-13 displays the year 2035 forecasts for the modified network condition, with Figure 4-14 highlighting the corresponding corridor congestion. The major traffic shifts that result from the Modified Network scenario were compared to the no build condition and are summarized below:

- US 83 NW Bypass volumes will increase significantly as a result of the four-lane expansion, which has the necessary capacity to accommodate these volumes and provision of greater mobility with additional capacity and access restricted to grade-separated interchanges.
- Traffic volumes will decrease along 16th Street NW and Broadway as a result of the expansion of the US 83 NW Bypass, so these roadways will now have greater capacity to serve shorter, local trips.
- The new Southwest Arterial will provide an outlet for trips that are destined for areas in the southwest sub-region resulting in lower volumes along 16th Street SW, increasing connectivity to Southwest Minot.
- As shown in Figures 4-12 & 4-14, “Severe” and “moderate” congestion will be significantly reduced throughout the system with these two large scale regional improvements, which will allow the overall system to be managed more reasonably from a project development perspective (fiscally and technically).

Figure 4-11: Year 2025 Daily Traffic Forecast – Modified Network

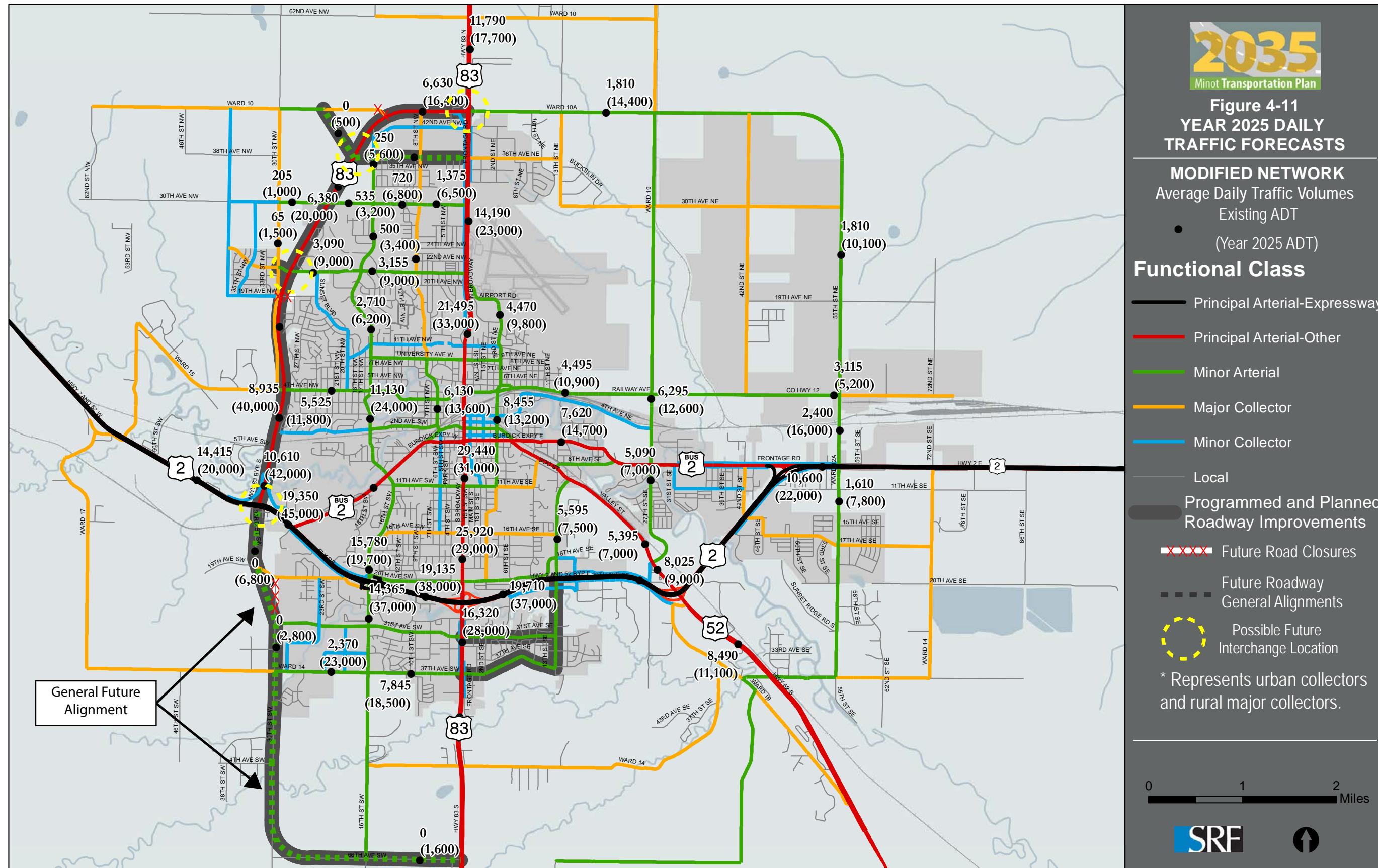


Figure 4-12: Year 2025 Modified Roadway Congestion

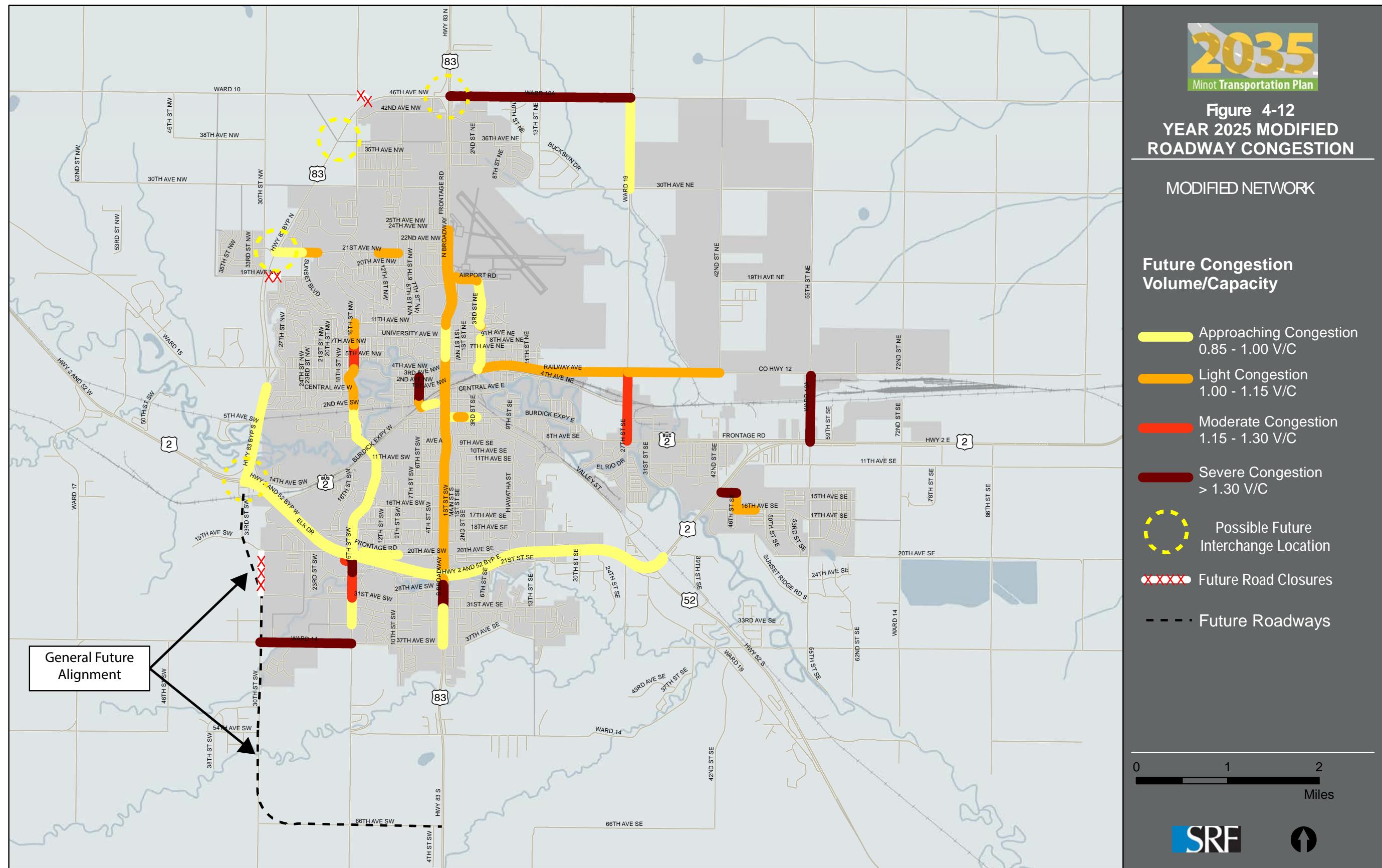


Figure 4-13: Year 2035 Daily Traffic Forecast – Modified Network

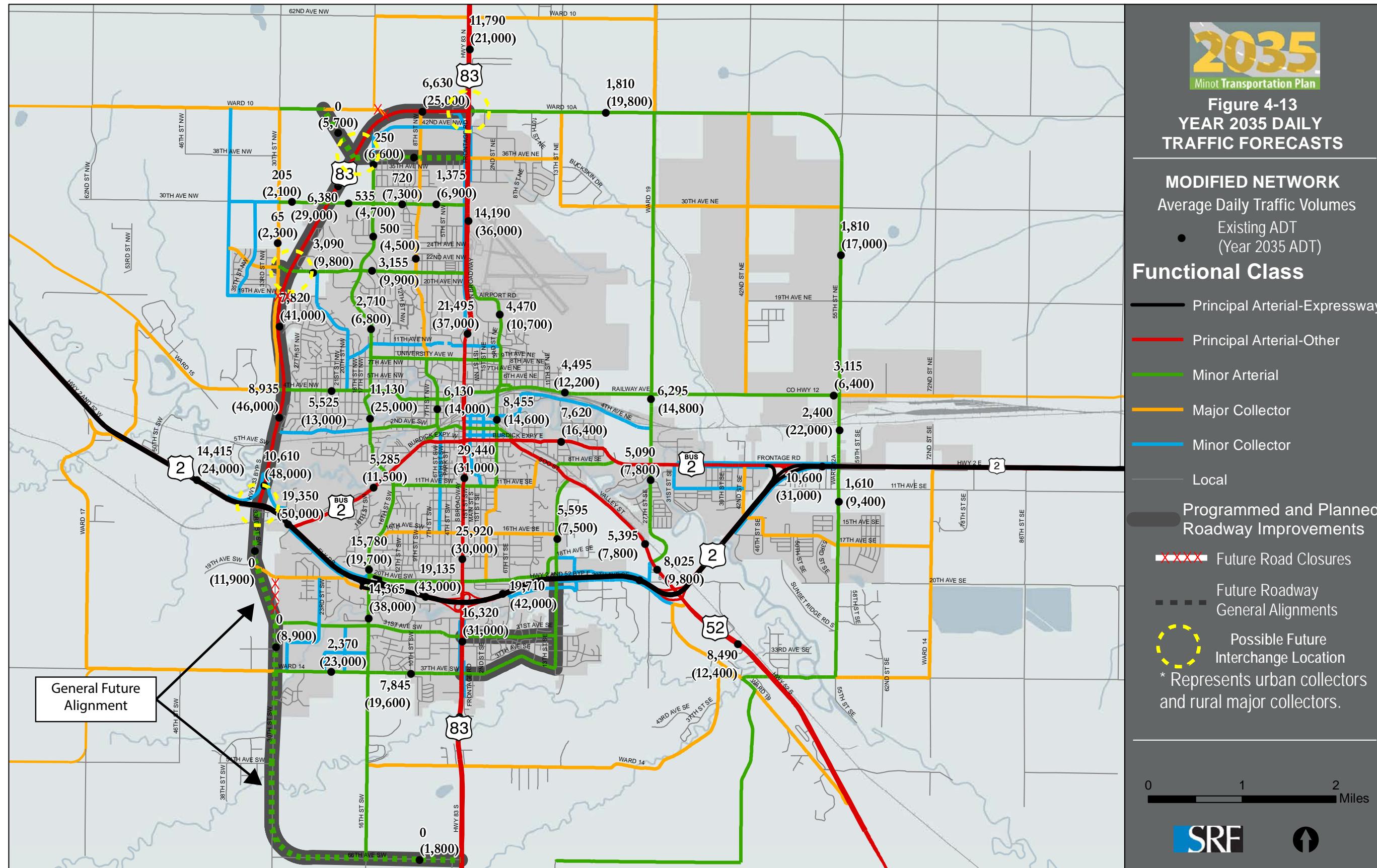
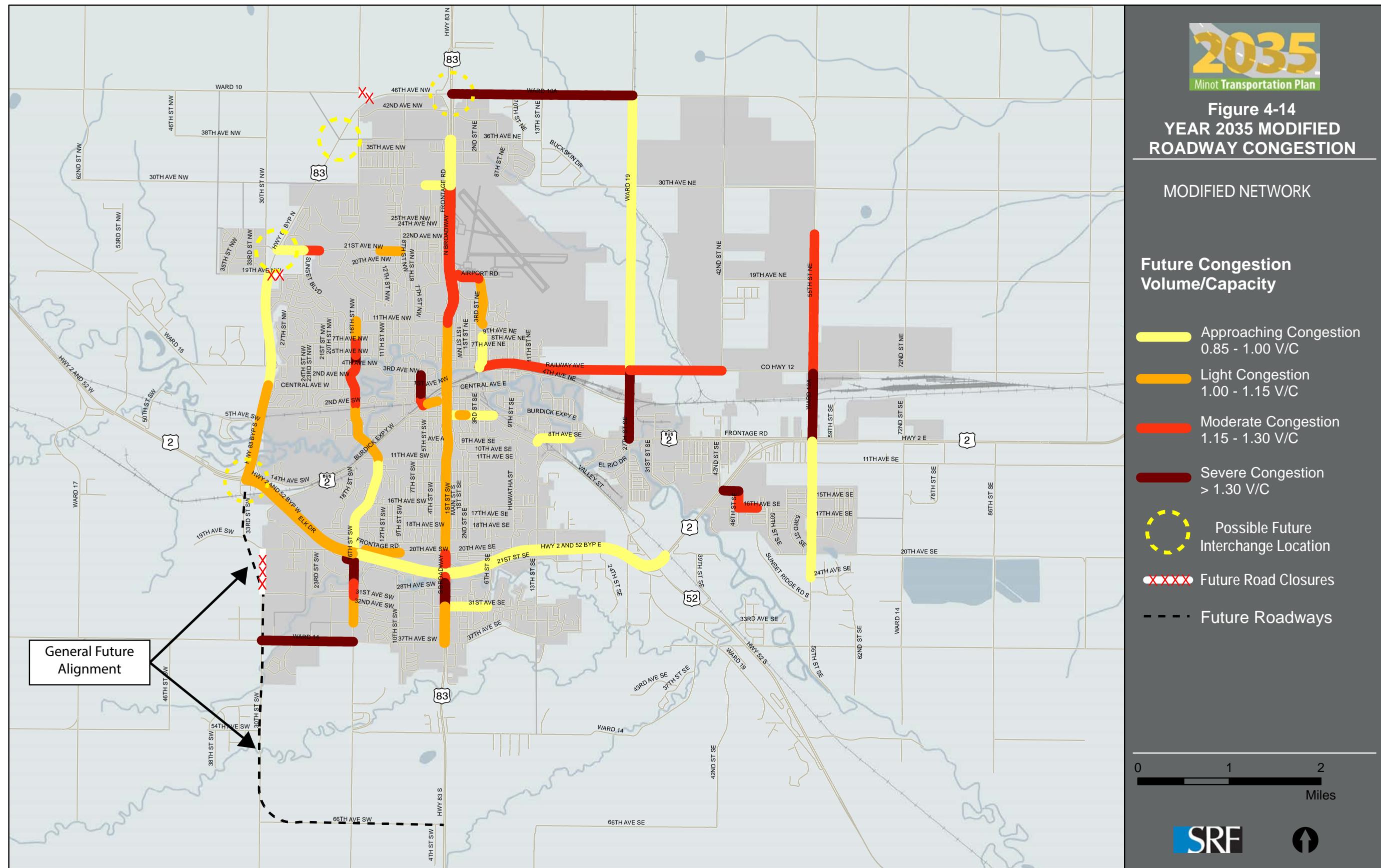


Figure 4-14: Year 2035 Modified Roadway Congestion



## MODIFIED NETWORK FUTURE TRAFFIC OPERATIONS

An operations analysis was conducted for the a.m. and p.m. peak hours at the key intersections to determine how traffic is expected to operate under year 2035 modified network conditions. The modified network includes the large scale roadway modifications previously identified. Once again, signalized intersections were analyzed using the Synchro/SimTraffic software, while unsignalized intersections were analyzed using a combination of Synchro/SimTraffic software and the HCM. The goal of the year 2035 modified network intersection operations analysis is to determine how the larger scale network modifications impact the key intersections compared to the year 2035 no build conditions, and what reasonable improvements can be planned to mitigate remaining issues.

Results of the year 2035 modified network operations analysis indicate that several key intersections are expected to continue to operate at an unacceptable overall LOS E or worse during the a.m. and p.m. peak hours with the modified network traffic controls and geometric layout. However, there is a noticeable improvement in the overall operations at many of the key intersections; this reduces the improvements needed at several locations. The expected level of service and queuing issues for the unimproved modified network condition are illustrated in Figure 4-15 and Figure 4-16.

### Modified Network Mitigation Plan

The City of Minot must plan in a comprehensive manner that takes into account all of the tools available to mitigate potential future congestion and ensure that the community is managed as efficiently, safely, and effectively as possible. This comprehensive approach includes system management options (i.e., access management, site development guidance/regulations, multimodal considerations, transit), system planning considerations (i.e., functional classification and jurisdictional needs), and expansion project needs (corridor and intersection related). The operational needs identified in this chapter lead toward the expansion project needs; however, a holistic approach incorporates elements of each of these components in a coordinated fashion.

The chapters that follow outline the corridor and intersection improvements needed to achieve "moderate" corridor congestion or acceptable overall intersection operations (Thoroughfare Plan contained within chapter 5). The expected level of service and queuing under year 2035 modified network conditions with improvements is illustrated in Figure 4-17 and Figure 4-18. It should be noted that some queuing issues are still expected, while the overall system is expected to function well with the identified improvements.

Figure 4-15: Year 2035 Modified Network Weekday A.M. Level of Service

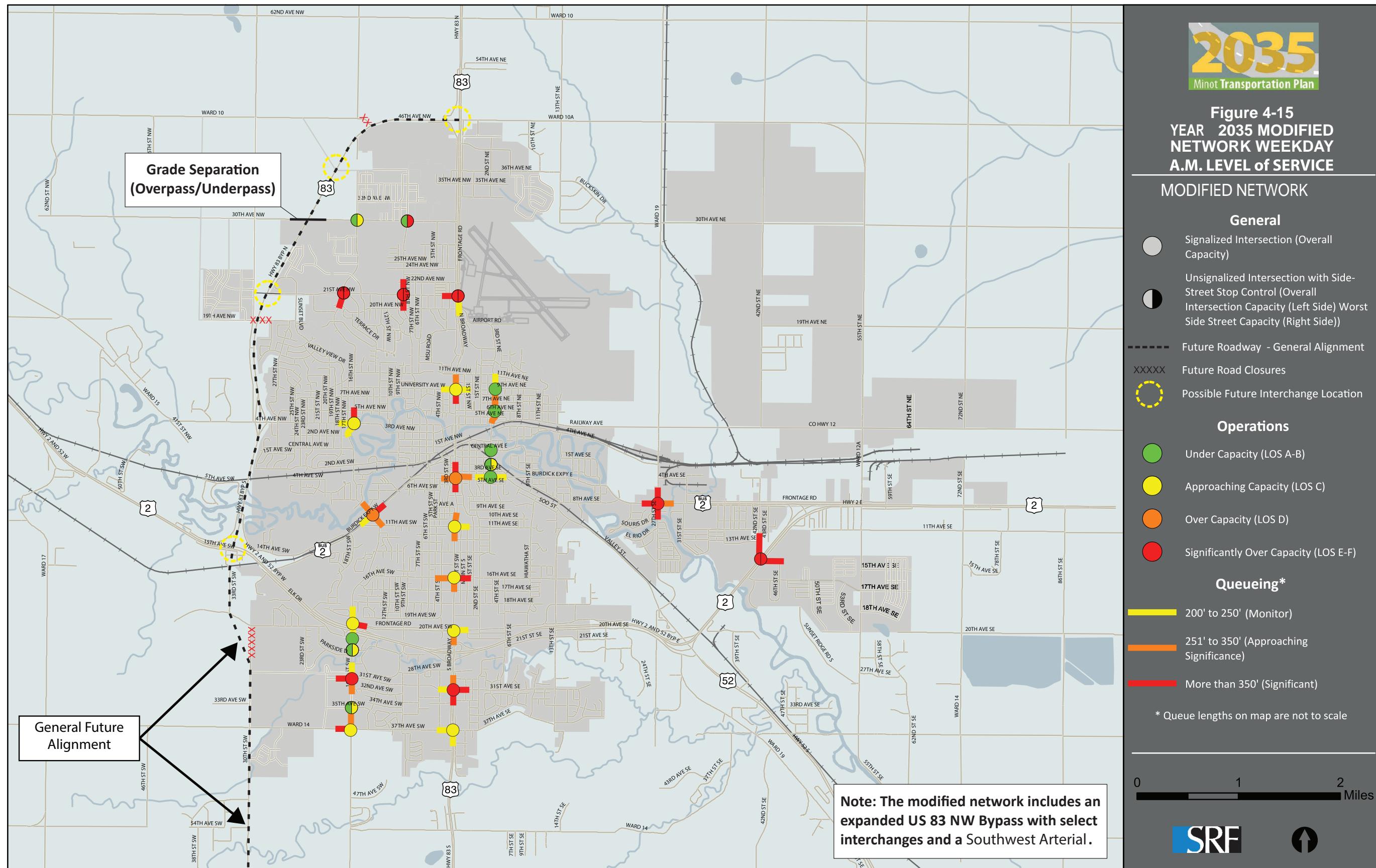


Figure 4-16: Year 2035 Modified Network Weekday P.M. Level of Service

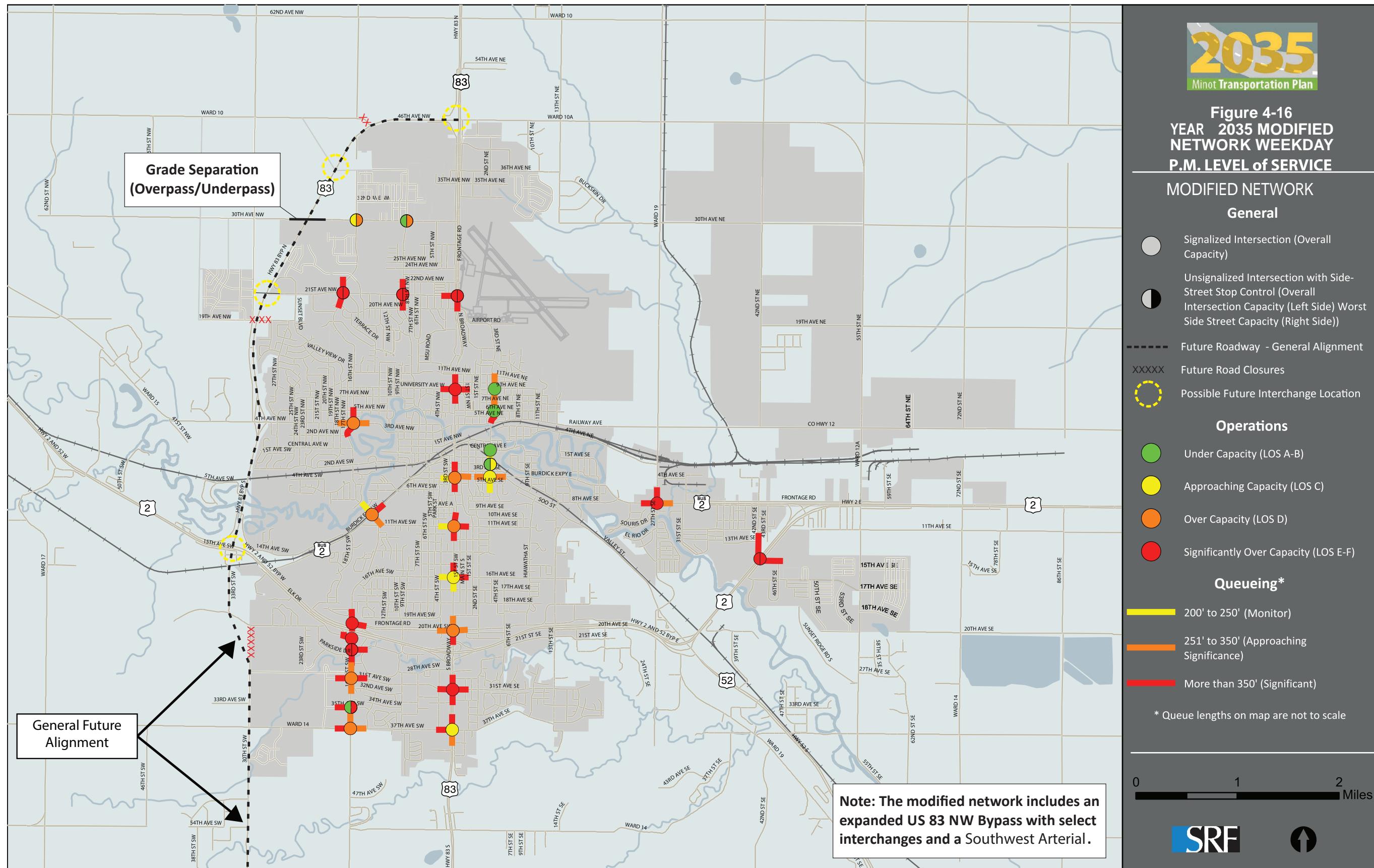


Figure 4-17: Year 2035 Modified Network Weekday with Improvements A.M. Level of Service

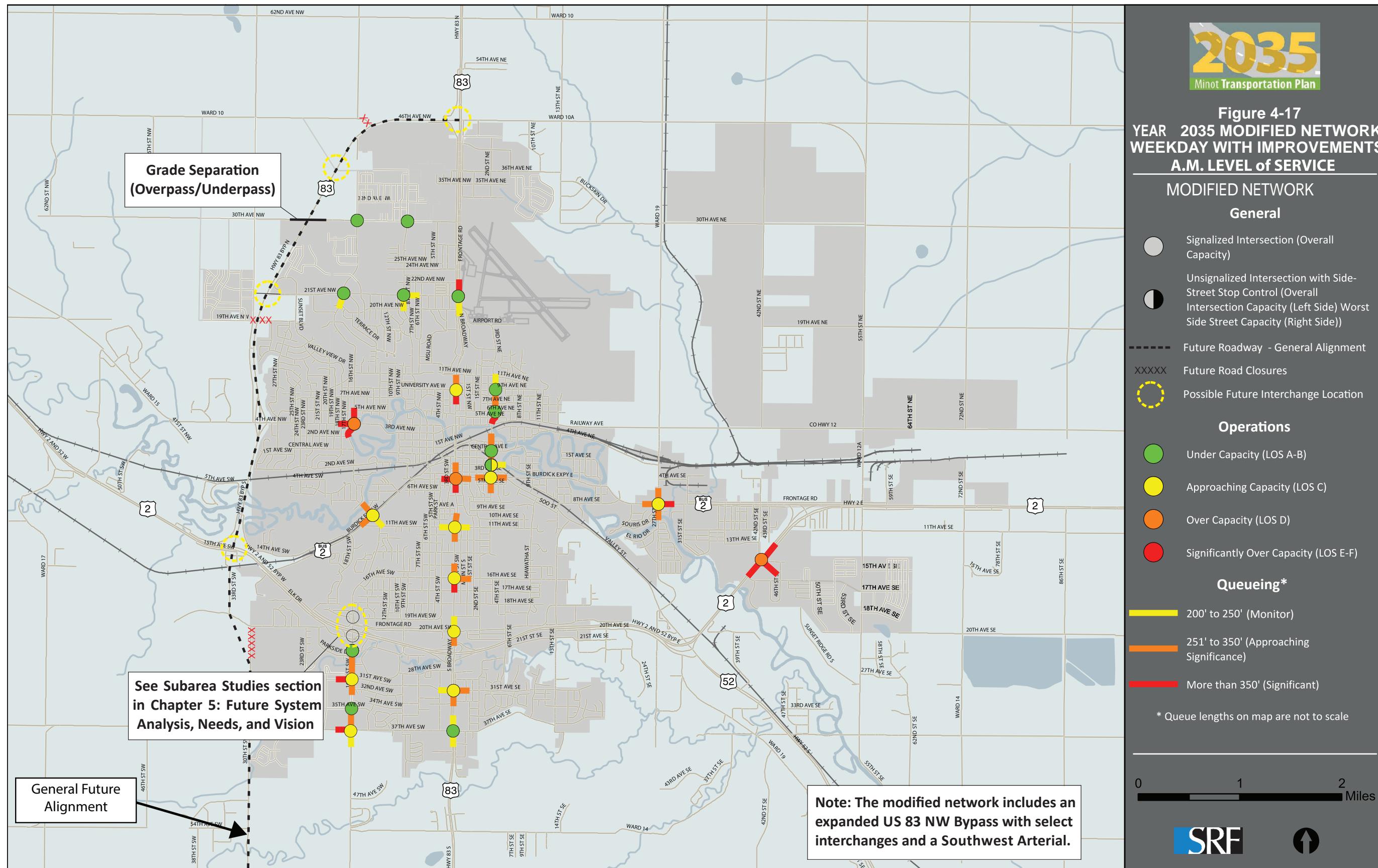
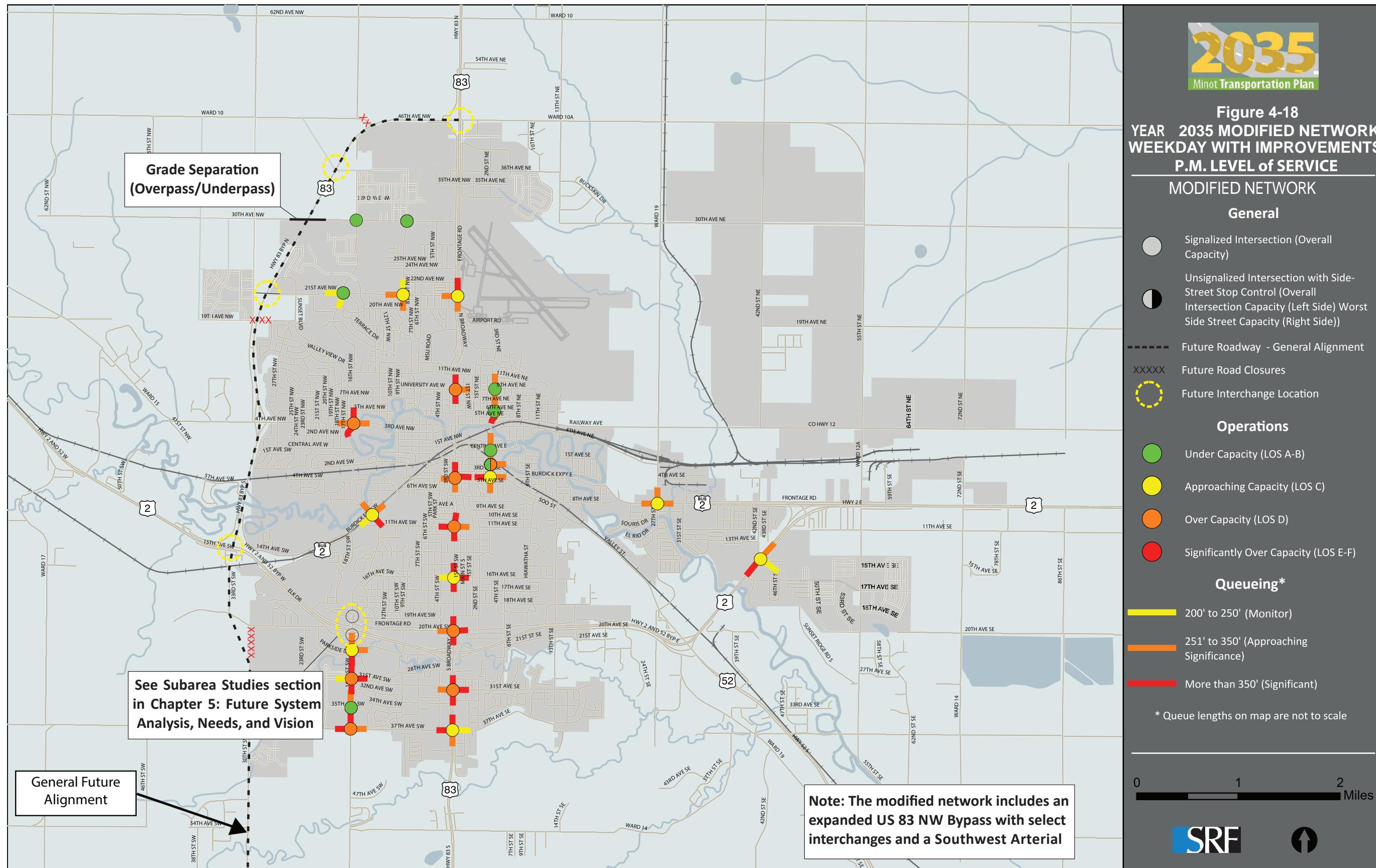


Figure 4-18: Year 2035 Modified Network Weekday with Improvements P.M. Level of Service



## 5. FUTURE SYSTEM ANALYSIS AND PLAN



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## 5. FUTURE SYSTEM ANALYSIS AND PLAN



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# 5. FUTURE SYSTEM ANALYSIS AND PLAN



## OVERVIEW

This chapter in part details the analyses completed to gain a greater understanding of the future system needs through the evaluation of two large scale system alternatives and increased analysis regarding three subareas. The two major corridors were identified by the PMT and the three subarea studies were identified as a result of the year 2035 modified network with improvements operations analysis discussed in Chapter 4 and discussions with members of the PMT. The intent was to provide further review of select areas with the goal of guiding future analyses and review for these critical areas. Further, the long-term form and function for each corridor and the subareas was then established.

To complete the analysis of the future system, future thoroughfare plan improvement recommendations were prepared, which were coordinated with proposed functional classification and jurisdiction changes to address needs identified by the network improvements and system configuration.

## SYSTEM ALTERNATIVES EVALUATION

The system alternatives evaluation built upon the modified network alternatives presented as part of the future traffic forecast and operations chapter. As previously discussed, the modified network was developed to account for expected traffic growth and resulting congestion. It was determined that major system improvements needed to be investigated to address future congestion or operational issues that could not be mitigated with low cost/high benefit solutions immediately at the problem locations.

As the first step in this process, two major corridors were examined to address the congestion issues identified as part of the traffic forecast and operations analysis. These included: expansion and access control of the US 83 NW Bypass, and construction of a new Southwest Arterial/Bypass corridor. Each corridor analysis had a slightly different approach given the varying alternatives available for each. Common components were an evaluation and documentation of feasibility, constraints, and impacts. Specific analyses unique to each corridor are included with their respective discussions (i.e., detailed traffic operations of the US 83 NW Bypass corridor).

### US 83 NORTHWEST BYPASS

The US 83 NW Bypass operates as the north-south principal arterial route in Minot, serving primarily regional mobility needs and providing a vital intra- and interstate connection. As a limited-access two-lane highway, this facility currently provides a bypass route around the west side of the City between Broadway and US 2.

Regional traffic growth and planned developments along the corridor are expected to result in significant traffic volume increases and place a great amount of strain on the corridor. Without capacity improvements, the corridor is expected to experience levels of congestion that will decrease its functionality as a regional bypass route.

Due to the prominent functionality of this regional corridor, the City and NDDOT are committed to ensuring that the US 83 NW Bypass continues to fulfill its intended regional connectivity function. As a part of this analysis, three alternatives were assessed and/or evaluated. The first alternative

consists of expanding the corridor to a four-lane expressway and maintaining at-grade intersections, whereas the other two alternatives offer varying grade-separated access options.

### Traffic Operations

The US 83 NW Bypass corridor was first assessed to determine if it could accommodate the forecast traffic volumes with at-grade intersections. Traffic operations were analyzed to determine if the existing, two-lane facility with at-grade intersections could function under year 2035 no build conditions. As expected, it was determined that the corridor could not handle the traffic volumes acceptably (LOS D or better) during the a.m. and p.m. peak hours – see Figure 5-1.

Therefore, the corridor was analyzed as an expanded four-lane expressway with at-grade intersections. It was determined that several of the at-grade intersections will continue to operate poorly with the inclusion of signalized intersections and additional capacity on the mainline. The issue is not solely corridor capacity but at-grade intersection conflicts and a confluence of volume interacting at these intersections. To maintain mobility along the US 83 NW Bypass, it was apparent that grade-separated intersections (interchanges) should be analyzed by year 2035.

To ensure the grade-separated scenarios will function acceptably, two scenarios were analyzed. Figure 5-2 depicts the two alternative access and interchange scenarios. Under either scenario it is understood that US 2/52 and US 83 NW Bypass/Broadway intersections will need to be evaluated for alternative configurations given traffic growth through the area. Access Alternative #1 was reviewed and determined to operate acceptably during the a.m. and p.m. peak hours. The expected level of service and queues are illustrated in Figure 5-3.

### Access Alternative Evaluation

Following the detailed operations analysis, a planning-level evaluation was conducted for the corridor alternatives. Social, environmental, and engineering factors associated with each alternative, such as traffic operations, safety, multimodal accommodations, freight movement, local circulation, system continuity, rail conflicts, connectivity needs, or other issues were evaluated.

The preliminary evaluation matrix contains a summary of recommendations/findings for each alternative under consideration. Alternate alignments to the west of the existing corridor were initially discussed and considered prior to the social, environmental, and engineering evaluation, but eliminated due to traffic analysis indicating that the function of the NW Bypass could be maintained in its current location. A description and evaluation of the US 83 Northwest Bypass alternatives is provided in Table 5-1.

### Interchange Concept Consideration

Interchange concepts were developed at a high-level to provide some perspective for the City regarding how potential interchange configurations will impact adjacent property and how the local roadway system may connect. The following interchange concepts were identified for the varying locations and should be evaluated further as future project development occurs.

#### *Concept A – Diamond Interchange*

*(21st Avenue NW, 30th Avenue NW, and 36th Avenue NW)*

This concept is often considered the most typical interchange configuration with on/off-ramps in all four quadrants of a grade-separated interchange. At 21st Avenue NW the diamond interchange configuration depicted in Figure 5-4 presents how the ROW will be impacted and how the adjacent street system will need to be modified to accommodate this design. Note that the adjacent street system modifications to the west are not feasible with this configuration due to recent development that has occurred in this area.

At 30th Avenue NW this interchange configuration (see Figure 5-5) will likely impact the existing commercial property and structure in the northwest quadrant of the intersection; all other existing street system connections could be accommodated. No existing structures will be impacted at the 36th Avenue NW intersection with this design; however, consideration of the property impacts with respect to ROW will need to be quantified (see Figure 5-6).

***Concept B – Parclo Interchange***

***(21st Avenue NW, 30th Avenue NW, and 36th Avenue NW)***

The partial cloverleaf (parclo) interchange design reduces property impacts in some instances and accommodates the predominant traffic movements to and from the cross streets (21st Avenue NW, 30th Avenue NW, and 36th Avenue NW). This design incorporates loop ramps in the same quadrants as diamond type ramps, creating an interchange with a smaller footprint that is limited to two quadrants to reduce potential property impacts.

At 21st Avenue NW this design will likely have intersection spacing issues with the existing local street system west of US 83 (at approximately 30th Street NW). This design at 30th Avenue NW mitigates the existing commercial property and structure impact, while it is well accommodated at 36th Avenue NW. The parclo interchange designs for each of the three locations are shown in Figure 5-7, Figure 5-8 and Figure 5-9.

***Concept C – Buttonhook Interchange (21st Avenue NW)***

This concept includes a buttonhook off-ramp and on-ramp on the west side of US 83 to provide separation from the 21st Street overpass (see Figure 5-10). This design will require traffic traveling south on US 83 from 21st Avenue NW to make a left turn onto 30th Street NW to go south to the buttonhook on-ramp. This results in additional travel for local traffic to access the regional system.

***Concept D – Tight Diamond (21st Avenue NW)***

The tight diamond design presented in Figure 5-11 is an attempt to achieve better spacing from 30th Street NW with the local roadway system. Also note that as shown the interchange could be configured as a hybrid diamond with an on-loop ramp in the southeast quadrant. This concept also represents the worst-case scenario for ROW needs in this quadrant.

***Concept E – Single Point Interchange (21st Avenue NW)***

The single point interchange design shown in Concept E, and Figure 5-12, maximizes intersection spacing along 21st Avenue NW and efficiently accommodates the traffic traveling to/from US 83 and 21st Avenue NW.

Each of the concepts listed here were evaluated at a high level with an understanding of the turning movements to/from US 83 and the local roadway system for each location. No determination was made regarding any of these concepts, as to which functions best or is most supported by the public or key stakeholders. The alternatives were presented to the general public as part of the citizen involvement process for early feedback and discussion. Additional analysis and evaluation is recommended, including coordination with impacted stakeholders to determine the locally preferred alternative.

### **Project Development / Sequencing**

There are various components to the US 83 Bypass improvement project, including corridor expansion to four lanes, access management – closures, and access management – traffic control (signals / grade-separations). An outline of how this project can be developed over time is as follows:

1. Expand US 83 to a four-lane facility
2. Close access as appropriate to consolidate movements to/from the corridor as much as possible – at a minimum full access to 19th Avenue NW and 46th Avenue NW (Ward County 10)

should be restricted. Full closure of these accesses should occur once the supporting local roadway network is developed. Other accesses along the corridor should be evaluated at the time of detailed project development (i.e., 2nd Street NW, 8th Street NW, 5th Avenue SW, and US 2 Frontage Road access).

3. Maintain remaining access points as full access at-grade intersections in the interim. It is anticipated these intersections will operate acceptable through year 2025; however, this situation should be reevaluated at the time of detailed project development. These intersections may need to be controlled with traffic signals for operational and safety purposes (i.e., US 2/52/83, US 83/21st Avenue NW, US 83/30th Avenue NW, US 83/36th Avenue NW – future, and US 83/Broadway).
4. Transition key access intersections to grade-separated interchanges or overpasses/underpasses. Based on traffic forecasts, it is anticipated this will be necessary between years 2025 and 2035.

Based upon the technical analysis completed as part of this alternatives review, and coordination with local stakeholders, it was determined the four-lane bypass can be designed a number of ways (i.e., divided or undivided roadway). For example, the current right-of-way along the corridor is approximately 320 feet, which will accommodate a rural four-lane divided roadway; this would be the widest facility type for US 83. Typical cross-sections are provided for the potential roadway types (see Figure 5-13).

### Conclusion

The NDDOT has emphasized the need to maintain this bypass facility when considering the future transportation system in the Minot region. Traffic analysis data indicates the function of the NW Bypass can be maintained in its current location as the City continues to grow and expand, if the City agrees to work with NDDOT on the following activities:

- Planning land use development in a manner that is compatible with the bypass facility with an emphasis on reducing the amount of land uses that may be subject to noise impacts.
- Maintaining the Bypasses Strategic Highway Network (STRAHNET) designation for the movement of military traffic.
- Implementing access management policies to control access along the corridor, which will maintain the corridor's role as a principal arterial. The City has already implemented a US 83 Bypass Development Policy that requires land owners to dedicate the right-of-way necessary to accommodate potential interchange access along the US 83 Bypass corridor.
- Generally assist in maintaining the public's perception that this corridor is Minot's northwest bypass.

The City Council understands the important role this corridor plays and by adopting this Plan, and its policies and planning tools, it is committed to supporting the actions noted above.

Figure 5-1: US 83 Bypass Year 2035 No Build Weekday A.M. and P.M. Level of Service

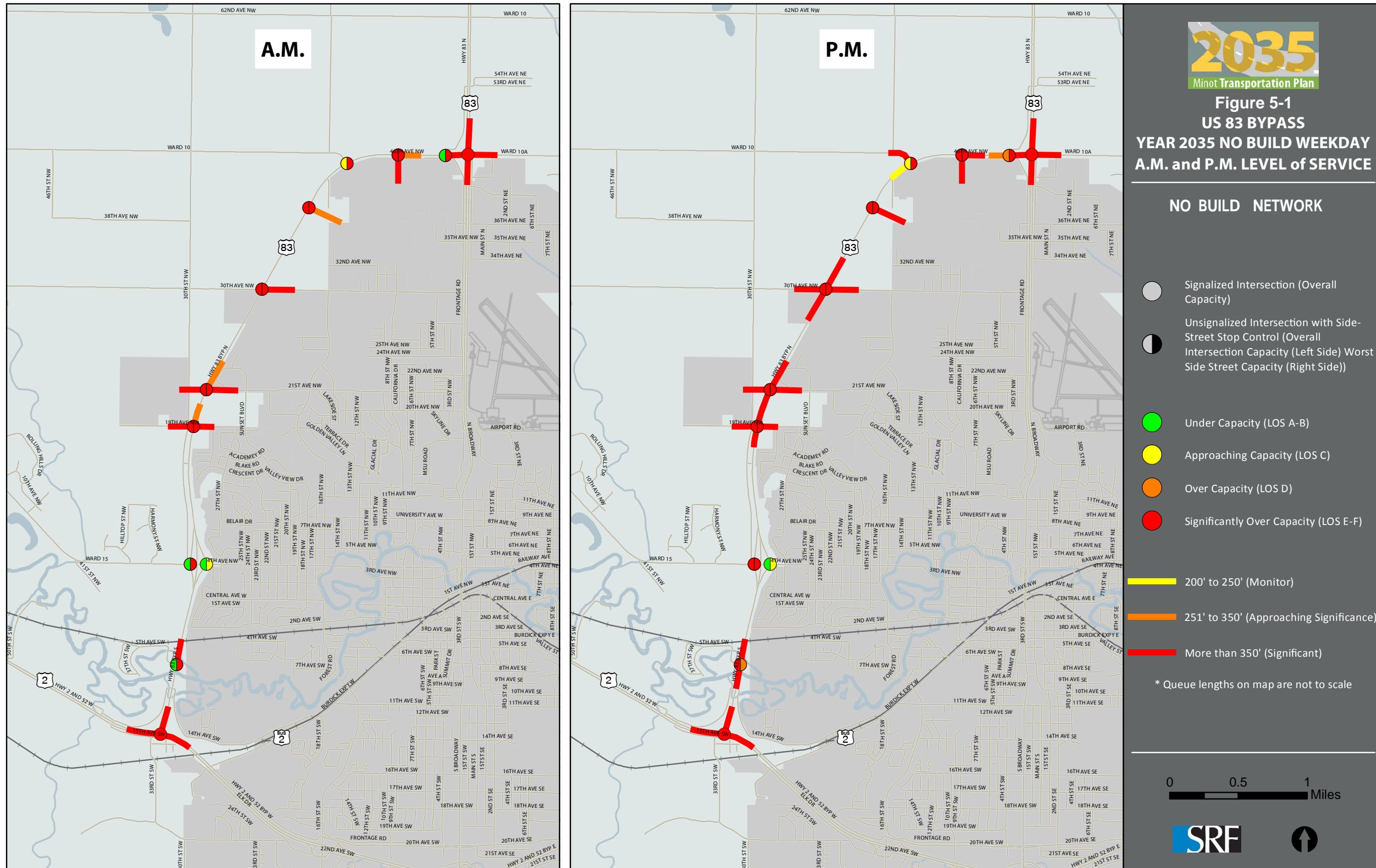
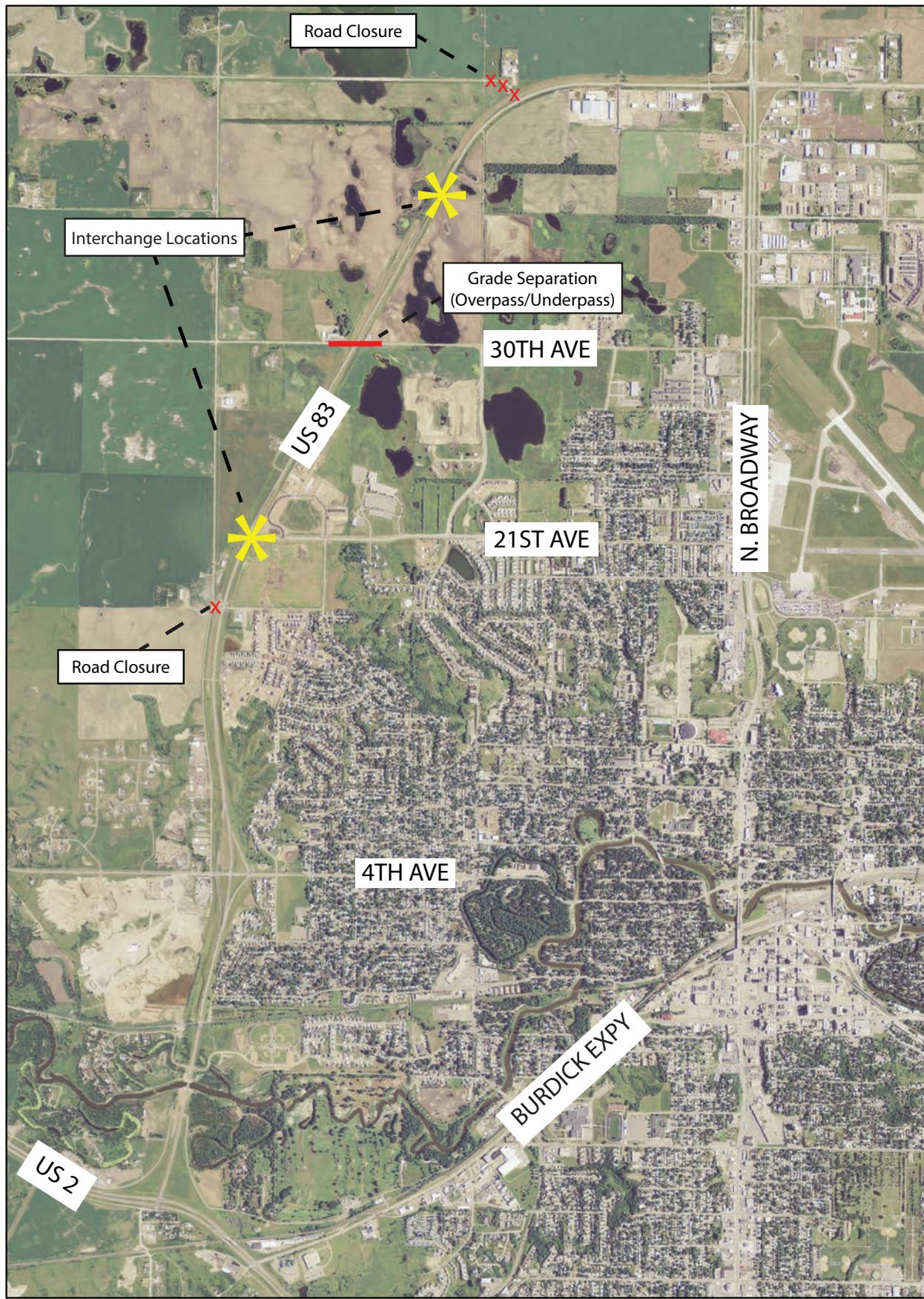


Figure 5-2: US 83 NW Bypass Access Configurations

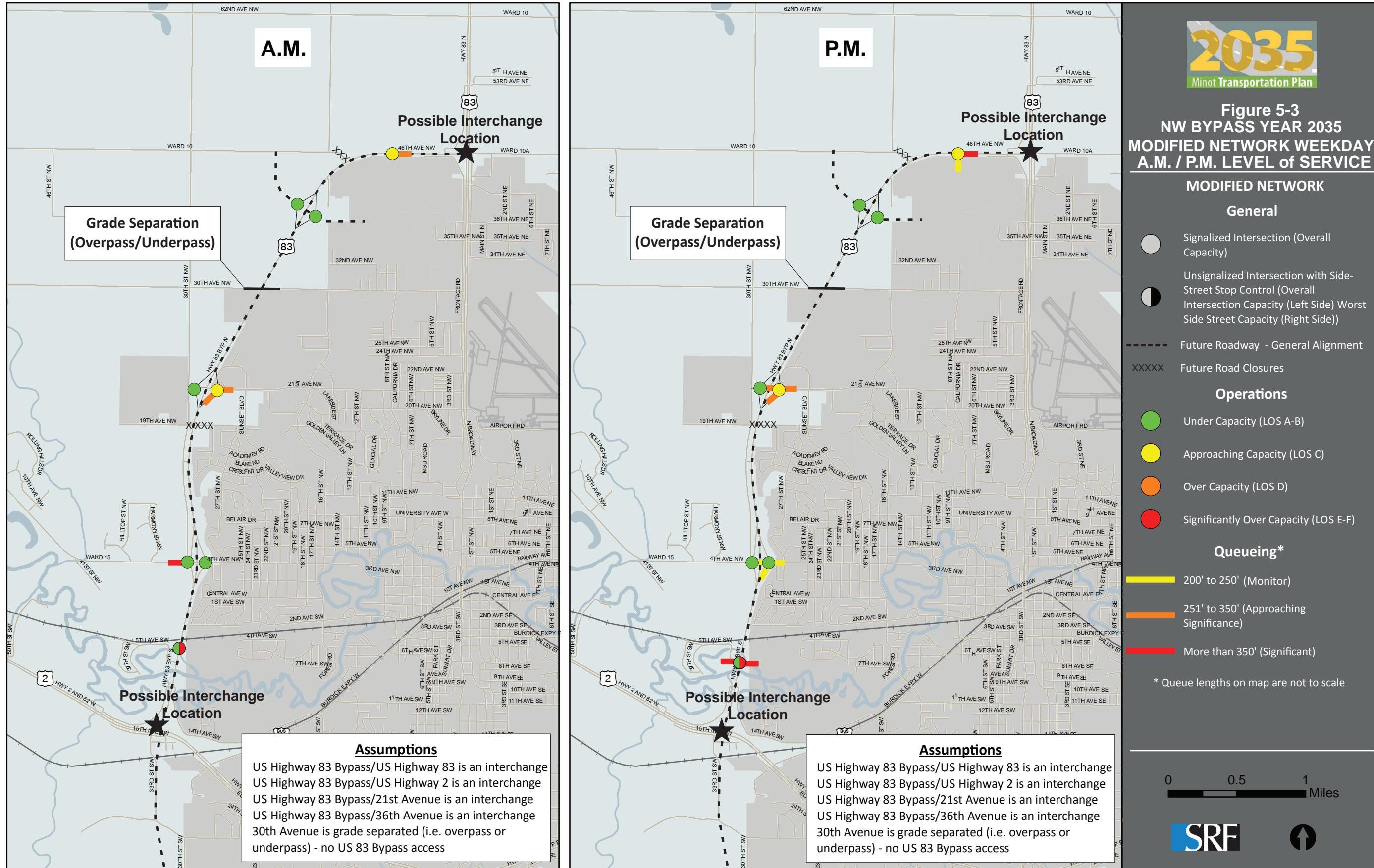
Access Alternative #1



Access Alternative #2



Figure 5-3: NW Bypass Year 2035 Modified Network Weekday A.M./P.M. Level of Service



**Table 5-1 US 83 Northwest Bypass Planning-Level Evaluation of Alternatives and Access Configurations**

Corridor	Improvement Description	Social	Environmental	Engineering	Recommendation / Findings
US 83 NW Bypass Corridor Improvements	<ul style="list-style-type: none"> <li>Expand corridor to a divided four lane expressway between N Broadway and US 2.</li> </ul>	<ul style="list-style-type: none"> <li>Minimal or no impacts.</li> <li>Potential impacts to multi-purpose trail that runs along the corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Federal threatened, endangered, proposed threatened, and candidate species are present in Ward County. Coordination with US Fish and Wildlife Services will be required to determine the effect to species present at the time construction is being planned.</li> <li>Coordination with North Dakota Fish and Game is required to identify regionally significant ecological areas and protected wetlands to be considered in more detail.</li> </ul>	<ul style="list-style-type: none"> <li>Accommodates projected daily traffic demand along the corridor.</li> <li>Reduces traffic volumes along parallel north-south facilities (e.g., N Broadway and 16th Street NW).</li> <li>Enhances regional mobility and diverts traffic from congested urban corridors.</li> </ul>	+ Improvement provides enough capacity, when coupled with interchange improvements, to achieve acceptable LOS operations during the peak periods.
Access Configuration 1	<ul style="list-style-type: none"> <li>Construct interchange at 36th Avenue</li> <li>Construct overpass at 30th Avenue</li> <li>Construct interchange at 21st Avenue</li> <li>Close access to 46th Avenue/County Road 10 and 19th Avenue.</li> </ul>	<ul style="list-style-type: none"> <li>Adding interchange at 36th Avenue and overpass at 30th Avenue may be accommodated without significant right-of-way impacts.</li> <li>Restricts access to interchange locations, which may improve safety<sup>1</sup> and mobility along US 83.</li> <li>Impacts to existing trail at 21st Avenue.</li> <li>Planned development at adjacent parcels along 21st Avenue may be impacted by interchange.</li> </ul>	<ul style="list-style-type: none"> <li>The National Wetland Inventory indicates the presence of numerous wetlands in the project area; it is probable the proposed improvements may impact these wetlands. The project may involve impacts to the Souris River. Coordination with the US Army Corps of Engineers will be required to determine jurisdictional wetlands and waterways subject to Section 404 permitting, including sequencing to avoid, minimize and mitigate impacts.</li> </ul>	<ul style="list-style-type: none"> <li>Eliminates at-grade access at 30th Avenue, which may improve safety<sup>1</sup> and mobility along US 83.</li> <li>Access control along US 83 should improve safety<sup>1</sup>.</li> <li>Accommodates regional mobility from 21st Avenue to US 83, addressing expected intersection LOS issues.</li> <li>Accommodates anticipated traffic demand to large residential and commercial developments adjacent to 21st Avenue.</li> </ul>	+ Access configuration accommodates intersection nodes that otherwise would have poor LOS and significant queuing. + Access spacing enhances corridor mobility and eliminates at-grade intersections with identified safety <sup>1</sup> issues. + Strategic bypass improvements will accommodate traffic demand from planned business park, residential developments, and schools.
Access Configuration 2	<ul style="list-style-type: none"> <li>Construct interchange at 30th Avenue</li> <li>Construct overpass at 36th Avenue</li> <li>Construct overpass at 21st Avenue</li> <li>Close access to 46th Avenue/ County Road 10 and 19th Avenue.</li> </ul>	<ul style="list-style-type: none"> <li>Adding this interchange and overpasses may be accommodated within current right-of-way.</li> <li>Restricts access to interchange locations, which may improve safety<sup>1</sup> and mobility along US 83.</li> <li>May require upgrades to multi-purpose trail with the construction of an overpass at 21st Avenue.</li> </ul>	<ul style="list-style-type: none"> <li>If the project moves forward as a federal undertaking, the Section 106 process to identify effects to historic and archeology resources would apply, including consultation with the North Dakota State Historic Preservation Office and tribal agencies.</li> <li>The proposed improvements may result in impacts to publicly owned properties protected by Section 4(f) and Section 6(f) legislation (trails). Review of historic and archeological resources could also identify sites subject to Section 4(f).</li> <li>Further identification and evaluation of the environmental impacts associated with the proposed improvements will be coordinated with the identified agencies and conducted at the appropriate time. Key agencies not noted above include the Federal Emergency Management Agency, Natural Resource Conservation Service, North Dakota Department of Health, and the State Water Commission.</li> </ul>	<ul style="list-style-type: none"> <li>Provides localized regional access to development adjacent to 30th Avenue.</li> <li>Overpasses at 21st Avenue and 36th Avenue reduce traffic volumes along 30th Avenue and minimizes access to the US 83 corridor, which may improve safety<sup>1</sup> and mobility.</li> <li>Access restriction on US 83 to 4th Avenue and 30th Avenue adds more pressure to local transportation system.</li> </ul>	- Access configuration does not accommodate all US 83 demand. Resulting in a lower LOS and queuing on the local system. 30th Avenue interchange will operate acceptably but will unnecessarily strain the local system.

<sup>1</sup> A crash analysis was performed for key intersections along the US 83 NW Bypass corridor using NDDOT crash and average annual daily traffic data (2008 – 2012). Results from this analysis indicated that two intersections (21st Avenue and 30th Avenue) exhibited above average crash rates (crashes per million vehicle miles) and two intersections (30th Avenue and 46th Avenue) exhibited above average crash severity rates (crashes per million vehicle miles weighted by crash severity – e.g., fatality, injury, property damage).

Figure 5-4: 21st Avenue NW - Concept A Diamond Interchange

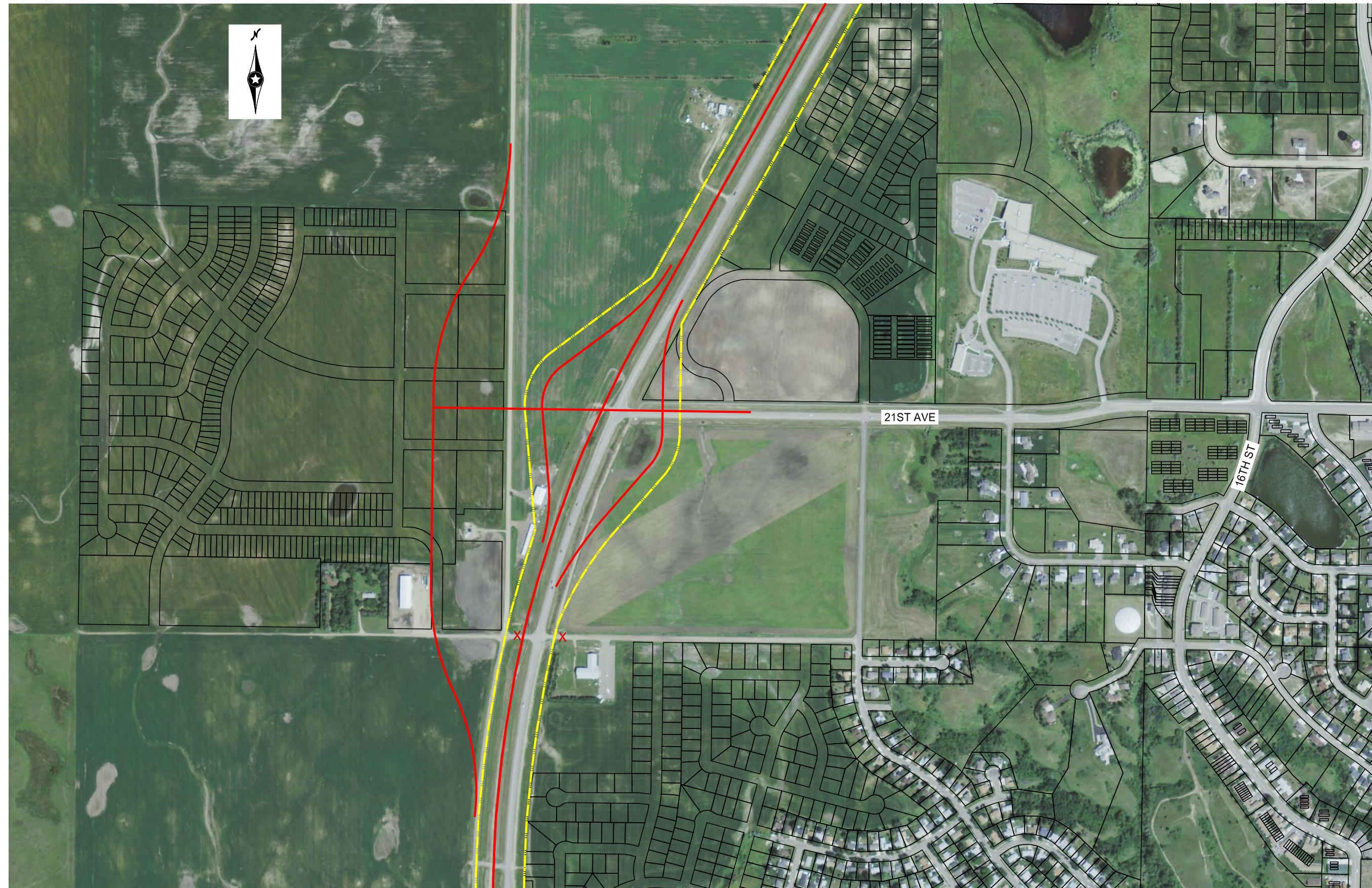


Figure 5-5: 30th Avenue - Concept A Diamond Interchange

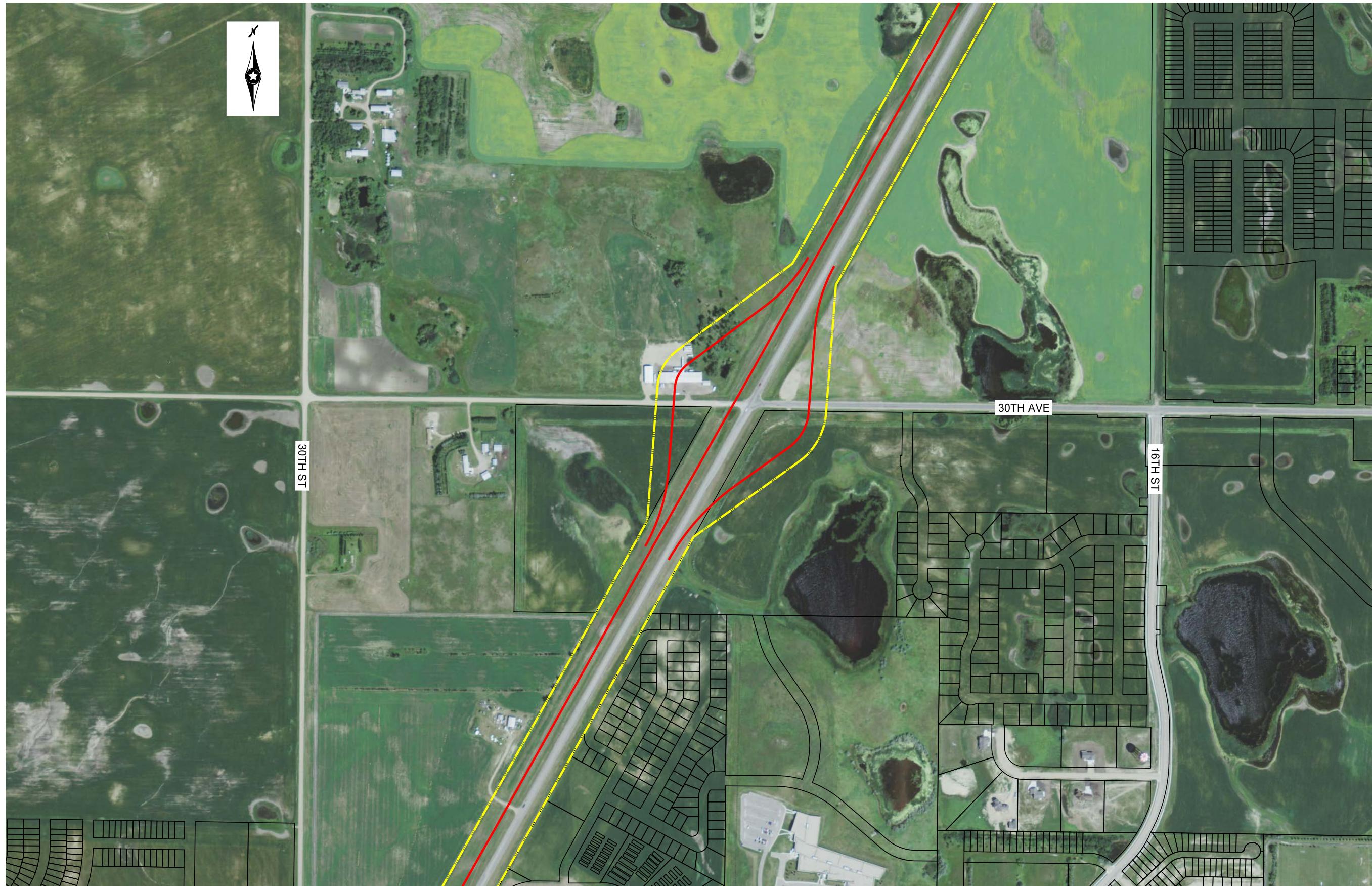


Figure 5-6: 36th Avenue - Concept A Diamond Interchange



Figure 5-7: 21st Avenue NW - Concept B Parclo Interchange

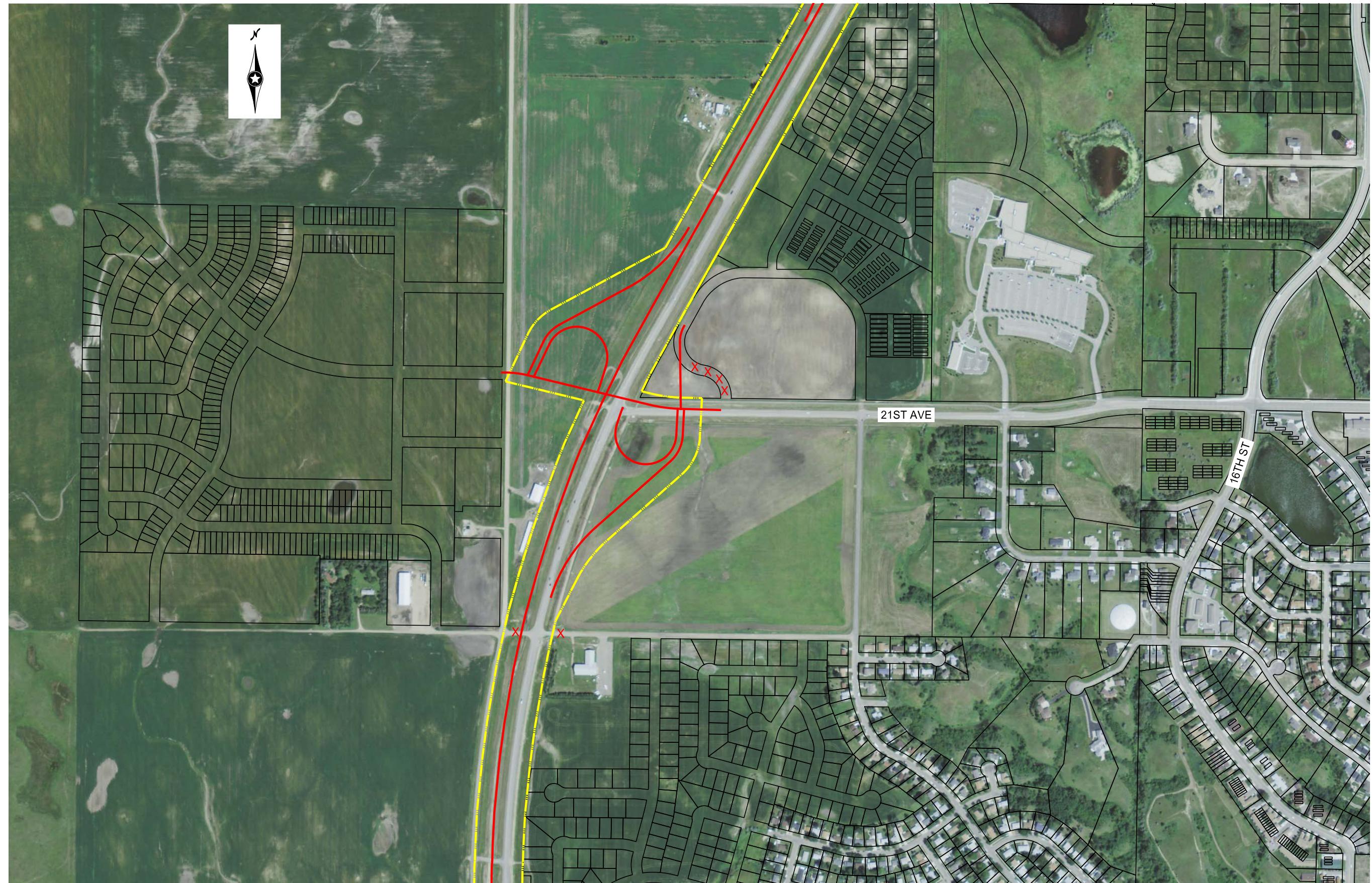


Figure 5-8: 30th Avenue - Concept B Parclo Interchange

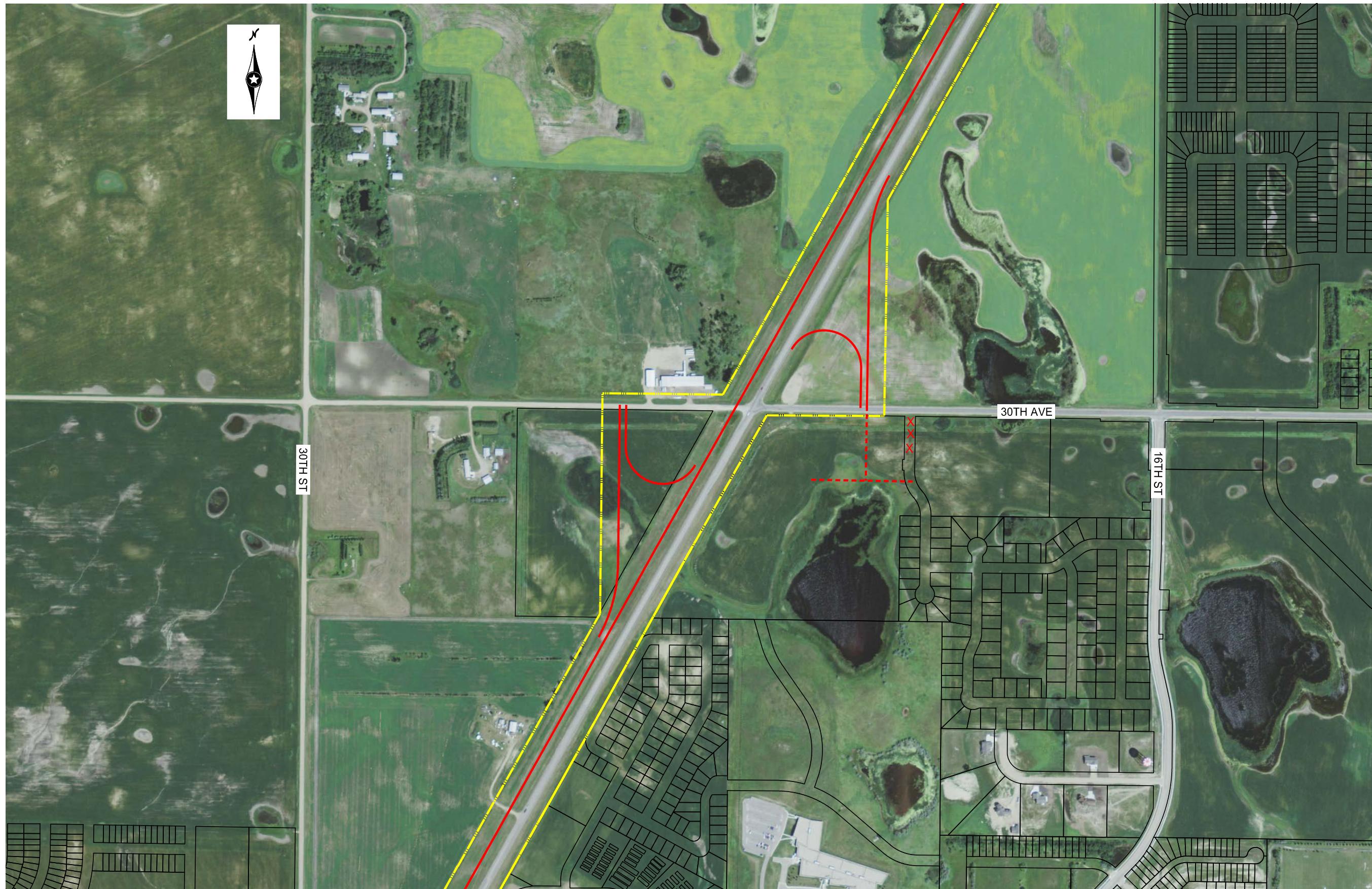


Figure 5-9: 36th Avenue - Concept B Parclo Interchange



Figure 5-10: 21st Avenue NW - Concept C Buttonhook Interchange



Figure 5-11: 21st Avenue NW - Concept D Tight Interchange

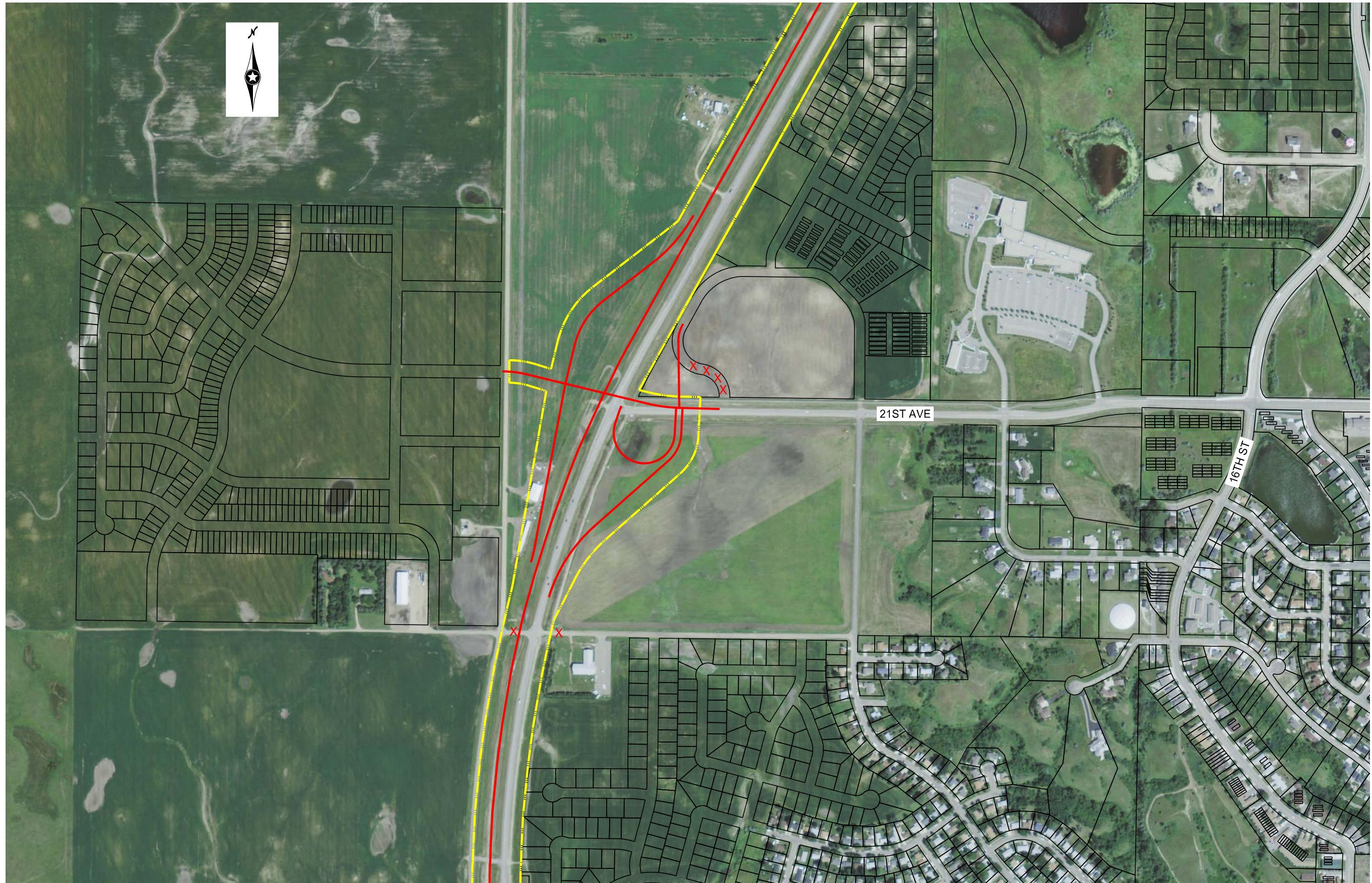
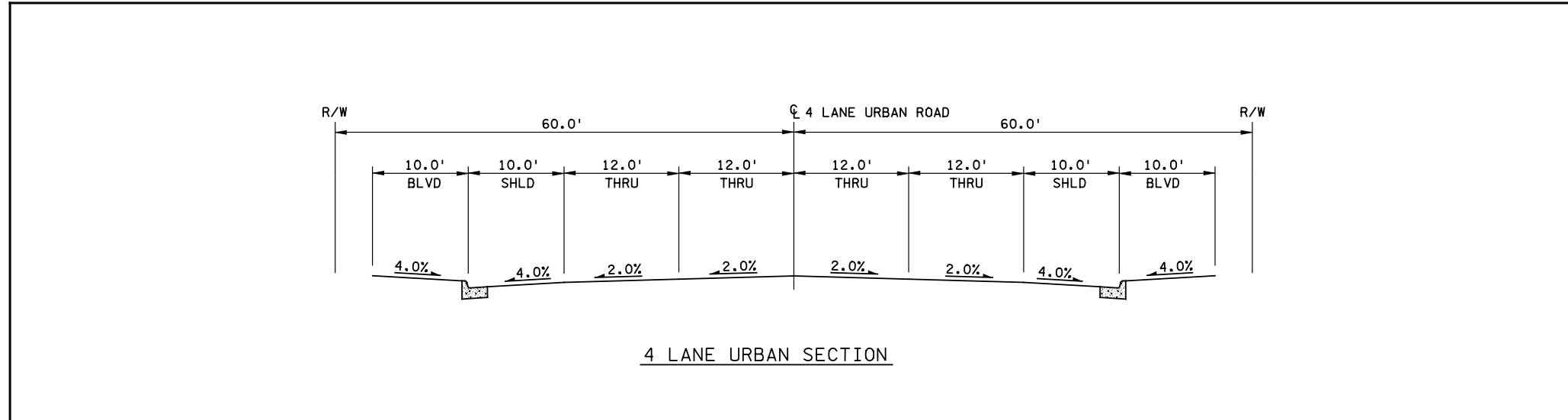


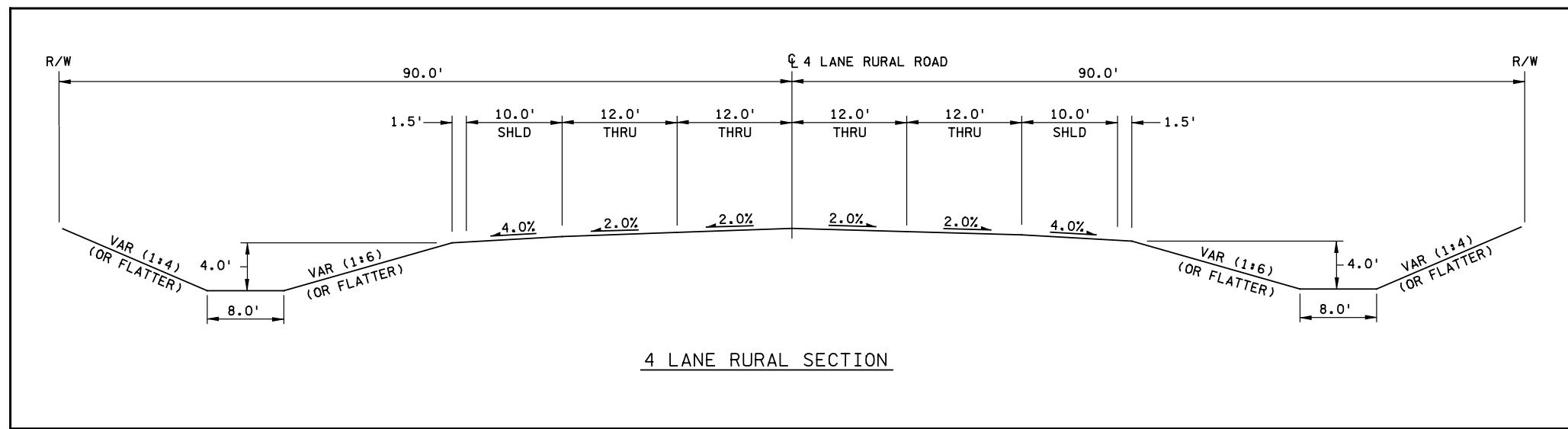
Figure 5-12: 21st Avenue NW - Concept E Single Point Interchange



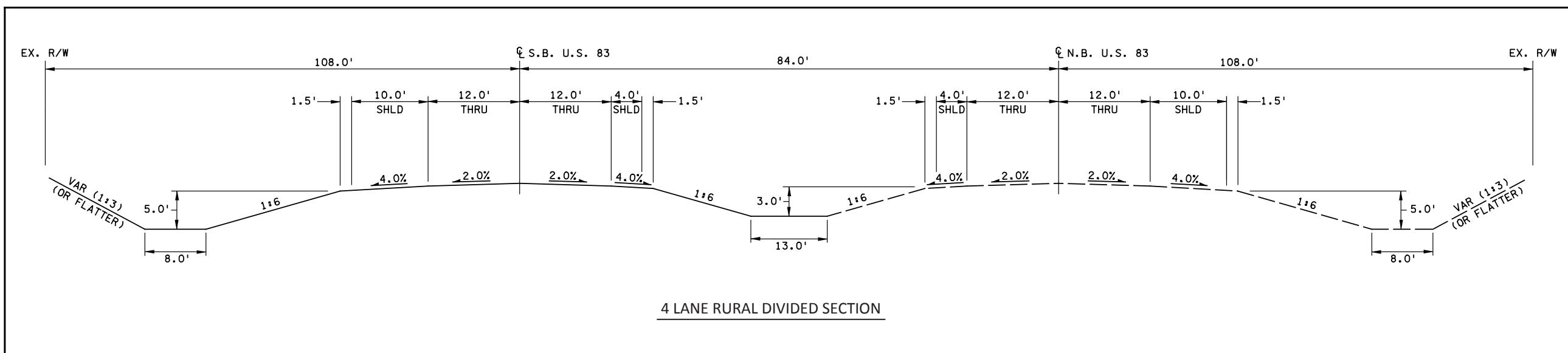
Figure 5-13: US 83 NW Bypass Typical Cross-Sections



4 LANE URBAN SECTION



4 LANE RURAL SECTION



4 LANE RURAL DIVIDED SECTION

## SOUTHWEST ARTERIAL/BYPASS

The southwest area of Minot is home to the Dakota Square Mall, four major developments that will experience a significant amount of commercial and residential growth (e.g., Southgate, Magic Meadows, Prairie Grass Addition, and Highlander Estates), and the future site of a new major medical center. Based upon the traffic forecasts and future "no build" operations analyses, it was determined that the current roadways in the southwest area of Minot will not be able to meet the future traffic demand. Further, other important north-south corridors throughout Minot (especially 16th Street SW) will benefit from an additional north-south route to serve travel demands.

Four alternatives were identified to increase connectivity and mobility between the northwest and southwest areas of Minot, as both areas are experiencing rapid commercial and residential growth. The Southwest Arterial/Bypass will connect to the US 83 NW Bypass, providing better access between the northwest and southwest areas of Minot and beyond.

The evaluation of the Southwest Arterial/Bypass system alternative included identifying its purpose and need (as a new facility), analyzing key heavy commercial truck volumes it may serve, establishing typical cross-sections, and evaluating preliminary concepts for possible social, environmental, and engineering impacts.

### Purpose and Need

Analyzing the purpose and need for future improvements can help define the magnitude of the problems, determine if the needs document a purpose for the project, and if further analysis should continue (e.g., alternative development and evaluation). Since any major new corridor and/or crossroad improvements will likely seek federal funding, pertinent Federal Highway Administration (FHWA) transportation purpose and need guidelines were used to help define needs. The purpose and need analysis utilized the existing conditions data, the future conditions technical analysis, and stakeholder public input received early in the study process.

#### *Purpose of the Proposed Improvement(s)*

The purpose of the proposed improvement(s) is to resolve and mitigate traffic conditions related to congestion, safety, and access in and throughout the City of Minot. Recent planning efforts have documented high traffic demand, straining the current transportation system. The City has examined current and forecasted traffic conditions, identified deficiencies, and proposed alternative solutions in order to provide safe and efficient travel conditions for roadway users.

#### *Needs for the Improvement(s)*

The needs for the proposed improvement(s) are based on an evaluation of the following issues:

- The City has experienced a rapid growth in traffic volumes, including high truck volumes on its transportation network. Vehicles that rely on US 83 and US 2 for regional trips are currently loading onto the partial cloverleaf interchange situated to the south of the City (see Figure 5-14). Closely spaced intersections on the approach to this interchange further intensify congestion, resulting in the diversion of local traffic to minor streets to avoid congestion.
- The Minot rural fire department station has also identified this interchange as a concern; it has been reported that emergency vehicle response times, as well as transit times have been impaired due to congestion.
- Safety issues exist on the current network, with the NDDOT reporting a high number of crashes at the intersection of the US 83 NW Bypass and US 2.
- Lack of access management near the US 83 and US 2 interchange contributes to congestion.

- Significant residential and commercial developments are expected in the areas surrounding the City of Minot, particularly in the southwest and northwest areas of the City. National retailers have made investments in areas adjacent to transportation investments, with Trinity Hospital also planning construction of a new hospital southwest of 37th Avenue SW and 16th Street SW.

### Planning-Level Evaluation

Four alternatives were evaluated for the Southwest Arterial/Bypass. Three alternatives would travel along or just west of the current 30th Street SW corridor as an urban four-lane arterial before transitioning to a rural two-lane roadway south of 37th Avenue SW. A fourth alternative was developed that represents a true truck bypass, providing connectivity between US 2 and US 83 several miles to the west of the 30th Street SW corridor. All four alternatives tie into US 83 on the southern terminus at approximately 66th Avenue SW. Figure 5-15 illustrates the four corridor alignments for the Southwest Arterial/Bypass. The description and evaluation of the Southwest Arterial/Bypass alternatives is provided in Table 5-2.

During the public involvement process a petition from the Beaver Creek subdivision, located along 30th Street SW, was submitted indicating concerns with Alignment A, specifically the section south of 37th Avenue SW. Some modifications to the alignment and scheduling of these possible alternatives were made in light of this input.

Typical cross-sections are provided to establish the potential ROW acquisition or corridor preservation that may be needed to accommodate the alternatives. Figure 5-16 illustrates the typical cross-sections for the following roadway sections: two-lane rural, four-lane urban, and five-lane urban.

Figure 5-14: Existing Truck Volumes

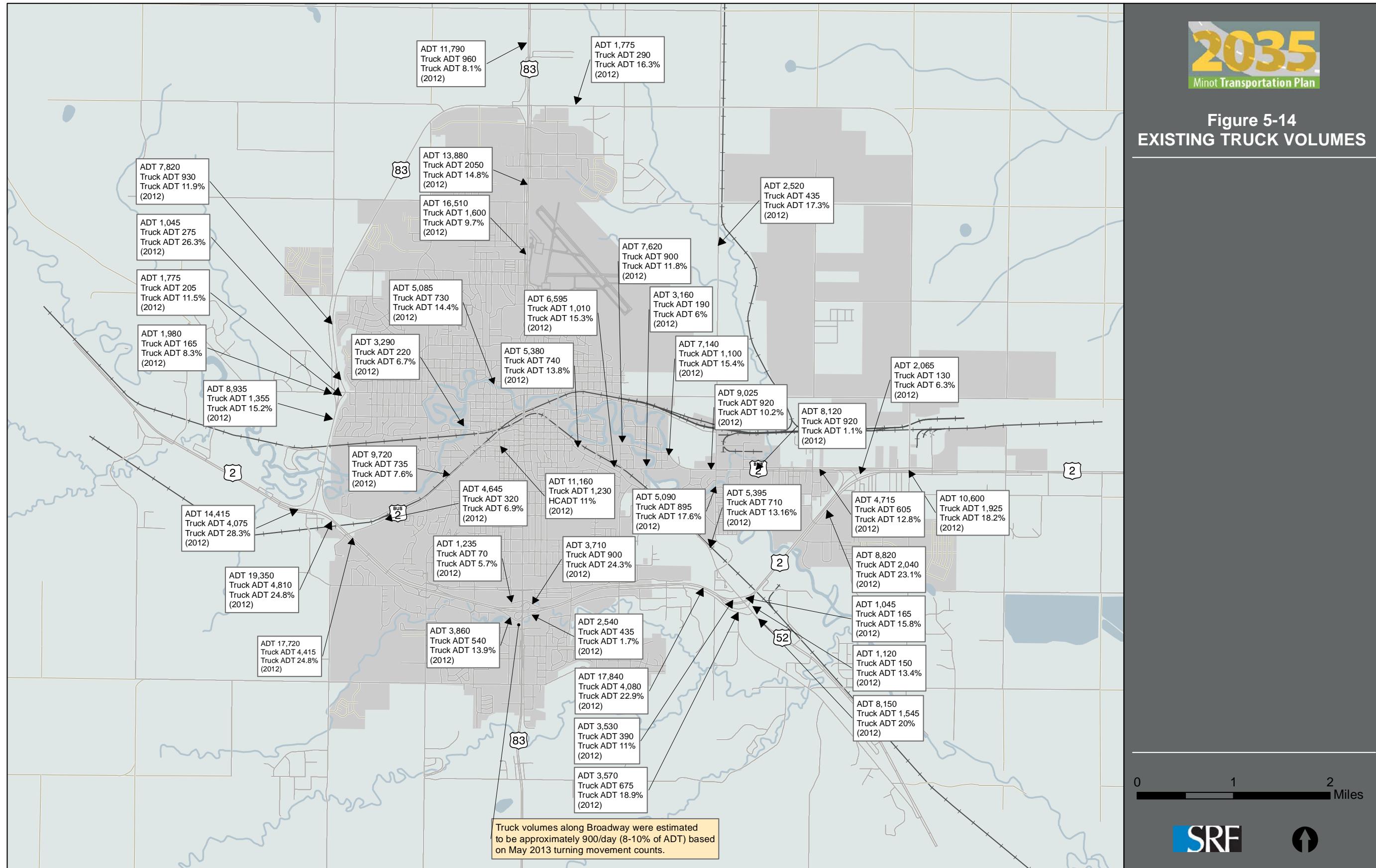
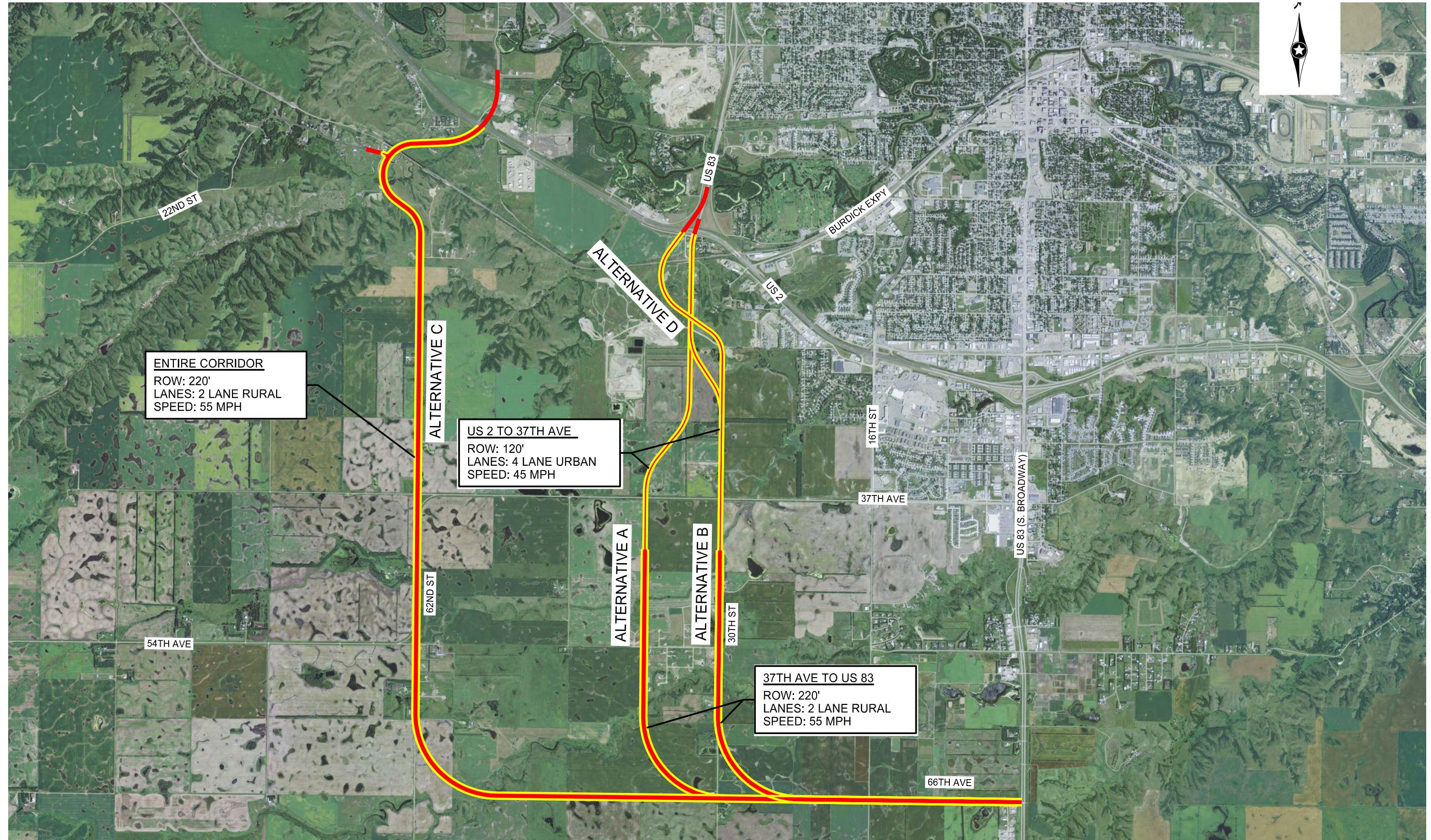


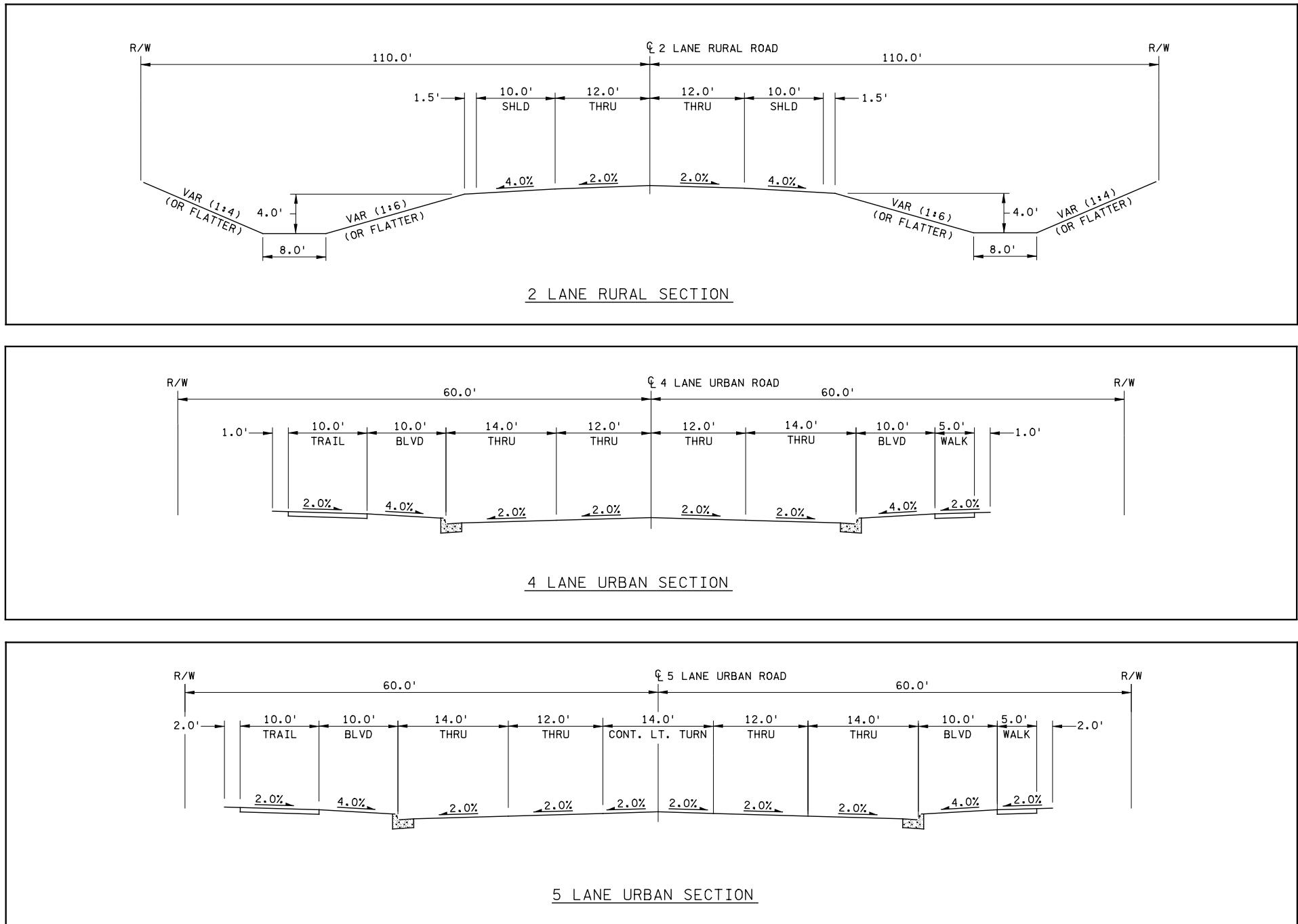
Figure 5-15: Southwest Arterial/Bypass Considerations



**Table 5-2: Southwest Arterial/Bypass Planning-Level Evaluation of Corridor Alignments**

Corridor	Improvement Description	Social	Environmental	Engineering	Recommendation / Findings
SW Arterial Alternative A	<ul style="list-style-type: none"> <li>Construct four lane roadway from US 2 to US 83. Urban cross-section should start at US 2 and extend south to 37th Avenue, west of the 30th Street corridor. Rural cross-section should continue south and head east along the 66th Avenue corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Provides greater access for planned developments.</li> <li>Aligns with current street network to alleviate potential right-of-way acquisition.</li> <li>As shown, impacts residences near US 2 at northern termini with urban section and impacts residential subdivision at 54th Avenue.</li> <li>Has parcel severance impacts.</li> </ul>	<ul style="list-style-type: none"> <li>Federal threatened, endangered, proposed threatened, and candidate species are present in Ward County. Coordination with US Fish and Wildlife Services will be required to determine the effect to species present at the time construction is being planned.</li> <li>Coordination with North Dakota Fish and Game is required to identify regionally significant ecological areas and protected wetlands to be considered in more detail.</li> </ul>	<ul style="list-style-type: none"> <li>Reduces traffic volumes along parallel north-south facilities (e.g., S Broadway and 16th Street SW).</li> <li>Provides continuous north-south corridor for the areas of Minot experiencing the greatest development pressures.</li> <li>Accommodates anticipated traffic demand to large residential and commercial developments between 31st Avenue SW and 37th Avenue SW.</li> </ul>	<ul style="list-style-type: none"> <li>+ Improvement needed to provide traffic volume relief along 16th Street SW, without it this corridor will experience significant queues and approach failures that results in the overall intersection failing and queues spilling back into adjacent intersections.</li> <li>+ SW arterial improvements are critical to overall system performance.</li> <li>- Alternative A has additional negative impacts to private lands.</li> </ul>
SW Arterial Alternative B	<ul style="list-style-type: none"> <li>Construct four lane roadway from US 2 to US 83. Urban cross-section should start at US 2 and extend south to 37th Avenue along the 30th Street corridor. Rural cross-section should continue south and head east along the 66th Avenue corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Provides greater access for planned developments.</li> <li>Aligns with current street network to alleviate potential right-of-way acquisition, but may impact residences near US 2 at northern termini and residential subdivision at 54th Avenue.</li> </ul>	<ul style="list-style-type: none"> <li>The National Wetland Inventory indicates the presence of numerous wetlands in the project area; it is probable the proposed improvements may impact these wetlands. Coordination with the US Army Corps of Engineers will be required to determine jurisdictional wetlands and waterways subject to Section 404 permitting, including sequencing to avoid, minimize and mitigate impacts.</li> </ul>	<ul style="list-style-type: none"> <li>Reduces traffic volumes along parallel north-south facilities (e.g., S Broadway and 16th Street SW).</li> <li>Provides continuous north-south corridor for the areas of Minot experiencing the greatest development pressures.</li> <li>Accommodates anticipated traffic demand to large residential and commercial developments between 31st Avenue SW and 37th Avenue SW.</li> </ul>	<ul style="list-style-type: none"> <li>+ Improvement needed to provide acceptable intersection LOS along 16th Street SW, without it this corridor will experience significant queues and approach failures that results in the overall intersection failing and queues spilling back into adjacent intersections.</li> <li>+ SW arterial improvements are critical to overall system performance.</li> <li>- Potential fatal flaw with residential impacts near US 2.</li> </ul>
SW Bypass Alternative C	<ul style="list-style-type: none"> <li>Construct two lane rural roadway from US 2 to US 83. Two lane roadway should start at US 2 and extend south to 66th Avenue along the 62nd Street corridor, continuing east along the 66th Avenue corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Has parcel severance impacts and would result in right-of-way impacts to railroad trestle bridge at County Road 12.</li> <li>Provides true truck bypass to alleviate congestion at S Broadway and US 2 intersections.</li> <li>Impacts residences near US 2 at northern termini and severs numerous farmsteads.</li> <li>Limited opportunities to serve planned development in southwest Minot.</li> </ul>	<ul style="list-style-type: none"> <li>If the project moves forward as a federal undertaking, the Section 106 process to identify effects to historic and archeology resources would apply, including consultation with the North Dakota State Historic Preservation Office and tribal agencies.</li> <li>The proposed improvements may result in impacts to publicly owned properties protected by Section 4(f) and Section 6(f) legislation (trails). Review of historic and archeological resources could also identify sites subject to Section 4(f).</li> </ul>	<ul style="list-style-type: none"> <li>Provides bypass for regional traffic with origins and destinations outside of Minot.</li> <li>Addresses concerns related to heavy truck traffic volumes along S Broadway and US 2.</li> </ul>	<ul style="list-style-type: none"> <li>+ True regional bypass to alleviate heavy truck traffic from congested corridors.</li> <li>- Does not address the congestion problems along 16th Street SW and S Broadway, which will experience significant queues and approach failures that results in the overall intersection failing and queues spilling back into adjacent intersections.</li> <li>+ Long term improvement consideration (post-2035).</li> </ul>
SW Arterial Alternative D	<ul style="list-style-type: none"> <li>Construct four lane roadway from US 2 to US 83. Urban cross-section should start at US 2 and extend south to 37th Avenue along the 30th Street corridor. Note, this urban section alignment does not impact residential development near US 2. Rural cross-section should continue south and head east along the 66th Avenue corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Provides greater access for planned developments.</li> <li>Aligns with current street network to alleviate potential right-of-way acquisition.</li> <li>As shown, impacts residences near US 2 at northern termini with urban section and residential subdivision at 54th Avenue.</li> </ul>	<ul style="list-style-type: none"> <li>Further identification and evaluation of the environmental impacts associated with the proposed improvements will be coordinated with the identified agencies and conducted at the appropriate time. Key agencies not noted above include the Federal Emergency Management Agency, Natural Resource Conservation Service, North Dakota Department of Health, and the State Water Commission.</li> </ul>	<ul style="list-style-type: none"> <li>Reduces traffic volumes along parallel north-south facilities (e.g., S Broadway and 16th Street SW).</li> <li>Provides continuous north-south corridor for the areas of Minot experiencing the greatest development pressures.</li> <li>Accommodates anticipated traffic demand to large residential and commercial developments between 31st Avenue SW and 37th Avenue SW.</li> </ul>	<ul style="list-style-type: none"> <li>+ Improvement needed to reduce traffic volumes along 16th Street SW, without it this corridor will experience significant queues and approach failures that results in the overall intersection failing and queues spilling back into adjacent intersections.</li> <li>+ SW arterial improvements are critical to overall system performance.</li> <li>+ Alternative D minimizes impacts to residential parcels near US 2.</li> </ul>

**Figure 5-16: Southwest Arterial/Bypass Typical Cross-Sections**



## Project Development / Sequencing

Although there are four future alternatives under consideration for the Southwest Arterial/Bypass, there are two general alignment areas to consider – western north-south alignment and eastern north-south alignment. The major difference between these two alignments include geography, function, and design. A significant amount of additional detailed evaluation will be needed for the Southwest Arterial/Bypass concepts/alignment alternatives. However, an outline of how this project can be developed is as follows:

- Construct the northern segment of the eastern north-south alignment as a four-lane urban divided facility through 37th Avenue SW.
- Manage access along the SW Bypass in compliance with the City of Minot access management guidelines (contained herein).
- Consider construction of the remaining arterial corridor south of 37th Avenue SW as a rural two-lane facility connecting to US 83 along 66th Avenue SW.
- Manage land use development (through the City and County review processes where applicable) to preserve the western north-south alignment alternative.

## Conclusion

Year 2035 system analysis indicates major system improvements need to be implemented to address future congestion or operational issues. These needs cannot be mitigated with low cost/ high benefit solutions at the problem locations. Therefore, the northern segment of the eastern north-south alignment of the Southwest Arterial should be implemented first. The remaining elements of the Southwest Arterial/Bypass can lag, with improvements expected potentially between year 2025 and 2035, if at all.

# SUBAREA STUDIES

Subareas requiring additional investigations or more detailed analysis were identified during the planning process. These areas were selected due to previously identified traffic operations, safety, circulation, system continuity, connectivity needs, or other planning and engineering issues. A total of three subareas were investigated, using the technical analysis completed as part of the traffic forecasts and future traffic operations. The subarea studies included an assessment of the following:

- 16th Street SW
- US 2/42nd Street SE
- US 2/US 52/US 83 Access Alternatives

The outcomes and findings from the subarea studies were used to develop the City's Thoroughfare Improvement Plan, provide additional information to establish the Transportation Plan's implementation program, or simply further the discussion regarding the subject areas and outline future considerations for the respective subarea.

## 16TH STREET SW

The 16th Street SW corridor between 37th Avenue SW and 20th Avenue SW, including the US 2/52 and 16th Street SW interchange, experiences an increase in volumes and congestion by year 2035 under both no build, and to a lesser extent, modified network conditions. Due to these increased volumes, the current buttonhook interchange configuration and roadway capacity is not expected to accommodate the future volumes.

Possible future interchange and corridor expansion configurations were reviewed to determine interchange configurations that would best fit this area in terms of ROW and roadway capacity. Various interchange configurations were tested using the Federal Highway Administration (FHWA) CAP-X tool, which evaluates interchange configurations based on the volume/capacity ratio. Based on the results of this evaluation, the most feasible interchange concepts were identified. These concepts are illustrated in Figure 5-17, Figure 5-18, and Figure 5-19. These images provide a reference for how the interchange could be reconfigured and provide acceptable operations. In addition to the reconfiguration, this corridor will likely need several geometric and traffic control changes in order to achieve acceptable levels of service. The following concepts were identified and should be evaluated further as development occurs.

### **Concept A – Single Point Interchange**

This concept removes the buttonhook interchange in favor of a single point interchange, with a shift of the north and south frontage roads to improve access and signal spacing along 16th Street SW. Additional capacity improvements along 16th Street SW, as well as several access closures/modifications, should also be considered (six-lane roadway along 16th Street SW). Figure 5-17 depicts Concept A – Single Point Interchange.

### **Concept B – C-D Roadway with Overpass**

Concept B creates a collector-distributor (C-D) roadway along the south side of US 2/52 between 16th Street SW and Broadway and includes revised access from the C-D roadway. This concept also includes a new overpass at 10th Street SW. Figure 5-18 displays Concept B – C-D Roadway with Overpass.

### **Concept C – Partial Cloverleaf Interchange**

This concept removes the buttonhook interchange design in favor of a partial cloverleaf interchange, which would include re-aligning the north and south frontage roads with the new ramps. Figure 5-19 displays Concept C – Partial Cloverleaf Interchange.

As previously noted, these concepts were identified as the most feasible based on volume/capacity ratio assessment. Additional analysis and evaluation is recommended, including coordination with impacted stakeholders.

### **Concept D – Corridor Expansion**

A corridor expansion concept was developed to better understand the ROW impacts north-south along 16th Street SW. It should be noted that corridor expansion is needed under each of the interchange concepts A-C, regardless of which is moved forward (if any). The ROW through this area is extremely limited and sound wall structures are located on the west side of the roadway. This concept did not consider a new interchange at US 2, but rather only illustrates a six-lane urban cross-section from 20th Avenue SW to 31st Avenue SW. Figure 5-20 displays Concept D – Corridor Expansion.

Figure 5-17: 16th Street SW Subarea Studies - Concept A

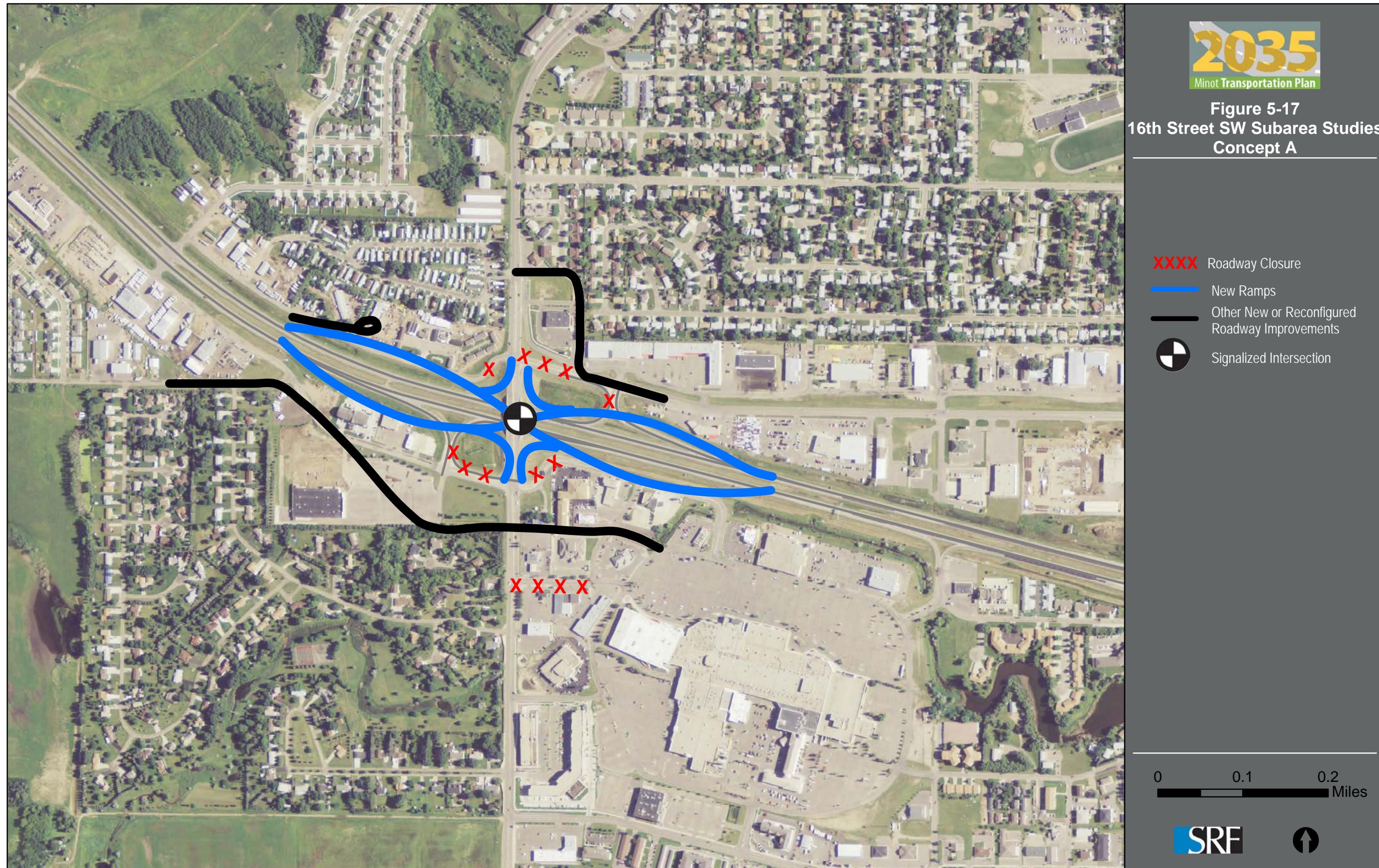


Figure 5-18: 16th Street SW Subarea Studies - Concept B

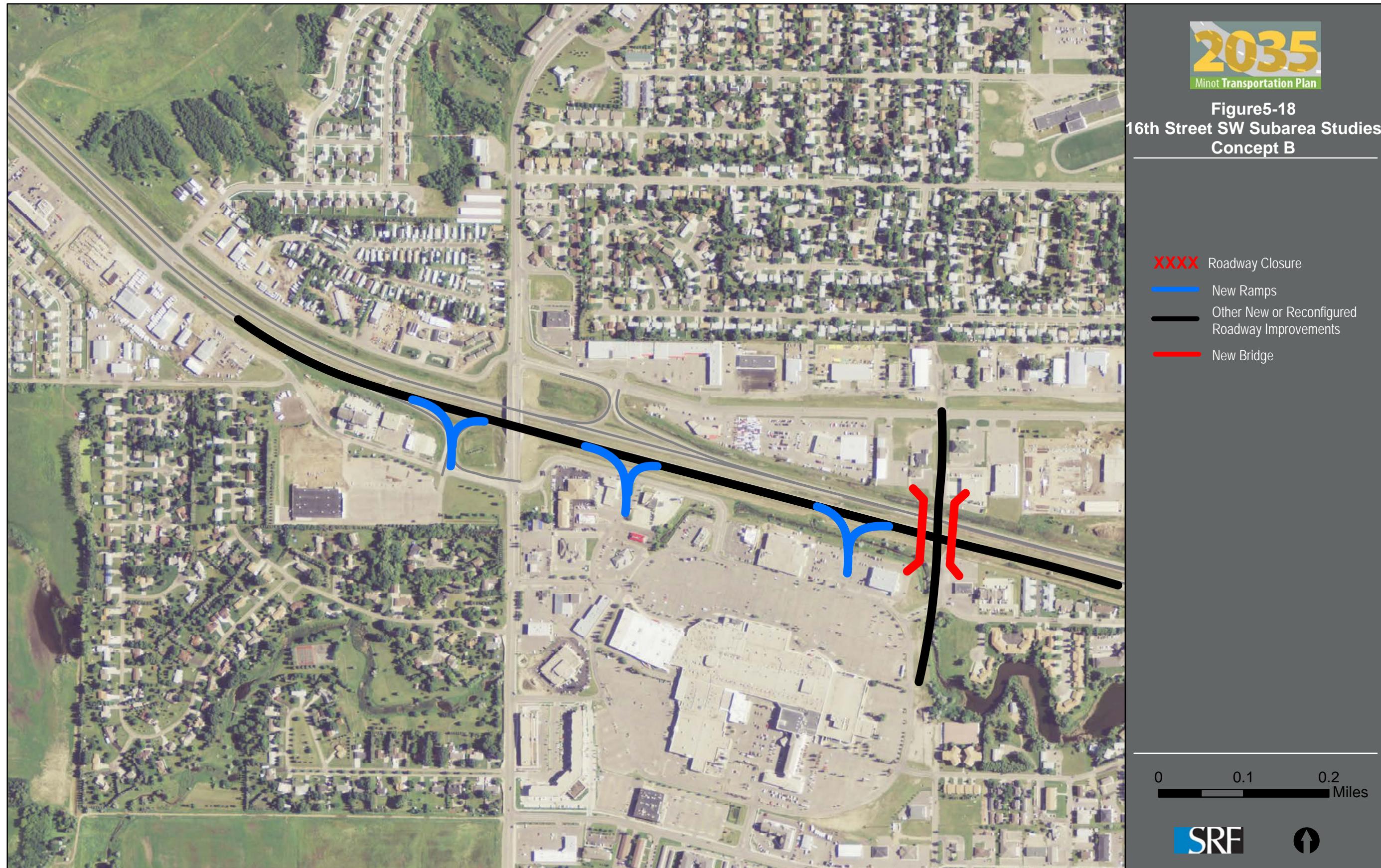
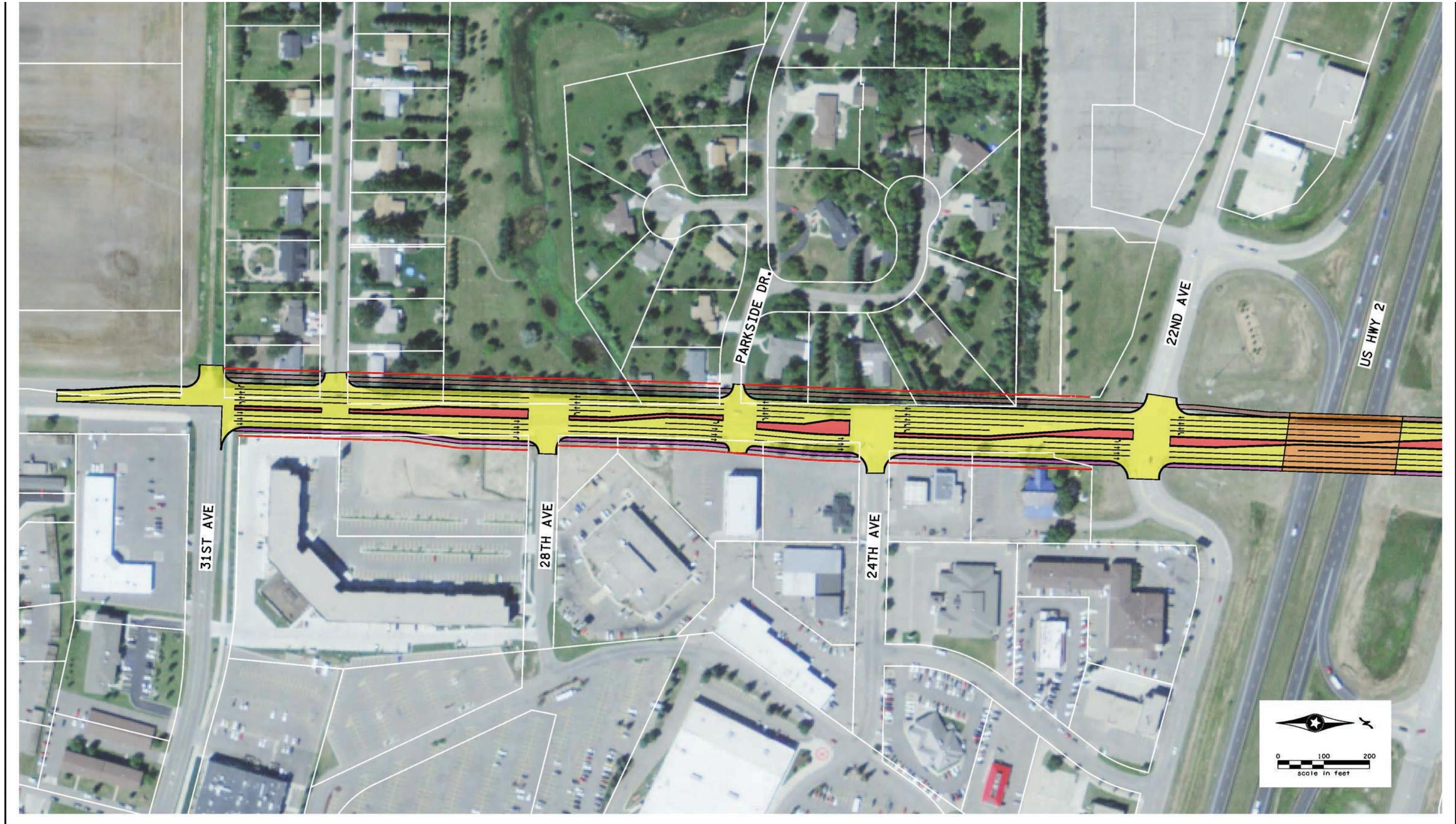


Figure 5-19: 16th Street SW Subarea Studies - Concept C



Figure 5-20: 16th Street SW – 6 Lane Urban Reconstruction - Concept D



Note: Example shown here is merely one concept. Future detailed analysis of this corridor with a corridor study or other like type study will identify the most appropriate concept for future implementation.

## US 2/42ND STREET SE

The US 2/42nd Street SE intersection is expected to see considerable traffic volume growth by year 2035 due to development in the area. As a result of traffic growth and perceived safety issues at this location, the existing US 2/42nd Street SE intersection was reviewed. Reconfiguration of this intersection will include additional turn lanes, roadway realignment, and installation of a traffic signal. Two intersection concepts were developed; the intent of these concepts is to illustrate potential ROW impacts and alternative roadway connectivity.

### Concept A – Northern Shift

Concept A shifts 42nd Street SE to the north and realigns the east and west approaches (see Figure 5-21). This configuration allows for adequate intersection spacing to the US 2 Frontage Road. This concept also shows a more continuous roadway connection with 46th Street SE, which eventually ties in with 16th Avenue SE. The ultimate outcome would provide a more direct connection to 55th Street SE (14th Avenue SE is not expected to make this connection). It should be noted that a southerly alignment was reviewed, but removed from further consideration due to the potential for significant ROW impacts.

### Concept B – System Maintenance

Concept B roughly maintains the 42nd Street intersection in relatively the same location as it exists today. However, the concept provides an improved east-west alignment, while minimizing ROW impacts (see Figure 5-22). This concept does not propose to significantly realign the US 2 Frontage Road, resulting in poor intersection spacing or as shown a circuitous route for existing businesses along the frontage road. This concept realigns 14th Avenue SE to 46th Street SE for a more continuous roadway connection, eventually connecting to 16th Avenue SE.

From a traffic operations perspective, both concepts (A & B) provide relatively similar operational conditions. Therefore, further discussions with impacted stakeholders should occur to identify a locally preferred realignment alternative.

Figure 5-21: US 2/42nd Street SE Subarea Studies - Concept A

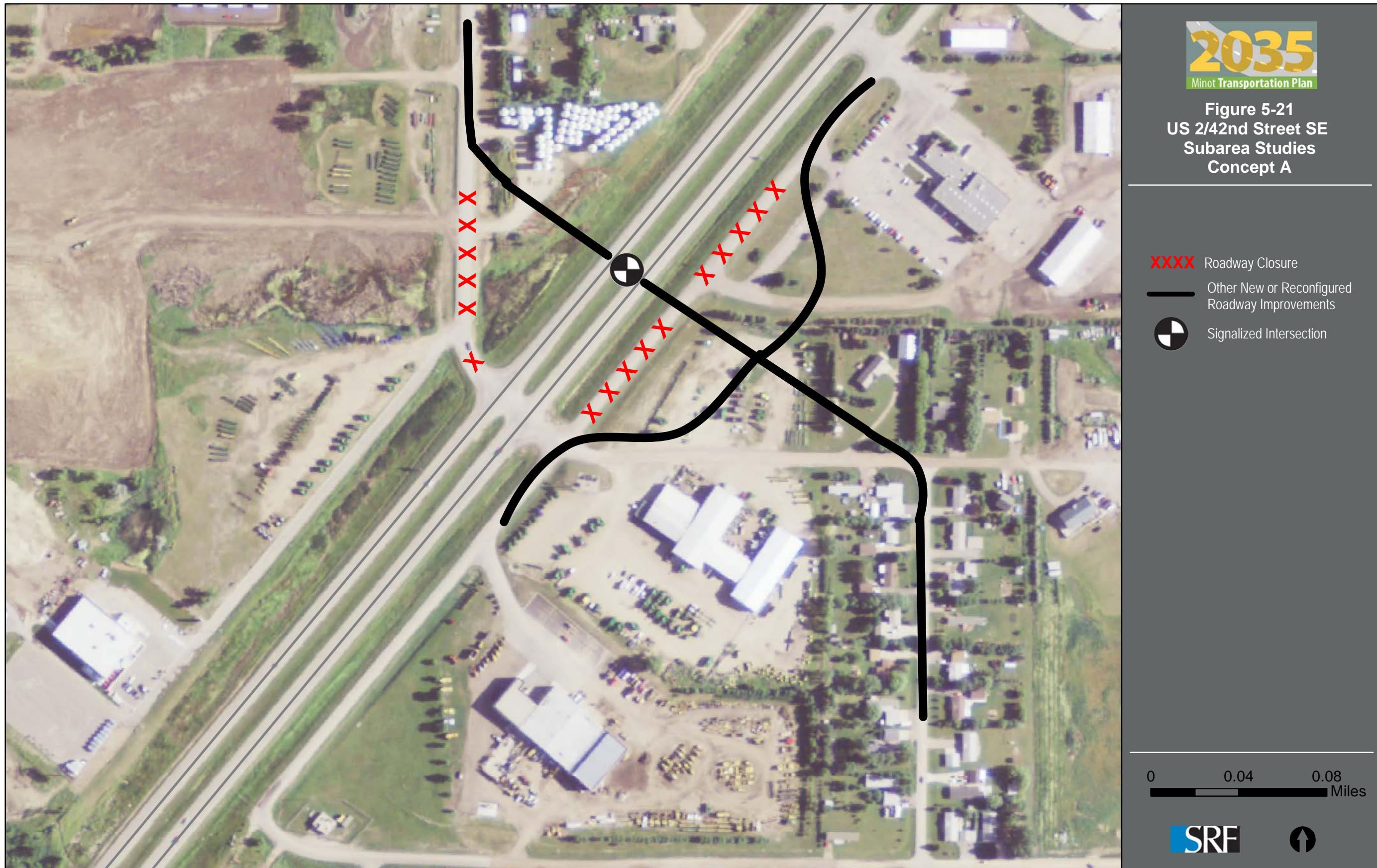
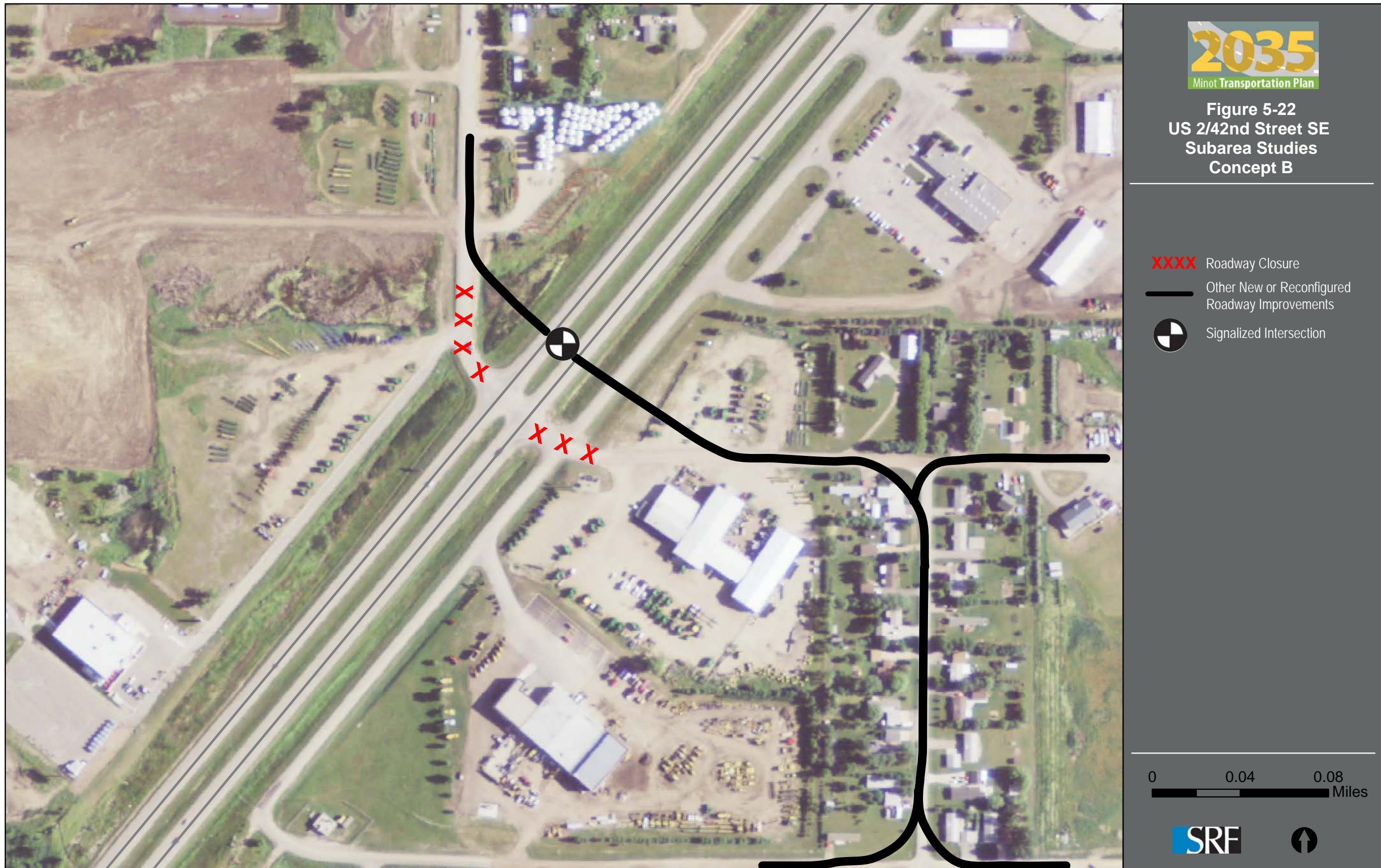


Figure 5-22: US 2/42nd Street SE Subarea Studies - Concept B



## US 2/US 52/US 83 ACCESS ALTERNATIVES

Significant congestion is expected at the US 2/52 and US 83 intersection under future conditions. Additionally, the connection of a future Southwest Arterial as the south leg of this intersection will further contribute to the congestion issues. An assessment of potential interchanges at this location was reviewed by the City of Minot as part of the 2001 Transportation Plan. Outcomes from that effort were considered as part of this current system configuration exercise. Several conceptual interchange configurations were identified for future consideration. Due to the proximity of the adjacent Burdick Expressway, this roadway was also included as part of the concept development process. The following concepts, which are shown in Figure 5-23, Figure 5-24, and Figure 5-25, were identified and should be evaluated further.

### Concept A - System Interchange

The interchange configuration is designed to favor the heavy movements, which are southbound to eastbound and northbound to westbound movements. The flyover design necessitates ramp improvements at the Burdick Expressway interchange due to its proximity. Figure 5-23 depicts Concept A – System Interchange.

### Concept B – Folded Diamond Interchange

The interchange configuration is also designed to favor the heavy movements. However, the flyover ramp in Concept A is not included. Burdick expressway would be converted to a grade separation with no access to US 2/52. Figure 5-24 depicts Concept B – Folded Diamond Interchange.

### Concept C – Standard Diamond Interchange

The interchange configuration would be a standard diamond configuration. Once again, Burdick Expressway would be connected to a grade separation with no access to US Highway 2/52. Significant geometric improvements would likely be necessary with this configuration. Figure 5-25 displays Concept C – Standard Diamond Interchange.

It should be noted, these concepts were identified as the most feasible at this time. Further evaluation is recommended, as well as coordination with impacted stakeholders to determine a locally supported alternative. Considerably more detailed engineering will be required before a final preferred alternative decision can be made for this system interchange area, including cost estimates and environmental impacts.

Figure 5-23: US 2/US 52/US 83 Access Alternatives Subarea Studies - Concept A

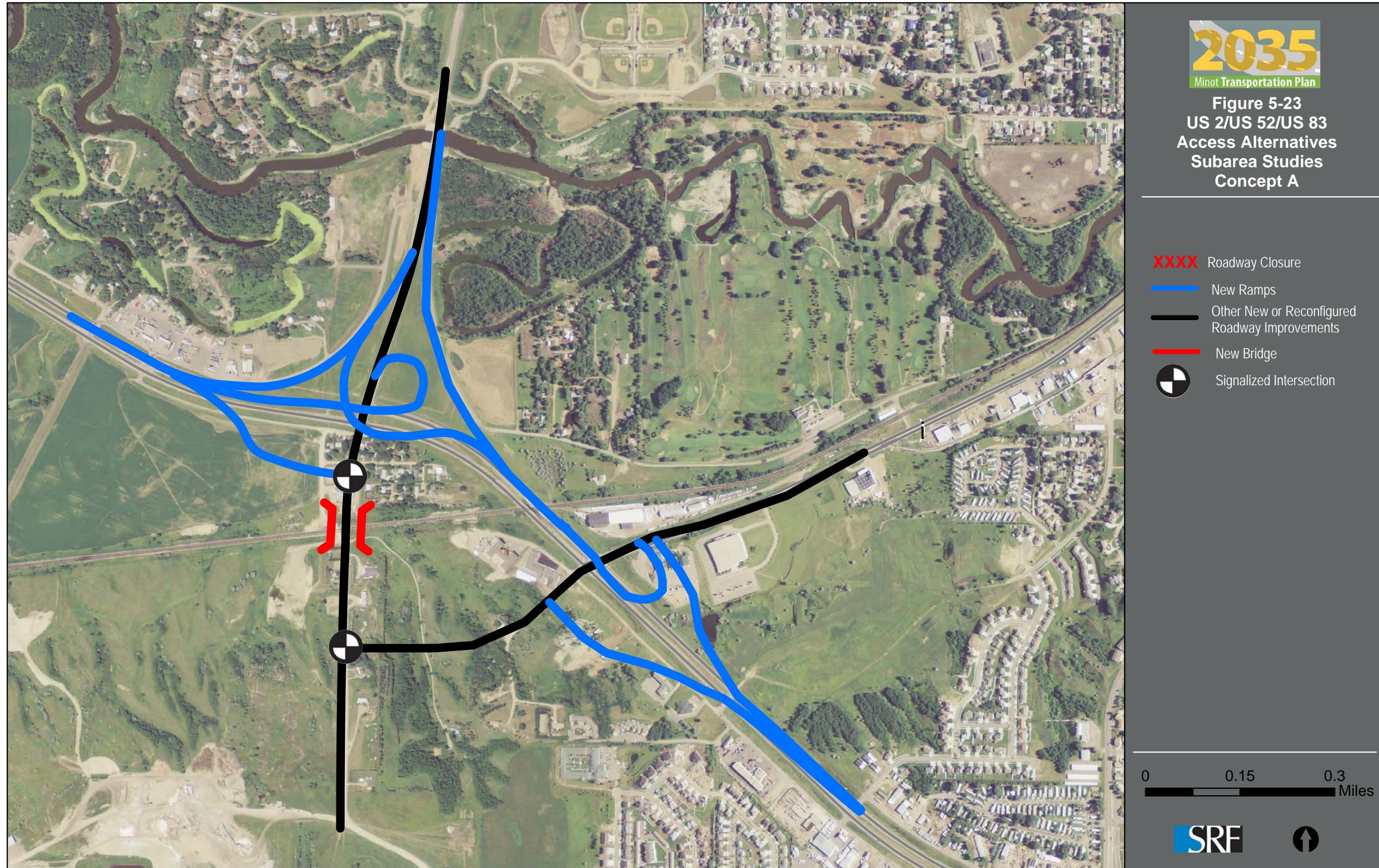


Figure 5-24: US 2/US 52/US 83 Access Alternatives Subarea Studies - Concept B

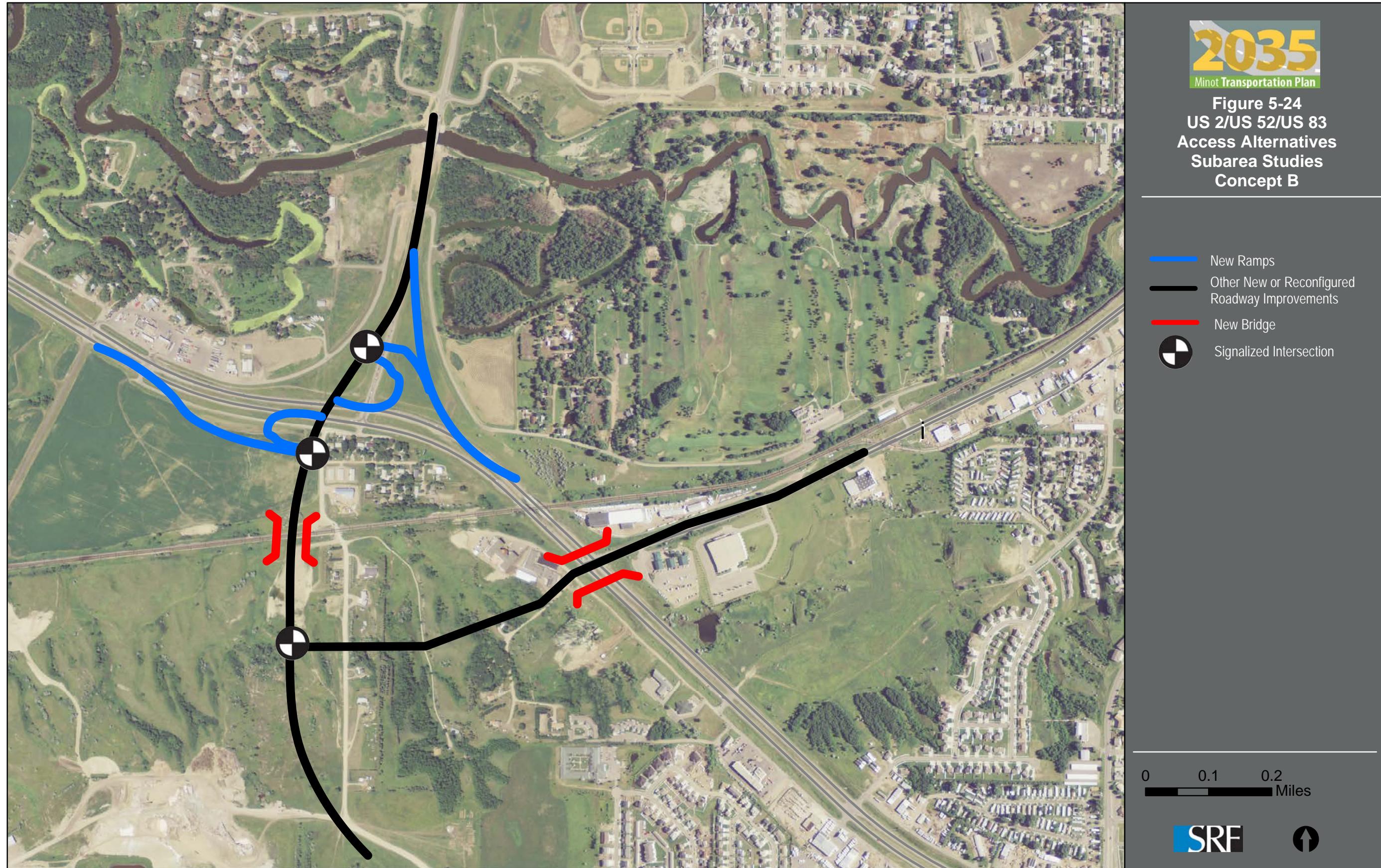
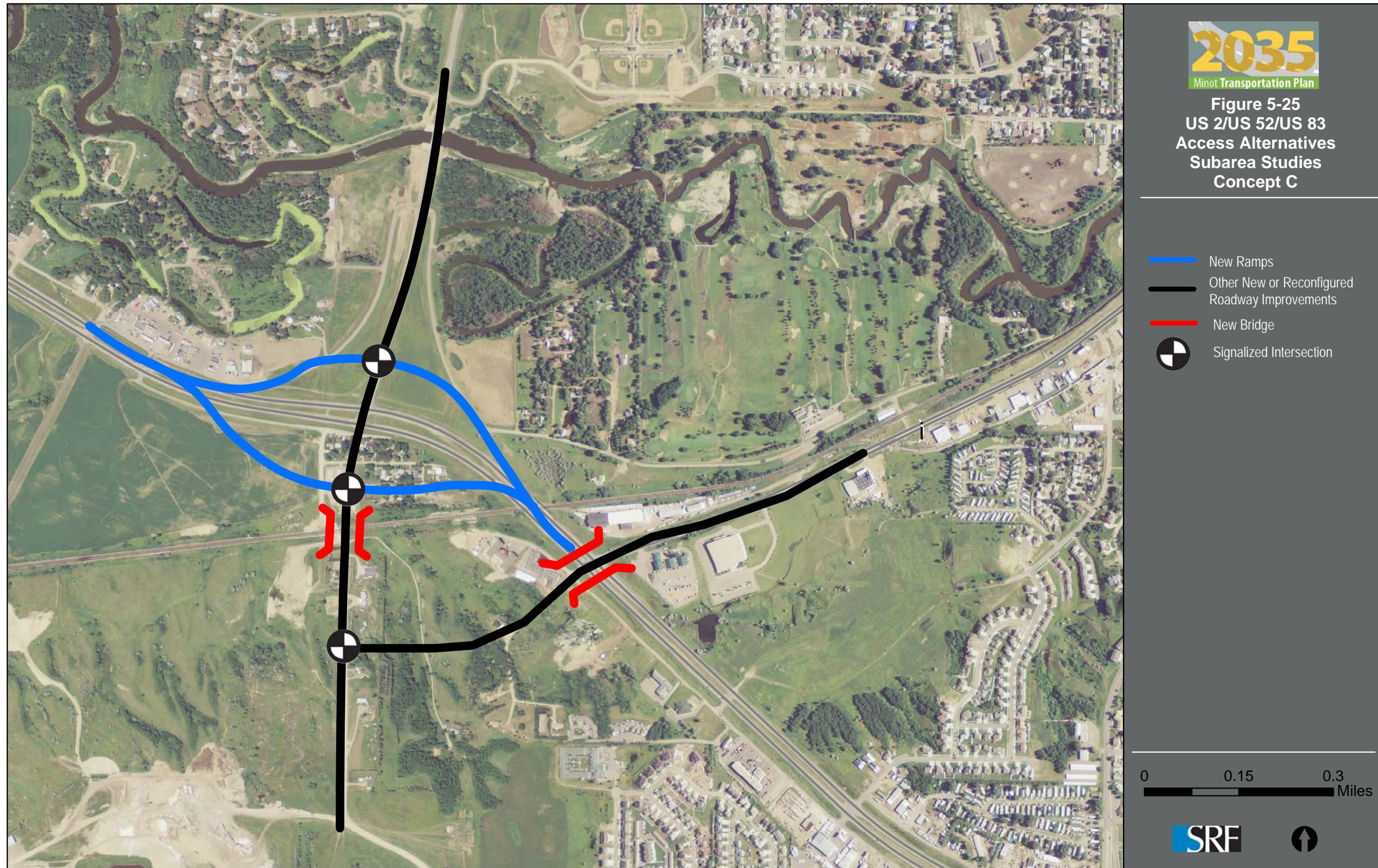


Figure 5-25: US 2/US 52/US 83 Access Alternatives Subarea Studies - Concept C



## FUTURE FUNCTIONAL CLASSIFICATION SYSTEM

The functional classification plan defines the function and role of a roadway within the hierarchy of an overall roadway system. By developing a future functional classification plan, local agencies and planning officials will be able to better manage access and the design of roadways. The future functional classification plan was developed to address the City's system needs by evaluating the current functional classification system and proposing adjustments to address inconsistencies, anticipated changes, connections to adjacent cities, and coordination with NDDOT plans.

The goal of the functional classification plan was to achieve a better performing system that aligns the functional classification of routes to current and future land uses and the intended purpose of the roadways. This goal was achieved by establishing a set of system analysis objectives that:

- Defined the roadway hierarchy to match function
- Designated function of roadways by using a logical systematic analysis process that was transparent and coordinated changes with the PMT
- Followed the established process and mileage guidance outlined by the most recent FHWA guidance

Further, the functional classification recommendations considered the following factors and rules:

- Comments from the City, County, Eureka Township, McKinley Township, Harrison Township, Nedrose Township, Afton Township, Sundre Township, NDDOT, and the public
- New conditions and future land use plans
- Anticipated future system improvements
- “Rules or characteristics” for identifying functional classification changes:
  - Trip length, type, spacing and size of traffic generators served
  - Ability to serve regional activity, population centers, and economic development facilities
  - Continuity between or through travelsheds
  - Role in providing mobility and access
  - Relationship to adjacent land uses

It is important to note that the proposed functional classification changes are expected to occur over the 20-year planning period and the pace of these changes will be dictated by the City's policies, growth, need, and opportunities.

Table 5-3 summarizes the City's overall functional classification system mileage, compared to FHWA guidelines, if the future classification plan is implemented as proposed. As shown, the proposed changes to the City's functional classification system will be consistent with the FHWA's guidelines.

*Table 5-3: City of Minot Proposed Functional Classification System*

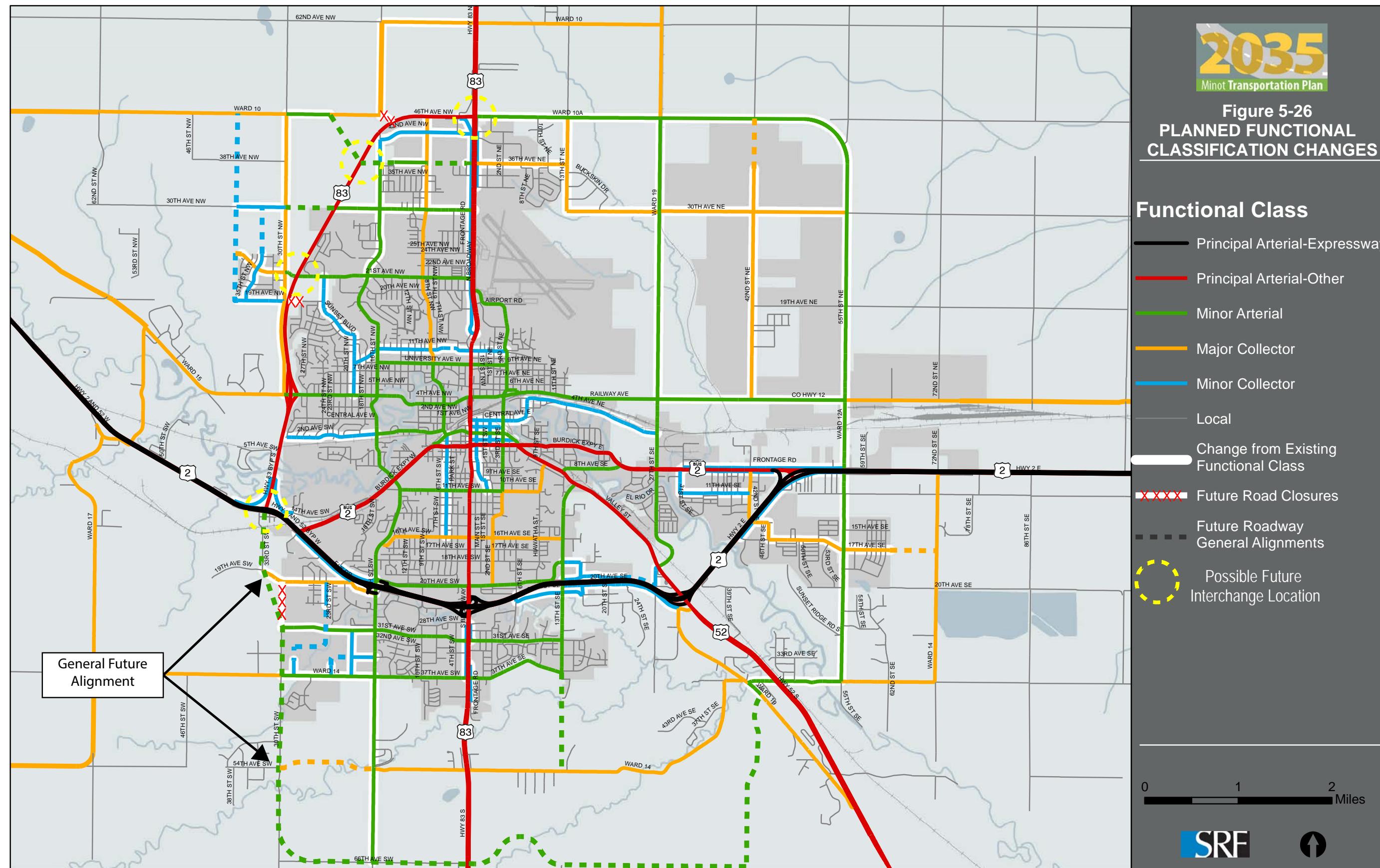
FUNCTIONAL CLASSIFICATION SYSTEM		MILES	SYSTEM %	FHWA GUIDELINE <sup>1</sup>		RANGE	
Principal Arterial	Interstate	0	0%	1 - 3 %	5 - 14%	Within	
	Other Freeways & Expressways	13	2%	0 - 2 %			
	Other Principal Arterials	34	6%	4 - 9 %			
Minor Arterial		66	12%	7 - 14 %		Within	
Major Collector		63	12%	3 - 16 %	6 - 32 %	Within	
Minor Collector		32	6%	3 - 16 %			
Local		329	61%	62 - 74 %		Within	
Subtotal		536	100%				

1 - North Dakota is defined as a rural state under FHWA's new criteria (FHWA Highway Functional Classification Concepts, Criteria and Procedures, 2013).

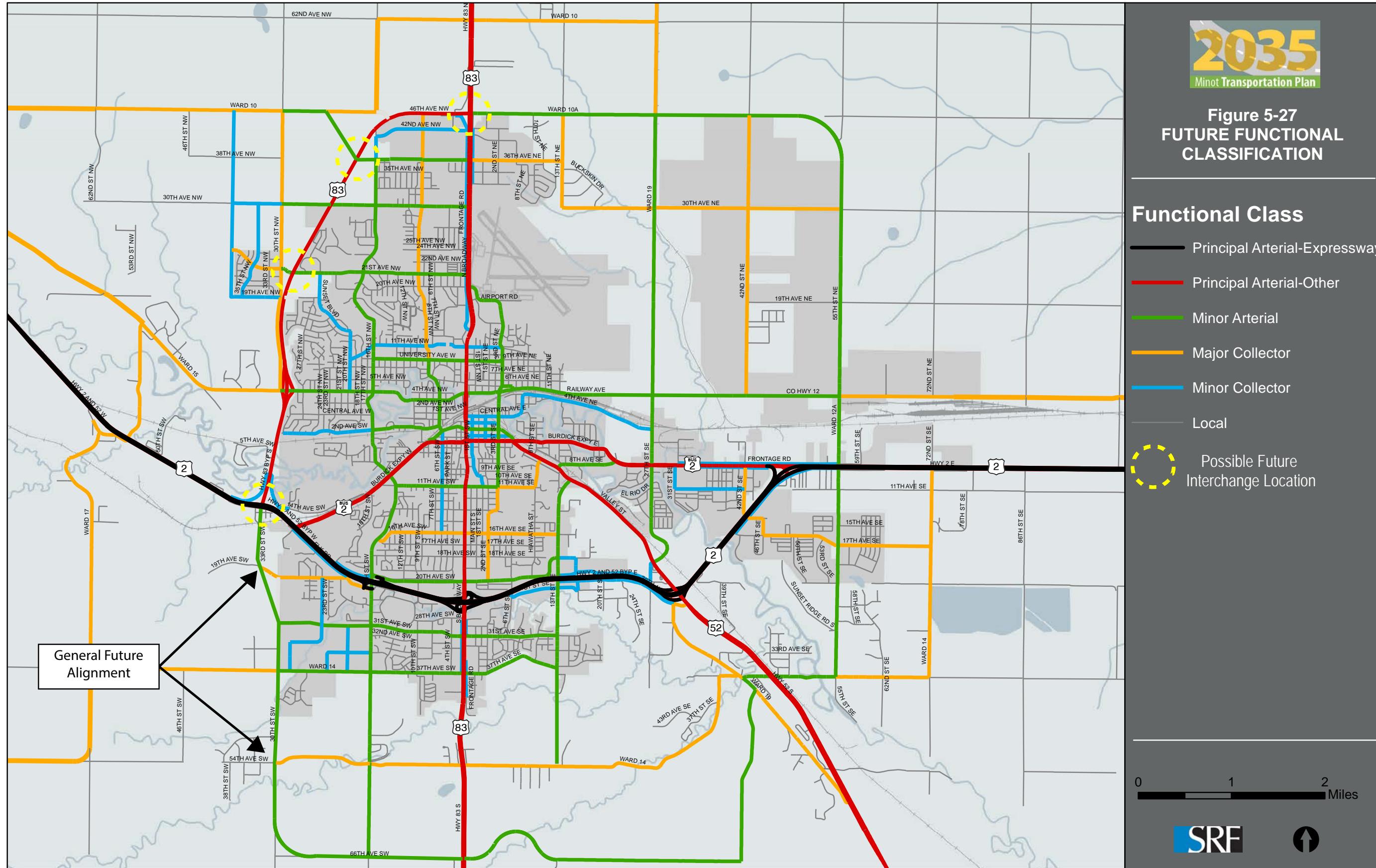
Figure 5-26 shows the City's proposed functional classification system with the changes highlighted, while Figure 5-27 illustrates the City's future functional classification system.

It should be noted that the Southeast Arterial/Bypass route, as shown on the future functional classification map, reflects discussions/decisions made during the 2010 City Comprehensive Plan. No evaluation of this future alignment was conducted, especially in the general vicinity of the river crossing. Therefore the future City/County planning process should further analyze alternative layouts and impacts.

Figure 5-26: Planned Functional Classification Changes



**Figure 5-27: Future Functional Classification**



## FUTURE ROADWAY JURISDICTION

The City of Minot's future jurisdictional alignment plan was developed using the goals, objectives, rules, and characteristics presented in the Existing Conditions section. These provided the overall framework for establishing the future jurisdictional plan.

- The previously updated future classification plan for the City was used as a basis to determine future roadway function.
- Specific jurisdictional guidelines, rules, and characteristics were developed to profile and evaluate potential transfers. These include:
  - State: interstate mobility, high travel speeds, multi-county facility and statewide functionality
  - County: regional connectivity, moderate traffic volumes, and connections to urban and rural areas
  - City: small travelsheds, serves local land access needs, moderate to low traffic volumes, and limited continuity with rural areas
  - Township: limited continuity, low traffic volumes, and access to local properties
  - Jurisdictional transfer candidates were identified based on analysis, and discussed with the PMT.
  - If recommended by the PMT, the jurisdictional changes were documented and incorporated into the future jurisdictional plan.

It should be emphasized that the proposed jurisdictional changes will occur over the 20-year planning period, at a pace commensurate with City growth, needs, opportunities, and system development.

Table 5-4 and Figure 5-28 illustrates the future jurisdiction of the City's roadway system with the changes highlighted, while Figure 5-29 illustrates the City's future roadway jurisdictional system.

*Table 5-4: Future Jurisdictional Classification System (Planned)*

JURISDICTIONAL CLASSIFICATION SYSTEM	MILES	SYSTEM %
State	50.3	9.4%
County	61.8	11.5%
Township	134.5	25.1%
Local	287.0	53.5%
Private	2.9	0.5%
Subtotal	536	100.0%

Figure 5-28: Planned Roadway Jurisdictional Changes

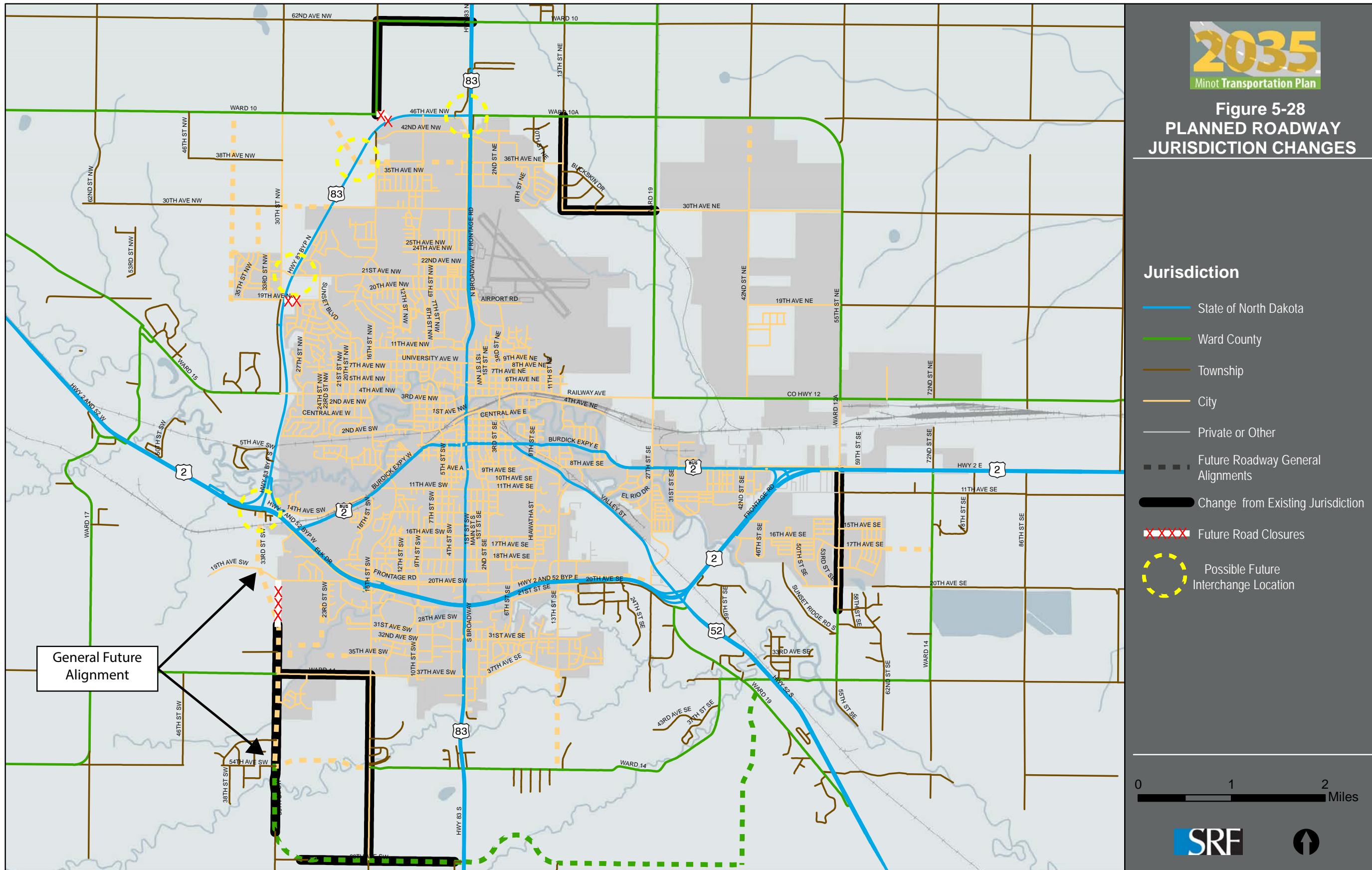
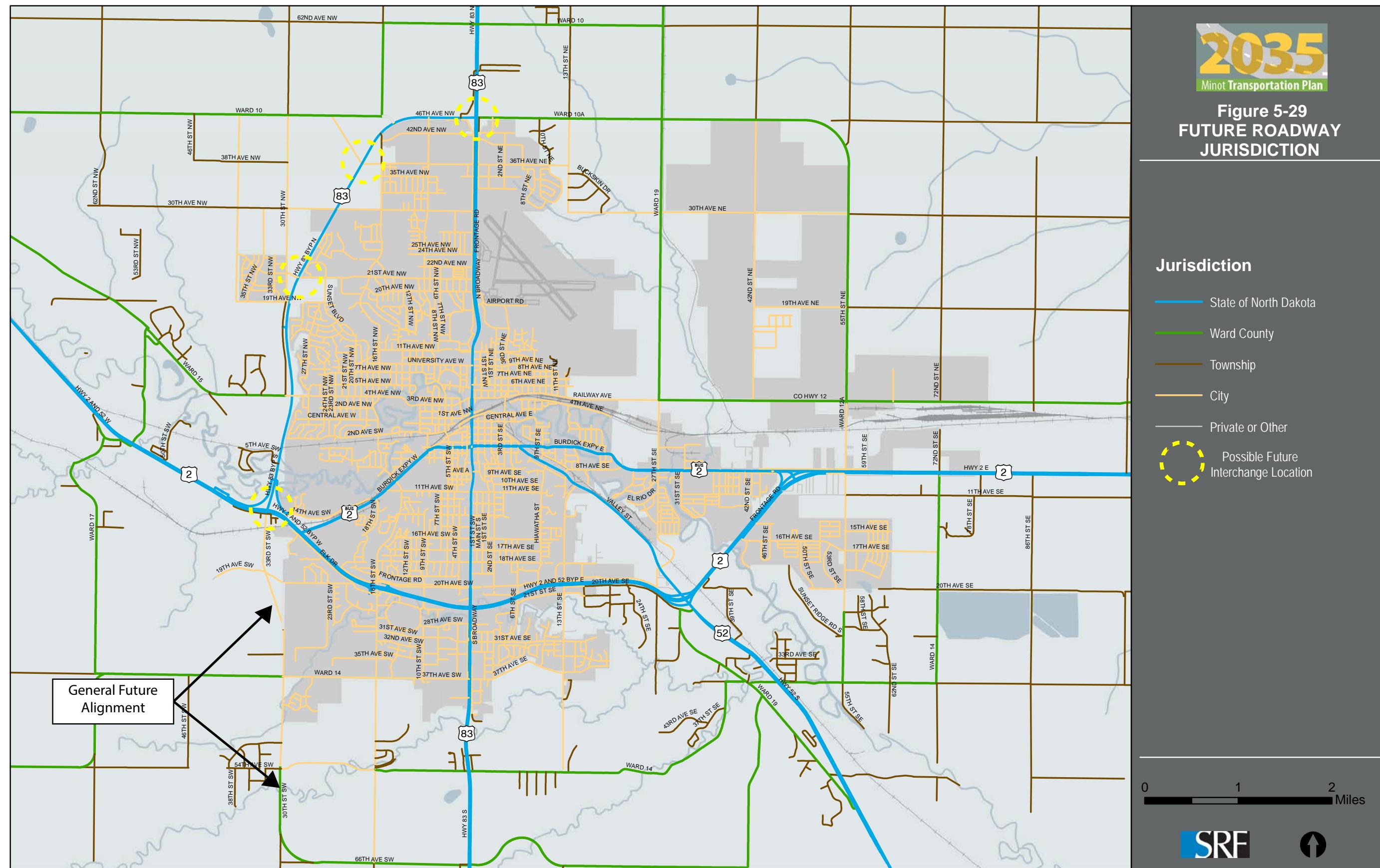


Figure 5-29: Future Roadway Jurisdiction



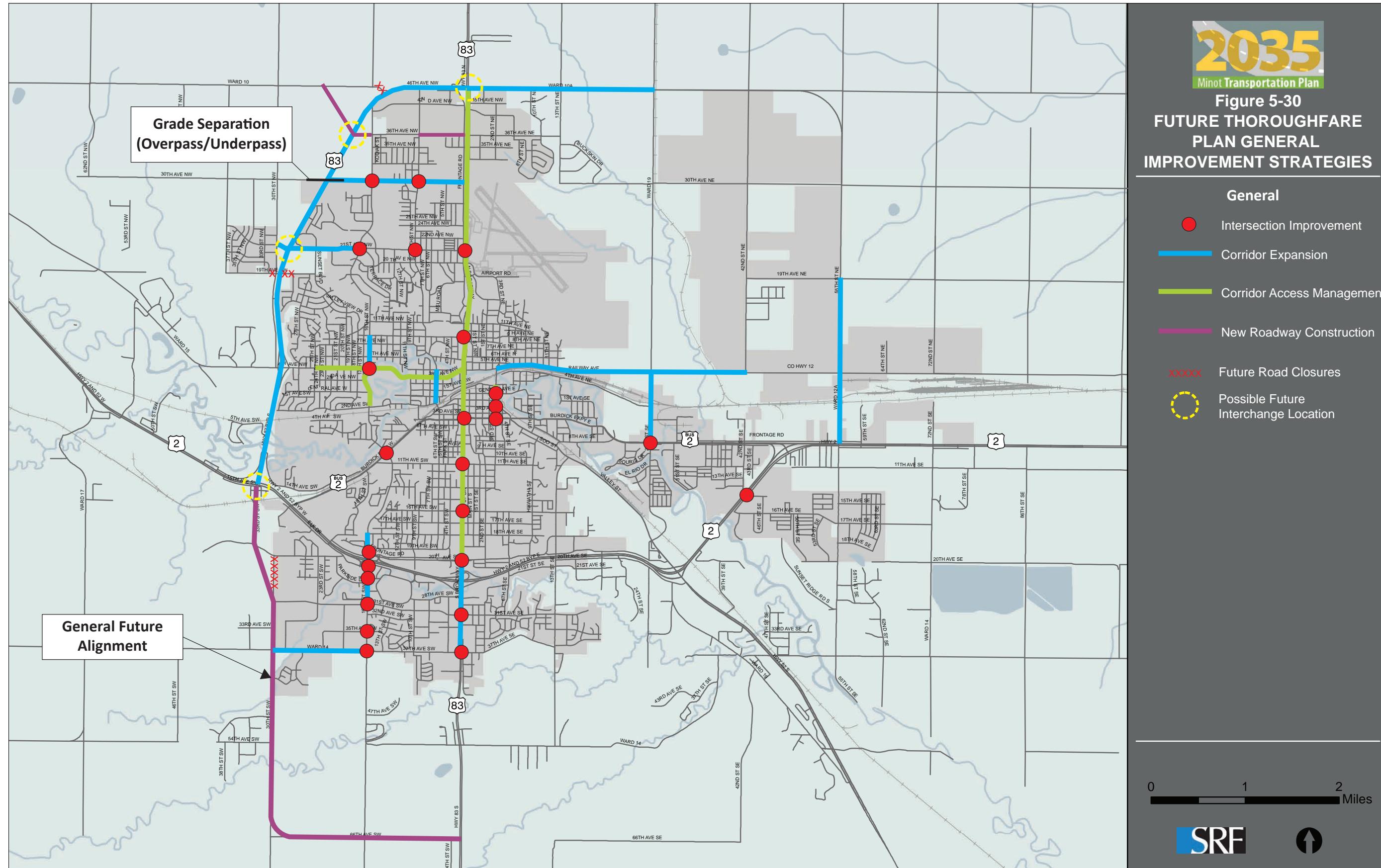
## THOROUGHFARE PLAN

The principle objective of the 2035 Thoroughfare Plan was to identify the desired, long-term form and function of the community's transportation system. This plan was formulated through the coordination of the future functional class and jurisdictional plans, analysis of system deficiencies, and identification of improvement projects and development of access management strategies.

A vital element of the future Thoroughfare Plan was the identification of critical improvements necessary to achieve the long range thoroughfare vision. Each of the future roadway improvements was based upon the technical analysis (e.g., issues identification, safety analysis, traffic forecasts, traffic operations, etc.) and stakeholder outreach. This collaborative approach ensured that transportation needs were supported by technical data and analysis, while also being vetted through the public involvement process. Figure 5-30 displays the general Thoroughfare Plan, highlighting where various types of project improvements and corridor access management strategies are recommended.

Each of the individual corridor and intersection improvements are detailed more thoroughly in the following sections.

Figure 5-30: Future Thoroughfare Plan General Improvement Strategies



## Corridor Improvements

A total of 20 corridor improvements were included in the 2035 Thoroughfare Plan, with recommendations including re-striping, access management, expansion, and new roadway construction (Figure 5-31). Each corridor was evaluated based upon the existing and forecasted traffic volumes, safety, congestion, and operation needs. While corridor and intersection operations were evaluated independently, the comprehensive Thoroughfare Plan was developed by merging the recommendations of the corridor and intersection analyses to develop a vision for the future transportation system.

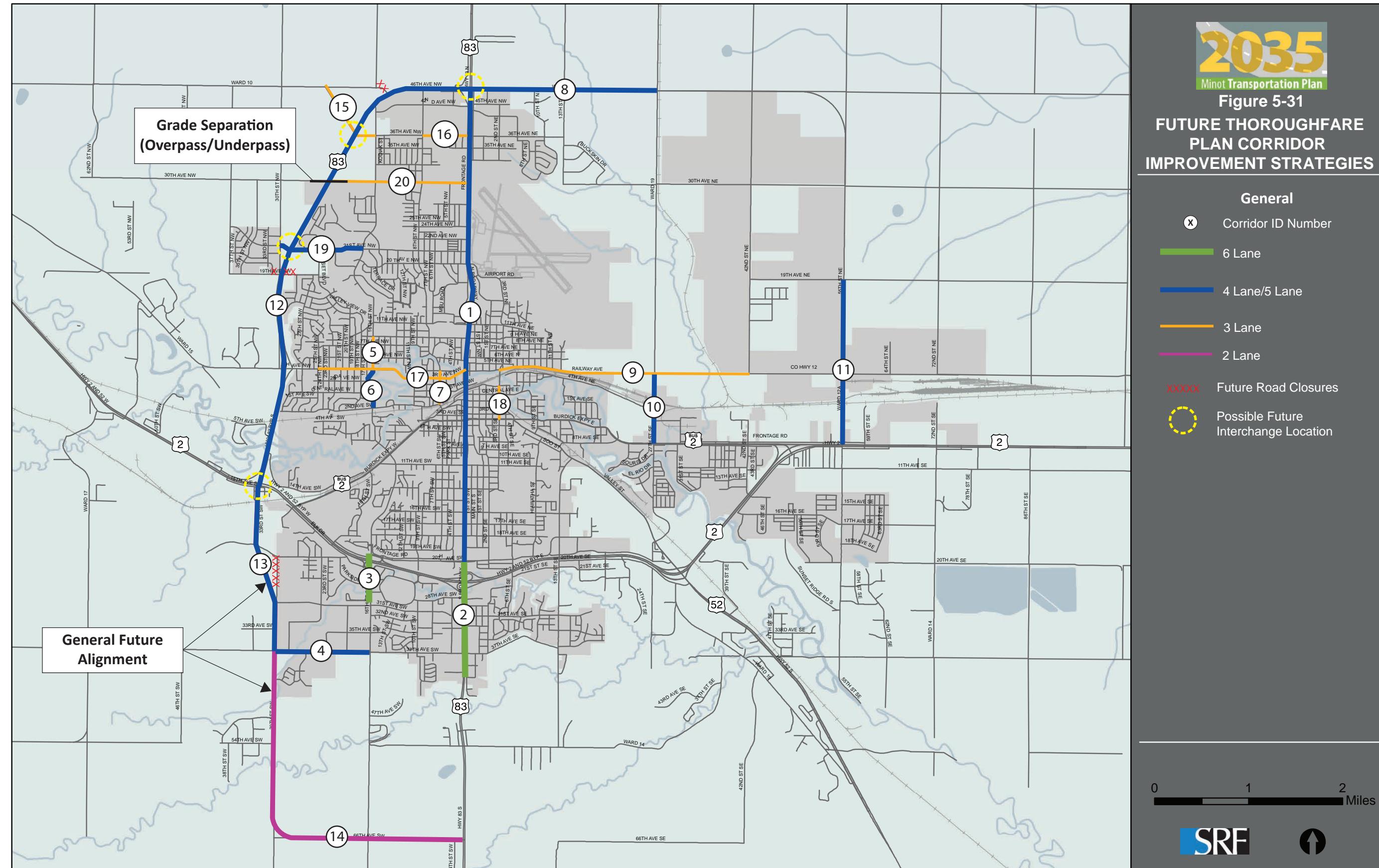
Table 5-5 provides a summary of the corridor improvements illustrated in Figure 5-31, coded with an identification number. Further, a detailed scope for the identified corridor improvements is provided as part of the Implementation Plan (Chapter 7), which includes an evaluation of deficiencies addressed, potential social and environmental impacts, cost, and time frame.

## Intersection Improvements

A total of 23 intersection improvements were included in the 2035 Thoroughfare Plan, with recommendations including new stop controls, adding turn lanes, lengthening approaches, and implementing new signal phasing (Figure 5-32). Each intersection was evaluated based upon the existing and forecasted traffic volumes and safety and operation needs.

Table 5-6 provides a summary of the intersection improvements illustrated in Figure 5-32, coded with an identification number. Again, as with corridor improvements, a detailed scope for the identified intersection improvements is provided as part of the Implementation Plan (Chapter 7), which includes an evaluation of deficiencies addressed, potential social and environmental impacts, cost, and time frame.

## **Figure 5-31: Future Thoroughfare Plan Corridor Improvements Strategies**



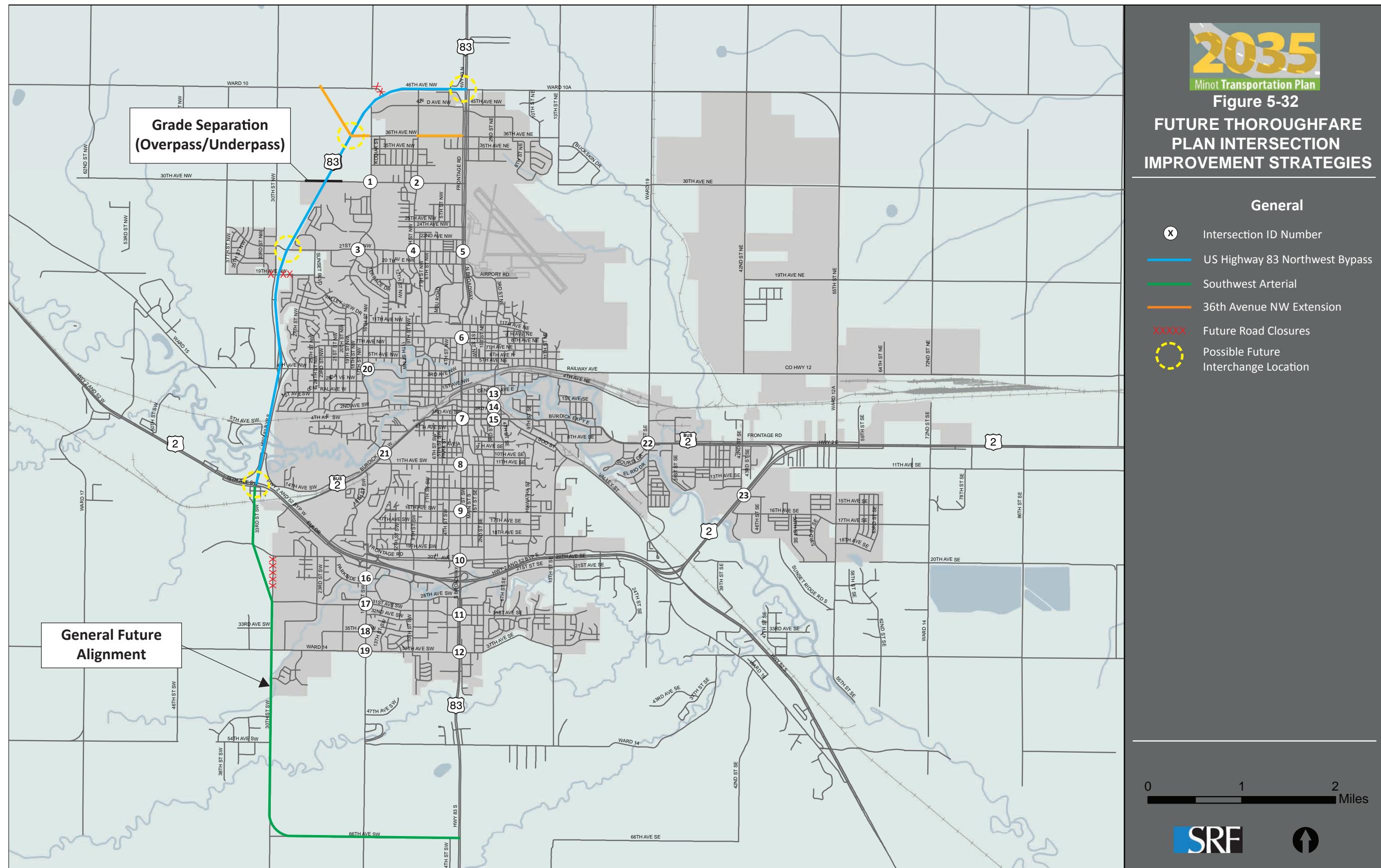
**Table 5-5: Corridor Improvements (1 of 2)**

Corridor ID #	Location	Corridor Improvement(s)
1	Broadway (46th Ave to 20th Ave)	<ul style="list-style-type: none"> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> <li>Note, this assumes a four-lane facility will be maintained (i.e. no expansion to a six-lane facility due to right-of-way constraints), in conjunction with expansion of the US Hwy 83 NW Bypass</li> </ul>
2	Broadway (20th Ave to 37th Ave)	<ul style="list-style-type: none"> <li>Expand to a six-lane facility along Broadway</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
3	16th St SW (20th Ave SW to 31st Ave SW)	<ul style="list-style-type: none"> <li>Revise the interchange configuration (further study necessary)</li> <li>Consider an overpass of US Hwy 2/52 between 16th Street SW and Broadway (near the 10th Street SW alignment)</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> <li>Note, this assumes the construction of the Southwest Arterial</li> </ul>
4	37th Ave SW (Future Southwest Arterial to 16th St SW)	<ul style="list-style-type: none"> <li>Expand to a five-lane facility along 37th Avenue SW</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
5	16th St NW (University Ave to 4th Ave NW)	<ul style="list-style-type: none"> <li>Re-stripe to a three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
6	16th St NW/SW (4th Ave NW to 2nd Ave SW)	<ul style="list-style-type: none"> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
7	6th St NW (2nd Ave SW to 4th Ave NW)	<ul style="list-style-type: none"> <li>Re-stripe to a three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>
8	46th Ave NE (Broadway to 27th St NE)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
9	Railway Ave (3rd St NE to 42nd St NE)	<ul style="list-style-type: none"> <li>Expand to a three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
10	27th St NE (Burdick Expy to Railway Ave NE)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>

**Table 5-5: Corridor Improvements (2 of 2)**

Corridor ID #	Location	Corridor Improvement(s)
11	55th St NE (US 2 to 19th Ave NE)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
12	US 83 NW Bypass (Broadway to US 2)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Restrict access to grade - depending on implementation timeframe</li> <li>Consider at-grade signalized intersections, as appropriate depending on implementation timeframe</li> </ul>
13	Future Southwest Arterial (US 2 to 37th Ave SW)	<ul style="list-style-type: none"> <li>Construct new four-lane urban facility</li> <li>Implement access management strategies, as opportunities arise</li> </ul>
14	Future Southwest Arterial (37th Ave SW to US 83)	<ul style="list-style-type: none"> <li>Construct new two-lane rural facility</li> <li>Implement access management strategies, as opportunities arise</li> </ul>
15	36th Ave NW (County Road 10 to US 83 NW Bypass)	<ul style="list-style-type: none"> <li>Construct new facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>
16	36th Ave NW (8th St NW to Broadway)	<ul style="list-style-type: none"> <li>Construct new facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>
17	4th Ave NW (25th St NW to Broadway)	<ul style="list-style-type: none"> <li>Re-stripe for three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>
18	3rd St SE (E Burdick Expy to 1st Ave NE)	<ul style="list-style-type: none"> <li>Re-stripe for three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>
19	21st Ave NW (30th St NW to 16th St NW)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>
20	30th Ave NW (US 83 NW Bypass to Broadway)	<ul style="list-style-type: none"> <li>Expand to a three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>

Figure 5-32: Future Thoroughfare Plan Intersection Improvements Strategies



**Table 5-6: Intersection Improvements (1 of 2)**

Intersection ID #	Location	Intersection Improvement(s)
1	16th St NW and 30th Ave NW	<ul style="list-style-type: none"> <li>• Add All-Way Stop Control</li> </ul>
2	8th St NW and 30th Ave NW	<ul style="list-style-type: none"> <li>• Add All-Way Stop Control</li> </ul>
3	16th St NW and 21st Ave NW	<ul style="list-style-type: none"> <li>• Install a traffic signal</li> </ul>
4	8th St NW and 21st Ave NW	<ul style="list-style-type: none"> <li>• Install a traffic signal</li> <li>• Install eastbound and westbound left-turn lanes</li> <li>• The eastbound and westbound left-turn signal phasing would operate protected/permissive</li> </ul>
5	Broadway and 21 Ave NW	<ul style="list-style-type: none"> <li>• Install a traffic signal</li> <li>• Lengthen the southbound right-turn lane</li> <li>• Lengthen the northbound left-turn lane (if possible)</li> </ul>
6	Broadway and University Ave E/W	<ul style="list-style-type: none"> <li>• Install eastbound and westbound right-turn lanes</li> <li>• Implement access management, as opportunities arise</li> <li>• Implement protected/permitted left-turn phasing in the eastbound, westbound, and southbound directions</li> </ul>
7	Broadway and Burdick Expy E/W	<ul style="list-style-type: none"> <li>• Implement access management, as opportunities arise</li> </ul>
8	Broadway and 11th Ave SE/SW	<ul style="list-style-type: none"> <li>• Implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> <li>• Implement access management, as opportunities arise</li> </ul>
9	Broadway and 16th Ave SE/SW	<ul style="list-style-type: none"> <li>• Implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> <li>• Implement access management, as opportunities arise</li> </ul>
10	Broadway and 20th Ave SE/SW	<ul style="list-style-type: none"> <li>• Install eastbound and westbound right-turn lanes</li> <li>• Implement access management, as opportunities arise</li> </ul>
11	Broadway and 31th Ave SE/SW	<ul style="list-style-type: none"> <li>• Convert Broadway to a 6-lane facility in the northbound and southbound direction           <ul style="list-style-type: none"> <li>◦ Northbound and southbound left-turns would be restricted to protected-only phasing</li> </ul> </li> <li>• Install eastbound and westbound right-turn lanes</li> <li>• Implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> <li>• Implement access management, as opportunities arise</li> </ul>
12	Broadway and 37th Ave SE/SW	<ul style="list-style-type: none"> <li>• End 6-lane facility into a trap, free southbound right-turn</li> <li>• Install eastbound right-turn lane</li> <li>• Allow only one westbound through lane</li> </ul>
13	3rd St NE and Central Ave E	<ul style="list-style-type: none"> <li>• Convert 3rd Street from a 4-lane undivided section to a 3-lane section</li> <li>• Install eastbound and westbound left-turn lanes</li> <li>• Implement protected/permitted left-turn phasing in all directions</li> </ul>
14	3rd St SE and 2nd Ave SE	<ul style="list-style-type: none"> <li>• Install eastbound and westbound right-turn lanes</li> <li>• Convert 3rd Street from a 4-lane undivided section to a 3-lane section</li> <li>• Close Front Street</li> </ul>

**Table 5-6: Intersection Improvements (2 of 2)**

Intersection ID #	Location	Intersection Improvement(s)
15	3rd St SE and Burdick Expy E	<ul style="list-style-type: none"> <li>Install northbound and southbound right-turn lanes</li> <li>Convert 3rd Street from a 4-lane undivided section to a 3-lane section</li> <li>Implement protected/permitted left-turn phasing in the northbound and southbound directions</li> </ul>
16	16th St SW and 24th Ave SW	<ul style="list-style-type: none"> <li>Install a traffic signal</li> <li>Install dual southbound left-turn lanes</li> <li>Improvements contingent upon 10th Street overpass of US Highway 2/52</li> </ul>
17	16th St SW and 31st Ave	<ul style="list-style-type: none"> <li>Install northbound and southbound right-turn lanes</li> <li>Implement protected/permitted left -turn phasing in the eastbound and westbound directions</li> </ul>
18	16th St SW and 35th Ave SW	<ul style="list-style-type: none"> <li>Install a traffic signal</li> <li>Install an eastbound right-turn lane</li> </ul>
19	16th St SW and 37th Ave SW	<ul style="list-style-type: none"> <li>Convert 37th Avenue (west of the intersection) to a 5-lane section</li> <li>Install a westbound right-turn lane</li> <li>Implement protected/permitted left-turn phasing in all directions</li> </ul>
20	16th St NW and 4th Ave NW	<ul style="list-style-type: none"> <li>Install eastbound and westbound right-turn lanes</li> <li>Convert 4th Avenue NW from a 4-lane undivided section to a 3-lane section</li> <li>Implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> </ul>
21	16th St SW and Burdick Expy W	<ul style="list-style-type: none"> <li>Install a northbound right-turn lane</li> <li>Implement protected/permitted left-turn phasing in all directions</li> </ul>
22	27th St SE and Burdick Expy E	<ul style="list-style-type: none"> <li>Lengthen the northbound and southbound turn lanes</li> <li>Install eastbound and westbound right-turn lanes</li> <li>Implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> <li>Implement access management, as opportunities arise</li> </ul>
23	US Hwy 2 and 42nd St SE	<ul style="list-style-type: none"> <li>Install a traffic signal</li> <li>Lengthen the turn lanes along US Highway 2</li> <li>Install a dual left-turn lane and right-turn lane along the southeast 42nd Street SE approach</li> <li>Install a left- and right-turn lane along the northwest 42nd Street SE</li> <li>Implement protected left-turn phasing from 42nd Street SE</li> <li>Implement protected/permitted left-turn phasing along US Highway 2.</li> </ul>

## 6. SYSTEM MANAGEMENT



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# 6. SYSTEM MANAGEMENT



## OVERVIEW

This chapter summarizes system management tools that can assist the City with achieving the goals, objectives, performance standards, and vision of the future transportation system. These tools include guidelines for access management and spacing, ROW preservation, setback policies, complete streets policies, and transit system enhancements that policymakers and decision-makers can use to accomplish the vision set forth in the Plan – to preserve and manage roadway corridors in a manner that is in-line with their intended function, while serving the greatest public good.

## ACCESS MANAGEMENT/SPACING GUIDELINES

### ACCESS MANAGEMENT PURPOSE AND GOALS

Access management is a strategic, multidimensional set of policies, methods, and tools to manage connectivity to public roadways from various types of land uses. Access management seeks to provide an appropriate balance between mobility needs and connections to property. Good access management supports a wide array of transportation system goals. These goals include creating a safe travel environment for all modes and users of transportation systems, encouraging a balance of roadway capacity and accessibility, and promoting an active transportation system (i.e., integration of multimodal facilities, context sensitive design principles, etc.).

### BENEFITS OF ACCESS MANAGEMENT

Access spacing guidelines are important because they define a starting point for balancing property access, safety, and mobility concerns. Transportation staff regularly receive requests for additional access (e.g., new public streets, commercial driveways, residential, and field accesses), which are evaluated by numerous agencies including city and NDDOT staff, developers, and property owners. This can result in confusion between agencies, as well as long-term safety and mobility problems. Standard access guidelines can be used to improve communication, enhance safety, and maintain the capacity and mobility of important transportation corridors.

Providing access management in some form (whether it is through grade-separated crossings, frontage roads, or right-in/right-out access) reduces the number of conflict points, which results in improved safety. Many studies have demonstrated a direct relationship between the number of full access points and the rate of crashes. Access management also plays an important role in maintaining roadway capacity and maximizing mobility, while supporting the jurisdiction's functional classification system.

### PRACTICES TO MANAGE EXISTING ACCESS

Practices and strategies when managing existing access to already present development differs from those used for new corridors. As the City has developed, current access may no longer reflect best practices and in some cases may cause unsafe conditions or reductions in roadway capacity. Tools that can be used by the City and its partners to improve existing access conditions include:

- Aligning access with other existing access points, when possible
- Providing adequate spacing to separate and reduce conflicts
- Encouraging indirect access on high-speed, high-volume arterial routes

- Restricting access to right-in/right-out, or right-in/right-out/left-in
- Redirecting access to another public roadway, if the roadway is reasonable, convenient and suitable

As with any guideline, there are exceptions and deviations that will occur. Along existing corridors with significant development, such as Broadway, the number of existing access points exceeds access guidelines. The access management strategy for such areas should entail aggressively minimizing new accesses, while consolidating/reducing existing access points as redevelopment occurs.

## PRACTICES TO MANAGE FUTURE NEW ACCESS

Putting access policies into practice as land develops requires close coordination between the State, County, and City, including engineering and land use staff at the local level. Strategies to employ when working with new development proposals include:

- *Encouraging shared driveways and internal circulation plans:* If indirect access cannot be achieved during plat reviews, internal site circulation should be promoted using shared access points.
- *Restrict turning movements to reduce conflicts:* If access points cannot be eliminated, consider turning movement restrictions (e.g., left-in or right-in/right-out only) through installation of raised medians or other channelization or signing. Eliminating a single turning movement can significantly reduce vehicle conflicts and crashes.
- *Develop good parallel street systems for carrying local traffic:* Make sure that important arterial routes have parallel roads that provide local access and carry shorter local trips.
- *Develop proper setbacks for future frontage roads:* If frontage roads cannot be immediately justified (benefits do not outweigh costs), make sure that proper building and parking lot setbacks are established to minimize the impacts of future frontage roads.
- *Develop proper signalized intersection spacing:* Ensure that plats and new development proposals provide proper intersection spacing for future signals. Signalized intersections should be limited depending upon the type of street. Collector streets should provide continuity with other street systems.
- *Encourage proper lot layout to minimize access points:* Promote direct residential access points onto local roads instead of onto arterials or major and minor collectors. Direct residential access onto arterial or collector routes slows traffic flow and can result in complaints when traffic levels increase.
- *Encourage connectivity between developments:* Streets in individual developments should be aligned to provide access to other developments and ROW should be provided for future connections to adjacent developments. This promotes neighborhood connectivity, good emergency services, and more efficient travel for mail, garbage, and bus services as well as street maintenance activities.
- *Consider official mapping for important corridors:* Important arterial corridors, or future interchange areas that are located in development-prone areas, can be protected through the official mapping process. City and County staff should work together to preserve key corridors at the time of platting or later by official mapping.

## ACCESS MANAGEMENT GUIDANCE

Working with the PMT, the following access and signal spacing guidelines have been prepared using known best practices, local policies, and NDDOT information (Table 6-1).

The City of Minot should formally adjust their access management guidance. This guidance is presented in a tabular format for quick access/reference by staff, the public, and interested parties. However, in order to fully understand the Access/Signal Spacing Guidelines table, each of the table's major components and their relevance to access management must be understood by staff and policymakers. Provided on the following pages is a description of key elements of the access/signal spacing guidelines. However, the connection between functional classification and mobility was previously discussed in the Existing Conditions chapter.

The intent is for these guidelines to be used as a reference for City and County officials as they seek to incorporate the access management policies into their respective transportation planning processes and regulatory frameworks.

### Access Management Guideline Components

Some of the most significant roadway characteristics to be addressed by Minot's comprehensive set of access spacing guidelines are related to functional classification, intersection characteristics, (i.e., the number of driveway conflict points) and traffic signal spacing. Noted below is a description of each and its importance to the City's new overall access policy.

**Table 6-1: Access Management Guidelines**

Functional Classification	Urban Core				Urban Area				Rural Area				
	Principal Arterials	Minor Arterials	Collectors	Local	Principal Arterials	Minor Arterials	Collectors	Local	Principal Arterial	Minor Arterials	Major Collectors	Minor Collectors	Local
Typical Facility Characteristics/ Configuration	Urban Arterial	4-Lane Divided to 2-Lane	3-Lane to 2-Lane	2-Lane	Bypass/Urban Arterial	4-Lane Divided to 2-Lane	3-Lane to 2-Lane	2-Lane	Expressway	Bypass <sup>(4)</sup>	4-Lane Divided to 2-Lane	4-Lane to 2-Lane	2-Lane
Intersection Design/Control	Traffic Signals/ Stop Sign Control	Traffic Signals/ Stop Sign Control	Traffic Signals/ Stop Sign Control	Stop Sign Control	Traffic Signals/ Stop Sign Control	Traffic Signals/ Stop Sign Control	Traffic Signals/ Stop Sign Control	Stop Sign Control	Strongly Discouraged	Strongly Discouraged	Stop Sign Control	Stop Sign Control	Stop Sign Control
Intersection Spacing <sup>(1)</sup>	330' – 660'	330' – 660'	330' – 660'	330' – 660'	1/2 Mile	1/4 Mile	1/8 Mile	330' – 660'	1 Mile	1 Mile	1/2 Mile	1/2 Mile	1/4 Mile
					1/4 mile	1/8 Mile	330' – 660'		1/2 Mile	1/2 Mile	1/4 Mile	1/4 Mile	1/8 Mile
Private Access <sup>(2)</sup>	330'	330'	150'	50' <sup>(5)</sup>	1/4 mile	660'	330'	50' <sup>(5)</sup>	N/A <sup>(3)</sup>	N/A <sup>(3)</sup>	1/4 Mile	1/8 Mile	330'
Signal Spacing	1/4 Mile	1/4 Mile	1/8 Mile	As warranted	1/2 Mile	1/4 Mile	1/4 Mile	As warranted	Strongly Discouraged	Strongly Discouraged	1 Mile	N/A	N/A

## Notes:

- All distances are potential minimums, individual corridors will be handled on a case by case basis.
- When addressing state-owned facilities, refer to FHWA Access Management Manual and guidance from NDDOT's Rural and Urban Design Manual.
- NDDOT's access management policy allows 5 accesses per mile per side, regardless of functional classification category.

(1) Dependent upon block length in urban core and urban area.

(2) Consider consolidation of driveways whenever possible.

(3) Discourage future driveway access directly to main roadway facility.

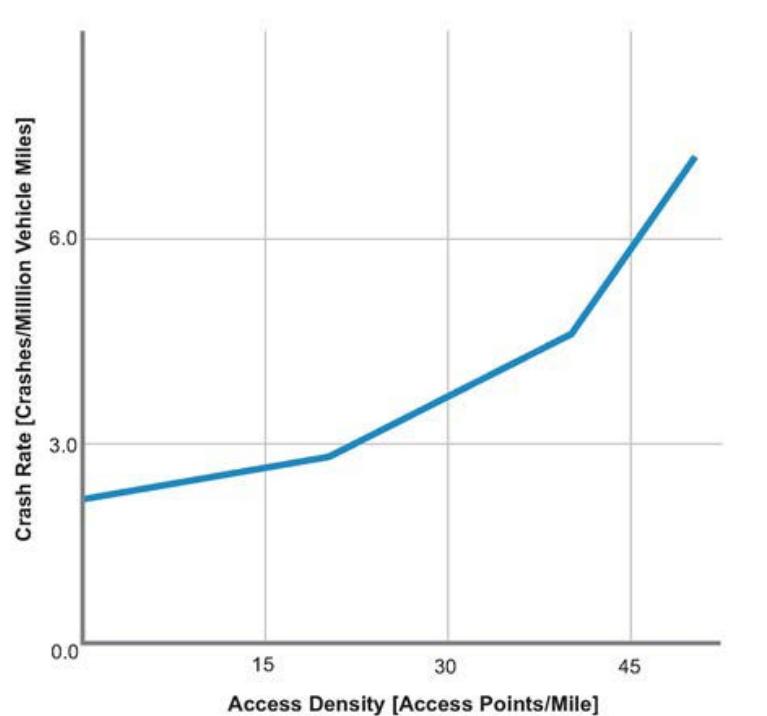
(4) Applicable for any functional classification category.

(5) Represents minimum distance from driveway to intersection, no minimum between driveways.

### *Intersection/Driveway Spacing/Conflict Points*

As the number of roadway intersections per mile increases, the opportunity for crashes increases. The existence of too many intersections per mile also increases delay and congestion for automobiles, transit, and freight. Figure 6-1 describes the positive relationship between lower access density and reduced crash rates.

*Figure 6-1: Access Density and Crash Rate Relationship*



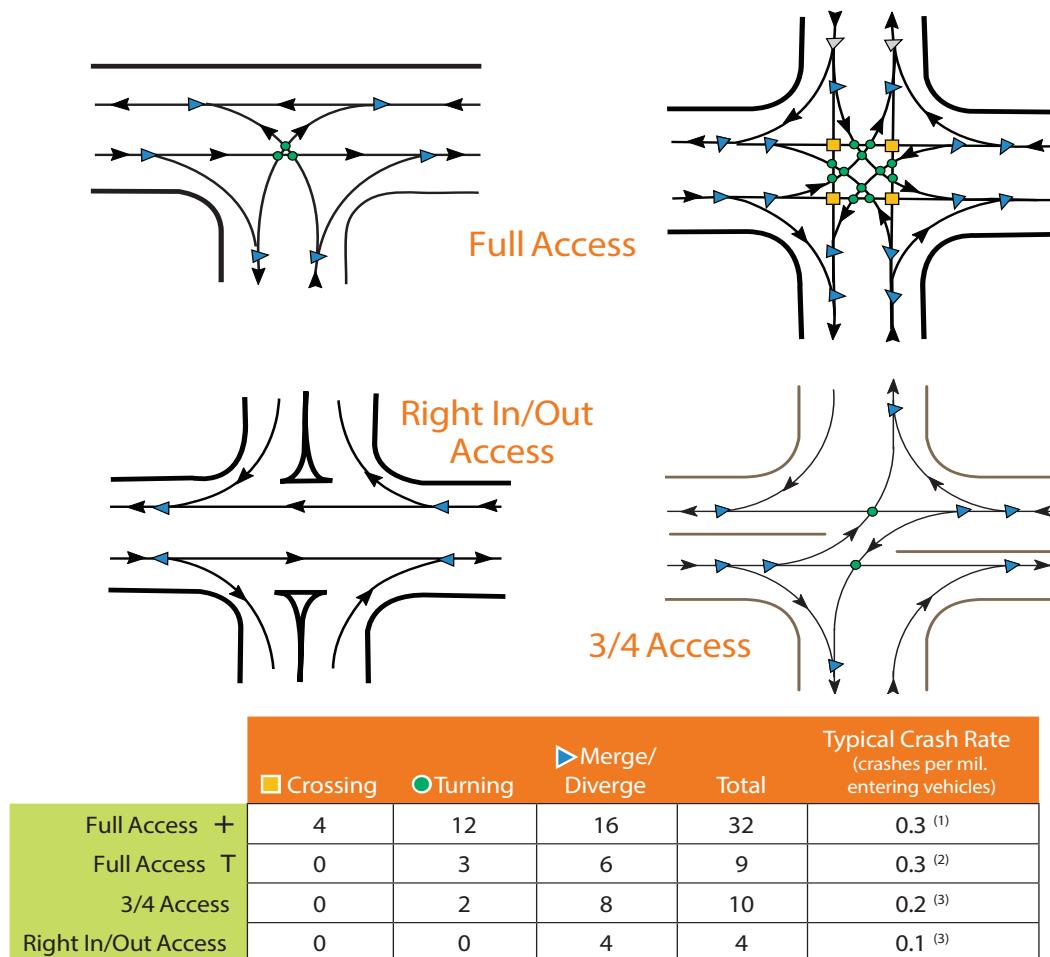
Source: MnDOT Traffic Safety Fundamental Handbook, 2008

Driveways for residential or commercial properties can also be considered a special type of intersection. Driveways should not be located within the functional area of an intersection. The functional area of an intersection is the area beyond the physical intersection of two roadways that comprises decision and maneuvering distance. Driveways located within the functional area may create too many conflict points within too small an area for motorists to safely negotiate. Driveway access should be limited in general.

Safety is also related to the number of conflict points at an intersection. Conflict points occur at access approaches where the intersecting paths of two through or turning vehicles merge, diverge, or cross. Each of these conflict points is a potential location for a crash.

The total conflict points at an intersection depend on the number of approach legs at the intersection and allowable turning movements (i.e., full or partial access), as illustrated in Figure 6-2. For example, a four-legged intersection (two-way intersecting roadways with full access) has a total of 32 conflict points as compared to four conflict points for a similar intersection with right in/right out (RIRO) access.

Figure 6-2: Conflict Point Diagram

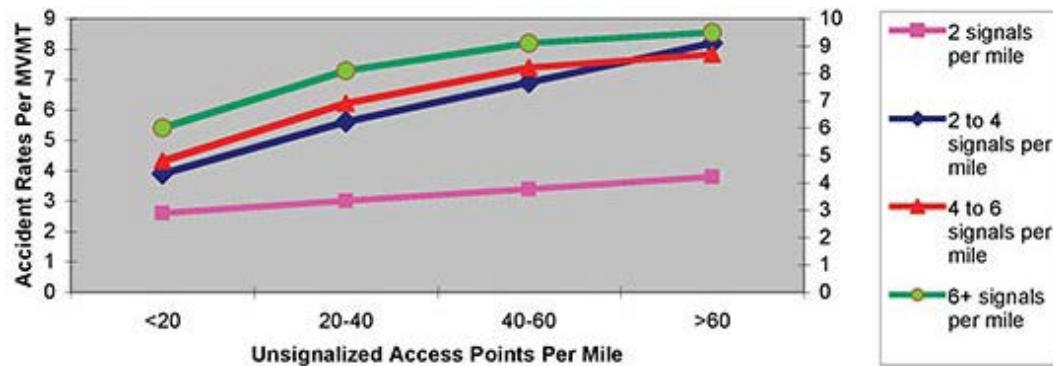


Source: MnDOT Traffic Safety Fundamental Handbook, 2008

### Signal Spacing

Research clearly indicates that access and safety are closely linked. Furthermore, comparative accident rates document that a greater number of access points and signals per mile translate into increases in crash rates. For example, if the number of access points are held constant at less than 20 unsignalized access points per mile, and the number of signals per mile is less than two, as compared to two to four signals per mile, there is a 50 percent increase in the crash rate (see Figure 6-3). A proliferation of traffic signals or improved signal spacing along a corridor can impact crash rates.

*Figure 6-3: Representative Crash Rates (Unsignalized Access vs. Signalized Access)*



Source: Tech Transfer Newsletter, UC-Berkeley (Spring, 2009).

### Access Management Guidelines Summary

Access management is the ultimate balance between connectivity, mobility, safety, intersection spacing, driveway allowance, and signal spacing. Limiting access to the transportation network too severely can result in longer trip lengths (increased VMT) causing more congestion on busy arterials, longer delays at arterial intersections, and degradation of emergency vehicle response times. However, too many access points increases the potential for crashes, and reduces mobility and the capacity of a corridor. The City's proposed Access Management Guidelines (Table 6-1) balance access and mobility.

## RIGHT-OF-WAY GUIDANCE

ROW is a valuable public asset. Therefore, it needs to be preserved and managed in a way that respects its intended function, while serving the greatest public good. A number of corridors have been identified in the Plan as needing future reconstruction or additional traffic lanes or new alignments in the future.

Many of these future improvements will require that adequate ROW be maintained or secured. To ensure consistency and wise use of taxpayer dollars, a set of ROW guidelines is provided below. Table 6-2 presents these ROW guidelines by functional classification and facility type for future roadways, roadway expansion, or reconstruction. Upon adoption of the Plan, and by referencing these guidelines, it is recommended that both City public works and planning and zoning staff, and Ward County staff, familiarize themselves with these guidelines so that they can be administered in a uniform manner. Use of these guidelines during the ROW acquisition or preservation process will, over time, reduce cost and streamline project development.

*Table 6-2: Right-of-Way Guidelines*

FUNCTIONAL CLASS	ROW WIDTH	FACILITY TYPE
Principal Arterial	120 ft.	2-lane Rural
	150 ft.	4-lane Urban
	300 ft.	4-lane Rural
Minor Arterial	80 ft.	2-lane Urban
	120 ft.	2-lane Rural
	100 ft.	3-lane Urban
	150 ft.	4-lane Urban
	220 ft.	4-lane Rural
Collector	80 ft.	2-lane Urban
	80 ft.	2-lane Rural
	80 ft.	3-lane Urban

- ROW width can typically accommodate potential parking on roadway and adjacent sidewalk/trail facilities
- Due to certain development conditions or physical features of a site, ROW greater than shown may be requested
- Reduced ROW widths may be considered as need warrants

## RIGHT-OF-WAY PRESERVATION

ROW is a valuable public asset. Therefore, it needs to be protected and managed in a way that respects its intended function, while serving the greatest public good. When future expansion or realignment of a roadway is proposed, but not immediately programmed, agencies should consider ROW preservation strategies to reduce costs and maintain the feasibility of the proposed improvement. Several different strategies can be used to preserve ROW for future construction, including advance purchase, zoning and subdivision techniques, and official mapping. Before implementing ROW preservation strategies, local agencies should weigh the risks of proceeding with ROW preservation without environmental clearance.

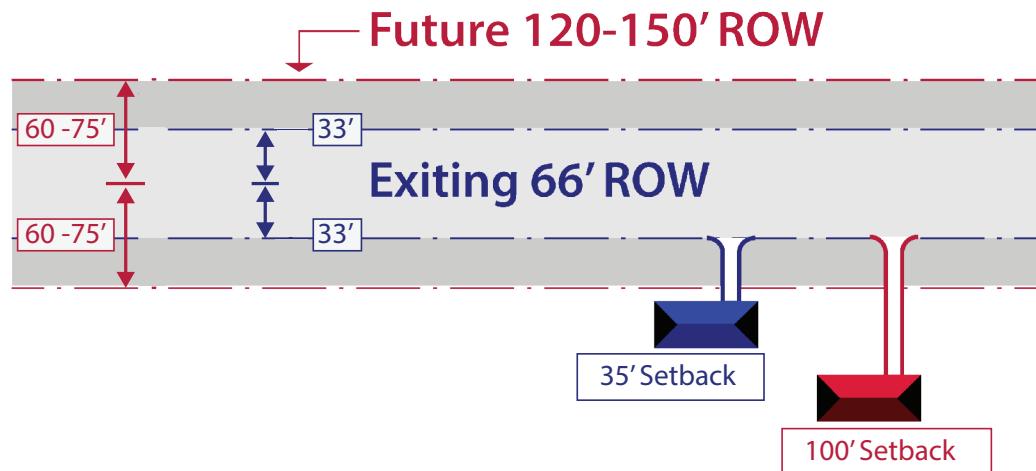
### OFFICIAL MAPPING

The North Dakota Century Code (NDCC) provides a method for cities to preserve corridors for future transportation. This provision is contained in the portion of the NDCC that allows for the establishment of Municipal Master Plans (Chapter 40-48). This section of the NDCC describes a master plan (e.g., Minot Comprehensive Plan) as a plan with accompanying maps, plats, charts, and descriptive matter that shows the commission's recommendations for the development of land in its jurisdiction, including: "the general locations, character, and extent of streets, waterways, waterfronts, playgrounds, plazas, squares, and open spaces, parks aviation fields, and other public ways and grounds". The area that can be included in the plan is described as the municipality and any land outside its boundaries which, in the commission's judgment, bears a relation to the planning of the municipality. Typically, cities have interpreted this to include the land inside city limits, as well as its extraterritorial area (ETA), which is defined in NDCC Chapter 40-47. Minot's ETA is two miles around the current city limits.

The NDCC also recognizes that the city will, at times, adopt and publish a plan that only covers one or more major sections or divisions of the land under its jurisdiction, or one or more of the subjects set out in NDCC Chapter 40-48. This is applicable to the city's Transportation Plan, which addresses the transportation network, and is adopted separately from the city's Comprehensive Plan, and serves as a much more detailed plan that addresses the city's transportation system.

The NDCC recognizes that a city may wish to protect the future ROW of an important transportation corridor within its jurisdiction in advance of being prepared to purchase the ROW for that corridor. This could apply to an existing corridor that requires future ROW, as illustrated below in Figure 6-4, or a new corridor on new ROW.

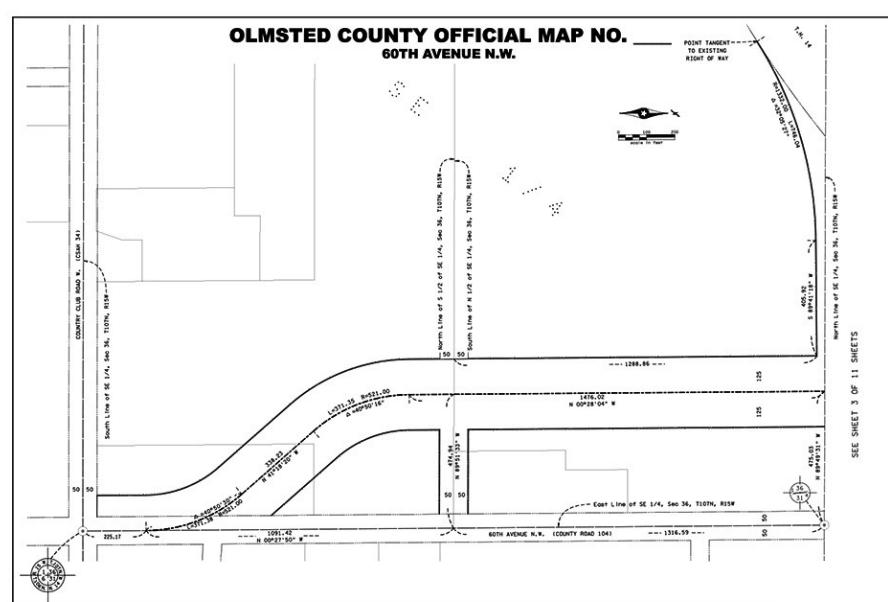
Figure 6-4: Typical Right-of-Way (ROW) Expansion to Section Line Roadway, When Transitioning From a Rural Facility to an Urban Arterial.



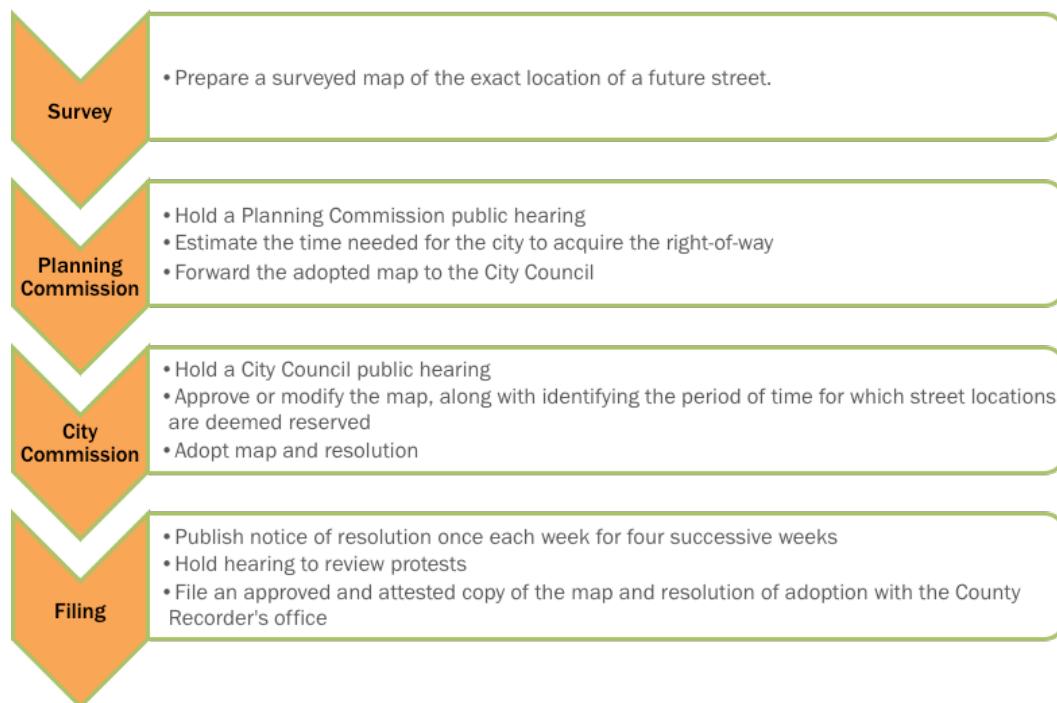
In Section 40-48-18 of the NDCC, cities are given the authority to extend their regulation of subdivisions beyond their corporate limits to the same extent as the extraterritorial zoning authority allowed under Chapter 40-47. This is important and applicable to ROW preservation in Minot, in that the Century Code allows cities to record, with the county auditor's office, a surveyed map showing the future alignment and ROW of any street identified in its master plan. Figure 6-5 provides an example of an official map for a new future roadway. This provision is particularly beneficial for future arterial roadways that are critical to the future of the transportation system, such as the Southwest Arterial/Bypass.

The NDCC makes provisions for addressing protests to the proposed street reservation. At any time after the filing of the map, the city and affected property owner(s) may come to agreement to modify the reserved street location.

Figure 6-5: Example Surveyed Street Alignment and Reservation Map



The process is described in great detail within NDCC Chapter 40-48, Sections 40-48-28 through 40-48-37. A brief summary of the process is described below:



This NDCC provision has been challenging for cities to put into practice. NDCC Section 40-48-36 states that within the first three months after filing of the resolution and map with the county recorder's office, owners of property lying within any proposed street or roadway widening may claim that adoption of the resolution to reserve the street corridor, or the refusal of the city to issue a building permit, constitutes a taking. Within that time, an owner may file a protest against the alleged taking of his or her property and make a demand that the municipality either vacate the map, or initiate condemnation of the property within three months after the filing of the owner's written protest and claim. If the municipality does not compensate the owner for the right to construct the desired structure or initiate condemnation proceedings for the ROW within this three-month period after the filing of the protest, the resolution and map becomes automatically vacated and annulled as it pertains to the property of the protesting owner.

## SETBACK POLICY

The purpose of setback policies is to preserve roadway corridors and prevent new building construction from encroaching into areas that may be needed for future roadway widening and improvements. This can be accomplished by: 1) preventing costly ROW acquisition and relocation costs, 2) preventing economic hardship and inconveniences to property owners, and 3) preserving roadway corridors.

The following section will address the area outside of Minot's urban boundary, in the City's fringe growth area. As noted earlier, Minot has an extraterritorial area (ETA) which extends two miles beyond the urban boundary. The City of Minot has sole jurisdiction over land use in that two-mile ETA. Because the future roadway network extends beyond the ETA, three additional jurisdictions need to be considered: Eureka Township, Afton Township, and Ward County, which exercises land use authority outside the Minot's ETA.

Regarding the locations of new buildings proposed for construction and whether they would encroach into future roadway corridor areas, a review of each jurisdiction's current zoning ordinance and subdivision regulations provides a picture of the available tools used.

## JURISDICTIONAL AUTHORITY

Ward County Zoning Resolution #6 lists Afton and Eureka Townships as "included" in the areas subject to Ward County's zoning. Afton and Eureka Townships may impose zoning standards that are more restrictive than Ward County, but not less restrictive.

Eureka and Afton Townships exercise zoning authority, but they do not have the authority to approve subdivision plats. Ward County approves or denies subdivision plats located in townships. When a proposed subdivision plat is located in one of the townships, the County will obtain input from the township and then decide on the plat. The City of Minot has platting authority within the city and within the two-mile ETA.

Building permits are issued by all four jurisdictions, the two townships, the County and the City. A blanket farming exemption, as cited in the North Dakota Century Code (NDCC), makes non-residential agricultural buildings exempt from building permit requirements.

## BUILDING SETBACKS

One way to regulate the placement of a building relative to an adjacent street, roadway, or highway, is through the application of front yard setbacks. Front yard setbacks are applied to platted subdivision lots which have been zoned. Each zoning district establishes a front yard building setback distance for that district measured from the front property line/ROW line. The City of Minot dictates the minimum setback distances within the city limits and the two-mile extraterritorial area around the city. Further, county roadways approaching the city limits, with potential of falling within the City's jurisdiction at a future time should consider meeting the City's setback regulations. In Table 6-3, minimum front yard setback distances are shown for the City of Minot and Ward County.

Table 6-3: Minimum Front Yard Setbacks

CITY OF MINOT			WARD COUNTY/AFTON TWP./EUREKA TWP.	
ZONING DISTRICT	SETBACK	ALONG COLLECTOR/ARTERIAL	ZONING DISTRICT	SETBACK
R1	25'	40'/20'*	R1	30'
R1S (house)	25'	40'		
R1S (garage)	25'/20'*	40'		
RA	35'	40'		
R2	25'	40'/20'*	R2	25'
RM	25'	40'	R3	25'
R3C	25'	40'/20'*		
RH	30'	40'		
C1	25'	50'	C1	25'
C2	25'	50'	C2	25'
C3	0'	0'	C3	0
PUD: To facilitate the economical provision of streets and public utilities (consideration may be made for reduced ROW or setbacks)				
M1	25'	50'	M1	25'
M2	25'	50'	M2	25'
M3	30'	50'		
Public: The Planning Commission review shall concern itself with the proposed uses relative to the comprehensive plan, lot area, lot dimensions, lot coverage, floor area ratio, building height, building setbacks, parking and loading spaces, traffic flow, and other similar requirements governing the use of private property.				
MH	25'	25'		
GMU	20'	40'		
AG	35'	35'	A1	50'
Signs	10'	10'		

\*Front yards facing a platted or proposed collector or arterial street – forty (40) feet. An exception will be made for a side-loaded garage to be twenty (20) feet provided the lot is an interior lot and a window is included on the street facing garage elevation.

## ADDITIONAL SETBACK REQUIREMENTS

Ward County provides additional setbacks to supplement the front yard setback distances shown earlier. In the Table 6-4, the setback distances for buildings is based on the type of roadway adjoining the property where the building will be constructed. Most of the distances shown here are measured from the centerline of the road, rather than from the ROW line.

*Table 6-4: Ward County - Minimum Setbacks from Roadways*

RESIDENTIAL BUILDINGS		COMMERCIAL OR INDUSTRIAL BUILDINGS	
TYPE OF ROAD	SETBACK	TYPE OF ROAD	SETBACK
All Roads	50' from ROW line	All Roads	50' from ROW line
Twp. Rds. & Sec. Lines	90' from centerline	Twp. Rds. & Sec. Lines	110' from centerline
County Roads	125' from centerline	County Roads	145' from centerline
Secondary Roads	150' from centerline	Secondary Roads	170' from centerline
Major Highways	200' from centerline	Major Highways	220' from centerline

This provision is especially useful for un-platted parcels. Ward County does not require subdivision plats for agriculturally-zoned parcels that are 40 acres or larger. The City of Minot does not require subdivision plats for agriculturally-zoned parcels of 20 acres or larger.

## BUILDING PERMITS

A building permit is an additional tool useful for regulating building placement along roadways. When someone applies for a building permit it allows an opportunity for exchanging information. Local government staff can review the proposed building location and check it for compliance with regulations such as setbacks. As mentioned earlier, the City of Minot, Ward County, and the state do not require building permits for agricultural buildings.

## COMPLETE STREETS POLICY

A Complete Streets policy seeks to create an integrated and connected transportation network that serves all categories of street users (i.e., transit, automobiles, freight, emergency services, bicyclist, and pedestrians of all ages and abilities). This policy ensures that the entire ROW is planned, designed, constructed, operated, and maintained to provide safe access for all users. While Complete Streets policies can vary widely, the material presented here provides a starting point from which the City of Minot can tailor a policy that is appropriate to the City's needs and desires.

The National Complete Streets Coalition promotes a comprehensive policy model that includes ten ideal elements, as noted below:

1. Vision: The policy establishes a motivating vision for why the community wants Complete Streets: for improved safety, better health, increased efficiency, convenience of choices, or other reasons.
2. All users and modes: The policy specifies that "all modes" includes walking, bicycling, riding public transportation, driving trucks, buses and automobiles, and "all users" includes people of all ages and abilities.
3. All projects and phases: All types of transportation projects are subject to the policy, including design, planning, construction, maintenance, and operations of new and existing streets and facilities.
4. Clear, accountable exceptions: Any exceptions to the policy are specified and approved by a high-level official.
5. Network: The policy recognizes the need to create a comprehensive, integrated, and connected network for all modes and encourages street connectivity.

6. Jurisdiction: All other agencies that govern transportation activities can clearly understand the policy's application and may be involved in the process, as appropriate.
7. Design: The policy recommends use of the latest and best design criteria and guidelines, while recognizing the need for flexibility to balance user needs.
8. Context sensitivity: The current and planned context—buildings, land use, and transportation needs—is considered in planning and design solutions for transportation projects.
9. Performance measures: The policy includes performance standards with measurable outcomes.
10. Implementation steps: Specific next steps for implementing the policy are described.

## SAMPLE COMPLETE STREETS POLICY

Using these key elements the following Complete Streets policies have been customized for Minot. Adoption and implementation of this policy statement by the City Council will initiate a Complete Streets program within the City. The City of Minot recognizes the benefits of promoting pedestrian, bicycle, and public transportation network connectivity as an alternative to the automobile in order to provide transportation options, protect all road users, reduce negative environmental impacts, promote healthy living, and improve the general quality of life.

- The City of Minot expresses its commitment to creating and maintaining Complete Streets that provide safe, comfortable, and convenient travel along and across streets (including streets, roads, highways, bridges, and other portions of the transportation system) through a comprehensive, integrated transportation network that serves all categories of users, including pedestrians, bicyclists, persons with disabilities, motorists, emergency vehicles, movers of commercial goods, users and operators of public transportation, and residents of all ages and abilities, through the design, operation and maintenance of the transportation network so as to create a connected network of facilities accommodating each mode of travel that is consistent with and supportive of the local community context, recognizing that all streets are different and that the needs of various users will need to be balanced in a flexible manner."
- This policy applies to all project identification, planning and scoping, and the design and construction of all new construction, reconstruction, resurfacing, rehabilitation, and pavement maintenance of surface transportation network facilities located within the public ROW conducted by or on behalf of the City, as appropriate, subject to the exceptions contained herein. Existing improvements, until they are altered or modified, are exempt from this policy.
- The City shall plan, design, build and maintain all trail, roadway, and transit facilities in accordance with latest accepted or adopted federal, state, and local standards and guidelines, but will consider innovative and/or nontraditional design options to balance modal and user needs, as appropriate.
- Resources to be referenced shall include, but not necessarily be limited to, the latest editions of: American Association of State Highway Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets, Guide for Planning, Designing, and Operating Pedestrian Facilities, and Guide for the Development of Bicycle Facilities; Institute of Transportation Engineers (ITE) Designing Walkable Urban Thoroughfares: A Context Sensitive Approach; National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide; U.S. Access Board Public ROW Accessibility Guidelines; Highway Capacity Manual and Highway Safety Manual; and the Manual on Uniform Traffic Control Devices.

- The incorporation of bicycle, pedestrian, and transit facilities shall be mandated in all street construction, reconstruction, rehabilitation, and pavement maintenance projects undertaken by or on behalf of the City, except under one or more of the following conditions:
  - The City Engineer determines there is insufficient space within the ROW to safely accommodate such new facilities.
  - The City Engineer determines that establishing such new facilities would require an excessive and disproportionate cost.
  - The City Engineer determines that inclusion of such new facilities would create a public safety risk for users of the public ROW.
  - The project is limited to routine or seasonal maintenance activities such as mowing, sweeping, or spot pavement repairs, including chip and seal and crack seal activities.
  - Bicyclists and pedestrians are prohibited by law from using the facility.
- The City of Minot shall put into place performance standards with measurable benchmarks reflecting the ability of users to travel in safety and comfort. Performance standards may include: miles of new bicycle facilities or sidewalks, percentage of streets with tree canopy, public engagement performed, improved street lighting, ADA pedestrian ramp replacement, or other.
- City staff shall review all street construction, reconstruction, rehabilitation, and pavement maintenance projects for consistency with this Policy.
- The City Council shall receive an annual report from the City Engineer on the City's consistency with this Policy with respect to all street construction, reconstruction, rehabilitation, and pavement maintenance projects under design or construction by or on behalf of the City.
- The City shall review and either revise or develop proposed revisions to all appropriate planning documents (comprehensive plan, transportation plan, etc.), zoning and subdivision codes, laws, procedures, rules, regulations, guidelines, programs, and templates to integrate Complete Streets principles on all street projects. A committee of designated stakeholders will be created to implement this initiative.
- The City will seek out appropriate sources of funding and grants for implementation of Complete Streets policies.

## TRANSIT SYSTEM ENHANCEMENTS

The City completed a Comprehensive System Analysis (CSA) of its transit system in 2013. The CSA provides a phased plan for future transit service that includes short-term strategies to be implemented in 1-3 years, mid-term strategies to be implemented in 3-10 years, and long-term strategies that will complete a vision for a fully developed system beyond 10 years. Implementation of these strategies will meet needs brought on by population growth in Minot, and provide more effective and efficient transit service. Transit improvements include route changes, as well as physical improvements such as a complete transit system, fixed bus stops, and transit centers, that will better accommodate existing and future travel patterns. It is encouraged that these transit enhancements be incorporated into the specific corridor and intersection improvements recommended by the Transportation Plan.

### FUTURE TRANSIT ROUTES AND CONGESTION

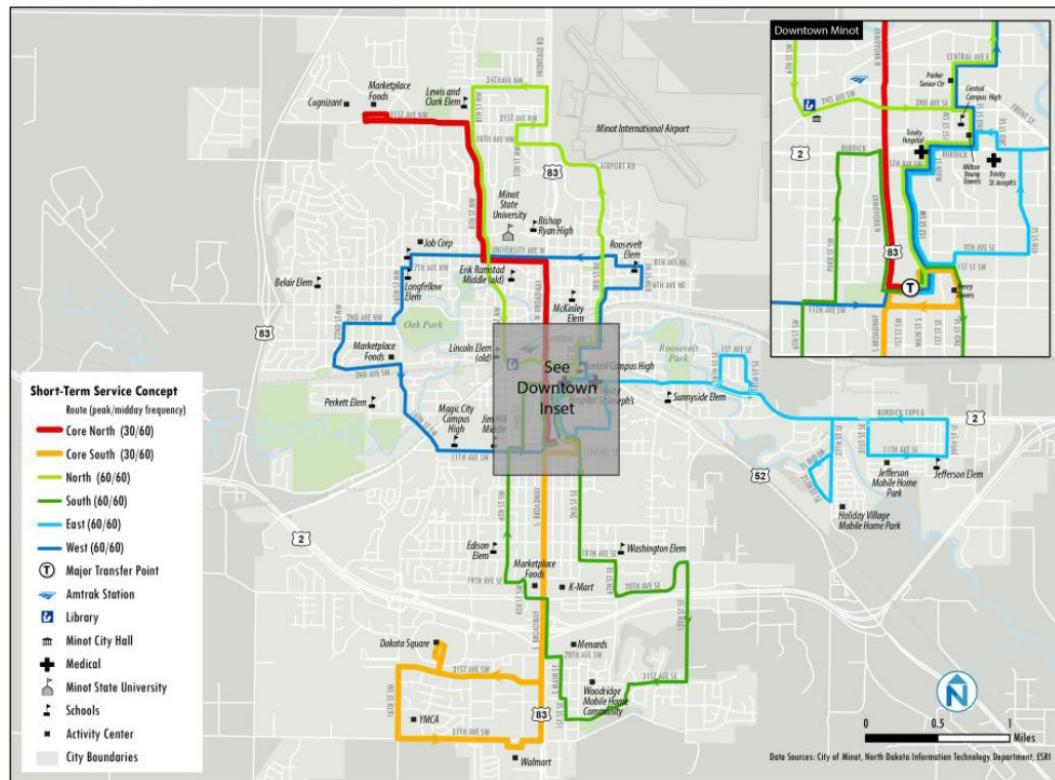
The existing transit system in Minot is coverage based, consisting of long loop routes that reach most of the city. While this provides good access to transportation, it does not necessarily provide

high quality service that offers reasonable travel times and high frequencies of fixed-route buses. The CSA recommends transitioning the Minot City Transit system to one that focuses less on coverage of the entire city, and instead builds up service on core routes, and connects riders to key employment, medical, shopping, and high density residential locations. Service based on coverage would only be deployed in neighborhoods that rely heavily on transit. The Existing Conditions Report of the CSA recommends an expanded span of service for the Minot City Transit system, and providing more direct service. Both of these would attract more riders to transit.

### Transit Route Recommendations

In the near term, the CSA recommends reconfiguring the bus routes in Minot as shown in Figure 6-6. The improved route network focuses on major commercial corridors, and provides frequencies of 30 minutes in some areas during peak times. Mid-term recommendations to do not alter this route network, but they do call for investments in frequency during midday, expanding service into early mornings and evenings, and adding service hours on Saturdays. Long term recommendations (beyond 10 years) add two routes to the network if demand arises. This includes a Northwest Route which would serve the Broadway corridor, 16th Street NW, and neighborhoods and retail destinations on the Northwest Side of Minot. The other new route would be a Southwest Route, which would primarily serve 16th Street SW, 37th Avenue SW, and the Dakota Square Mall.

*Figure 6-6: Proposed Minot Transit Network*



### Congestion

Growth in traffic volumes are expected to result in varied levels of congestion throughout the City, which will impact performance along several corridors served by transit. Congestion can impact travel time, reliability, and transit ridership. The CSA prepared in 2013, used earlier traffic model forecast which are included in Table 6-5 and Table 6-6. Major roadway segments that are

forecasted to have moderate or severe congestion in 2025 and 2035 are summarized in these tables, along with their potential impacts on transit.

*Table 6-5: 2025 Transit Impacts*

ROADWAY	2025 CONGESTION	TRANSIT IMPACT
North Broadway	Moderate	Core North, Core South, North, South, West Routes, and a future Northwest Route (2025) will operate on North Broadway
South Broadway	Severe	Core South, and South Routes will operate on South Broadway
5th Street SW/NW	Moderate/Severe	No transit impact
15th Ave SE	Severe	No transit impact
16th Street NW	Severe	West Route and a future Northwest Route (2025) will operate on 16th Street NW
16th Street SW	Moderate	West Route will operate on 16th Street SW
27th Street SE	Severe	East Route will operate on 27th Street SE
37th Ave SW	Severe	Future Southwest Route (2025) will operate on 37th Ave SW
46th Ave NW	Severe	No transit impact
55th Street NE	Severe	No transit impact
Highway 83	Moderate	No transit impact.

*Table 6-6: 2035 Transit Impacts*

ROADWAY	2035 CONGESTION	TRANSIT IMPACT
North Broadway	Severe	Core North, Core South, North, South, West Routes, and a future Northwest Route (2025) will operate on North Broadway
South Broadway	Moderate/Severe	Core South, and South Routes will operate on South Broadway
5th Street SW/NW	Severe	No transit impact
15th Ave SE	Severe	No transit impact
16th Street NW	Severe	West Route and a future Northwest Route (2025) will operate on 16th Street NW
16th Street SW	Severe	West Route will operate on 16th Street SW
27th Street SE	Severe	East Route will operate on 27th Street SE
37th Ave SW	Severe	Future Southwest Route (2025) will operate on 37th Ave SW
46th Ave NW	Severe	No transit impact
55th Street NE	Severe	No transit impact
Highway 83	Moderate	No transit impact.

In the near term, reconfiguration of transit service will not be affected by congestion. However, looking forward over the next 10-20 years, congestion may have an impact on Minot's transit network. Several roadway and signal improvements can be made to lessen the impact of congestion on providing reliable transit service. For example:

- Transit Signal Priority (TSP) – TSP can employ various techniques to use traffic signals to give buses or other transit vehicles priority over other traffic. Sensors are placed in signals that detect approaching buses, and can offer early green lights, extended green lights, or alter the phase of a traffic signal to help a bus maintain on-time performance and faster travel times.

- Dedicated ROW – Shared HOV lanes, bus lanes, or bus-on-shoulder operations can offer ways for transit vehicles to bypass congestion.
- Bus Stop Improvements – In order to minimize weaving actions, which can compound congestion, curb extensions or similar treatments can be added to bus stops to bring the bus stops closer to the roadway. Conversely, bus pull-outs can be added to give a place for transit vehicles to exit the roadway, and offer refuge for pedestrians. The appropriateness of each depends on the characteristics of the roadway, and the pedestrian traffic in the area.
- Bus Stop Spacing – Transit systems should continually evaluate bus stop spacing. Placing stops too close together can cause unnecessary impacts to travel times, and have negative impacts on safety and efficiency.

## PHYSICAL DEVELOPMENT OF TRANSIT

### Streets

One recommendation of the CSA is to develop a “complete transit system.” The plan outlines four main components of a complete transit system, as shown in Table 6-7. Many of these components impact the physical development of transit, bicycle, and pedestrian facilities on or adjacent to a roadway.

*Table 6-7: Components of a Complete Transit System<sup>1</sup>*

COMPLETE TRANSIT SYSTEM COMPONENT	GUIDING PRINCIPLES
Put passengers first	<ul style="list-style-type: none"> <li>• Make transit easy to use</li> <li>• Create a safe, tactile environment for transit passengers</li> <li>• Make transit universally accessible</li> <li>• Make transit comfortable at all points in the trip</li> </ul>
Make transit convenient	<ul style="list-style-type: none"> <li>• Provide mobility to a wide range of destinations</li> <li>• Facilitate fast and reliable service</li> <li>• Increase ridership by integrating other modes and making access safe and easy</li> <li>• Invest in service and infrastructure where it can attract the most users</li> </ul>
Use transit to build a healthy vibrant community	<ul style="list-style-type: none"> <li>• Make transit facilities central to community gathering places</li> <li>• Increase walking and bicycling to improve health outcomes</li> <li>• Employ best practices in transit-oriented design</li> <li>• Use transit to meet environmental targets</li> <li>• Use energy responsibly</li> </ul>
Improve transit service and quality through partnerships	<ul style="list-style-type: none"> <li>• Work with the City to maintain fast and reliable operations</li> <li>• Collaborate and share assets among transportation providers</li> <li>• Build political alliances</li> </ul>

The CSA identifies several elements of transit supportive roadways and facilities. These elements are expected to be adopted by the City of Minot in areas where transit service is to be deployed. Bus stops, for example, should have adequate amenities for the safety and comfort of the transit user. Waiting on a curb without a sidewalk next to high speed traffic is discouraged: passengers are exposed to the elements, there is no place for sitting/resting (particularly important for older adults and people with mobility challenges), and there is little protection between the passenger and passing traffic. Alternatively, a better transit experience allows the passenger to feel protected from the elements and traffic, secure due to street activity, and comfortable waiting for a bus.

<sup>1</sup> Source: City of Minot Comprehensive System Analysis, Nelson/Nygaard (2013)

Paved connections to sidewalks, and shelters in areas with high boardings and alightings should be included on transit routes. The following are some selected improvements to transportation facilities listed in the CSA:

- Parallel and connecting bicycle facilities
- Visible and safe pedestrian crossings within walking distance of transit stops
- Managed speeds: signal progressions, raised medians, pedestrian refuges, etc.
- Landscaping

### Bus Stops

Minot City Transit currently uses a system of flag stops, and inconsistently deployed bus stops. It is recommended that Minot City Transit move to the use of fixed stops on the north and south core routes. As the system grows, it will become more important to minimize the time needed to board passengers; therefore, controlling the number of stops on these productive lines will be beneficial. In addition, to serve the major attractions along these routes it will be necessary to have buses on Broadway and other busy streets, which will raise concerns of where passengers will board and/or cross the street.

### Development of Transit Center

Minot City Transit follows a hub-and-spoke model of transit routing, meaning that many passengers make transfers at a central hub. Currently, this transfer point is located at the Town and County Center in downtown Minot. This location, while central, presents the following challenges for future development:

- Buses use curbside spaces on the southwest corner of the shopping center
- There are often conflicts with delivery vehicles and private vehicles that improperly pick up and drop off people
- This facility is privately owned and operated. While Minot City Transit is currently permitted by the property owners to use this area as a transfer point, it is not assured in the future or wholly within the City's control.
- The transfer location is adjacent to the building and requires buses to traverse the parking lot; access is slow – especially during busy times.
- Speed bumps were added on the back side of the parking lot to slow vehicular traffic, which also slows buses and increases the time it takes to travel through the parking lot.

Access to Broadway is also difficult depending on the direction of bus travel. A long term recommendation of the CSA is for Minot City Transit to develop a new transit center in downtown Minot. The plan outlines several options, but the most promising one is a site adjacent to Trinity Hospital that is available for redevelopment. It should also be assumed that transit operations will have a downtown focus; at present downtown locations have the greatest number of boardings and alighting's in the system.

## 7. IMPLEMENTATION PLAN



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## 7. IMPLEMENTATION PLAN



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# 7. IMPLEMENTATION PLAN



## OVERVIEW

This chapter documents the process used to prepare Minot's Implementation Plan and presents the recommended improvements for the future roadway network with consideration of forecasted financial resources. The primary objectives of this chapter are:

- Refining the project list based on stakeholder and public input to ensure it was consistent with the Plan's goals, objectives, standards, and performance measures.
- Analyzing possible social, environmental, and economic impacts.
- Completion of a project prioritization process, which included coordination and outreach with local and state DOT staff aimed at addressing previously identified system deficiencies, as well as maintaining consistency with federal and state planning policies.
- Estimating anticipated revenue available for transportation projects.
- Prioritizing projects into time periods over the planning horizon to create a program of projects and ascertain any significant funding issues.
- Identifying financial gaps associated with the proposed improvement program and presenting innovative or special funding opportunities that could address identified funding short falls.

The result of this effort was the preparation of a financially-conscious program of projects that address forecasted needs for the Minot planning area over the next 20 years.

## IMPROVEMENT PROJECT LIST AND REVIEW

This section assembled a comprehensive list of improvement projects needed to address current and future transportation needs, as presented in earlier chapters. The process of developing the improvement list included the compilation of previously identified roadway projects, followed by the identification of new improvements aimed at addressing future system needs, issues and deficiencies, and the refinement of project concepts based on public and stakeholder input.

Importantly, the improvement projects were developed to be consistent with the Plan's goals, objectives, and performance checks. As such, the improvement projects emphasized the need for increased connectivity and mobility, as well as system management.

Next, an environmental review was conducted of all proposed projects to gain a greater understanding of potential impacts that may be associated with these improvements. The social, environmental, economic (SEE) scan data was compiled, mapped, and then incorporated into a matrix documenting the potential issues associated with projects presented on the comprehensive improvement list.

## SOCIAL, ENVIRONMENTAL AND ECONOMIC 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 Thoroughfare Plan. The scan area was bounded by the following geographic cordon:

- Northern limit: 46th Avenue NE
- Eastern limit: 55th Street
- Southern limit: 66th Avenue SW
- Western limit: US 83 Bypass/30th Street SW

This area is referred to throughout this chapter as the “environmental study area.”

None of the projects identified as a part of this Plan are programmed for construction at this time. Based on the type of project funding and the type of work being completed, some projects may require some level of environmental documentation through the National Environmental Policy Act (NEPA) process and/or project permitting from regulatory agencies. It is not the intent of this section to identify which projects may require such environmental documentation or permitting.

Social, environmental, and economic resources identified within the environmental study area are identified and discussed below. Where applicable, the analysis identifies resources that cross, or are directly adjacent to, the corridor and intersection improvement projects identified in the 2035 Minot Transportation Plan. If data was not available to identify the specific location of a resource, then the resource is discussed in general terms and not differentiated between the improvement projects. Importantly, 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 identified projects. Further, this review focused on issues that may require future coordination and permitting with local, state, and federal agencies. These issues are covered under the following topics:

- Wildlife and Vegetation
- Wetlands
- Floodplains
- Water Resources
- Farmland and Soils
- Potentially Contaminated Properties
- Parks and Trails
- Cultural Resources

Findings related to these topics are presented in more detail below.

### Wildlife and Vegetation

#### *Regulatory Framework*

Section 7 of the Endangered Species Act (ESA) of 1973 (16 USC 1531-1544) requires that all federal agencies consider and avoid, if possible, adverse impacts to federally listed threatened or endangered species or their critical habitats, which may result from their direct, regulatory, or funding actions.

Species of concern and significant ecological communities within North Dakota are also tracked by the North Dakota Parks and Recreation Department and listed in the state's Natural Heritage Inventory.

#### *Data and Findings*

Information from the U.S. Fish and Wildlife Service (USFWS) indicates that there are six threatened, endangered, or candidate species with habitat located in Ward County, including:

- Whooping crane (Endangered)
- Piping plover (Threatened)
- Red knot (Proposed Threatened)
- Sprague's pipit (Candidate Species)
- Dakota skipper (proposed threatened)
- Gray wolf (Endangered)

According to mapping by the USFWS, the City of Minot is not within the critical habitat range of the Dakota skipper or the piping plover. The environmental study area is located in an area that has been previously disturbed or developed with impervious surfaces and buildings; therefore, it is unlikely that the corridor contains critical habitat for other threatened, endangered, or candidate species identified above.

#### *Project Specific Considerations*

None of the projects identified in the Plan have a high likelihood for impacts to threatened and endangered species. This topic is not a differentiating factor among projects.

#### *Conclusions*

Future individual project reviews will require coordination with the USFWS to verify its information and to determine the effect on species present at the time construction is being planned. A North Dakota Department of Transportation (NDDOT) Threatened, Endangered, Candidate Species, and Critical Habitat Affect Determination Table has been developed in consultation with the Federal Highway Administration (FHWA). If the Affect Determination Table results in a finding other than "No Effect," additional coordination with USFWS is needed.

Future coordination with the North Dakota Fish and Game and the North Dakota Parks and Recreation Department would be conducted to identify regionally significant ecological areas and verify that the information on wildlife, fisheries, and ecological areas is up to date when an official environmental document is prepared.

## **Wetlands**

#### *Regulatory Framework*

Wetlands are federally protected through Section 404 and 401 of the Clean Water Act, with the exception of those that are isolated hydrologically<sup>1</sup> 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, 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 a number of regulatory programs. These statutes were enacted to allow the state's water-related resources to be utilized prudently and minimize flooding.

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<sup>1</sup> 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.

### *Data and Findings*

Wetlands were inventoried using National Wetland Inventory (NWI) mapping, and all boundaries are approximate and were not formally delineated. As shown in Figure 7-1, there are many NWI-mapped wetlands within environmental study areas, especially in the northern portion of the study area and surrounding the Souris River.

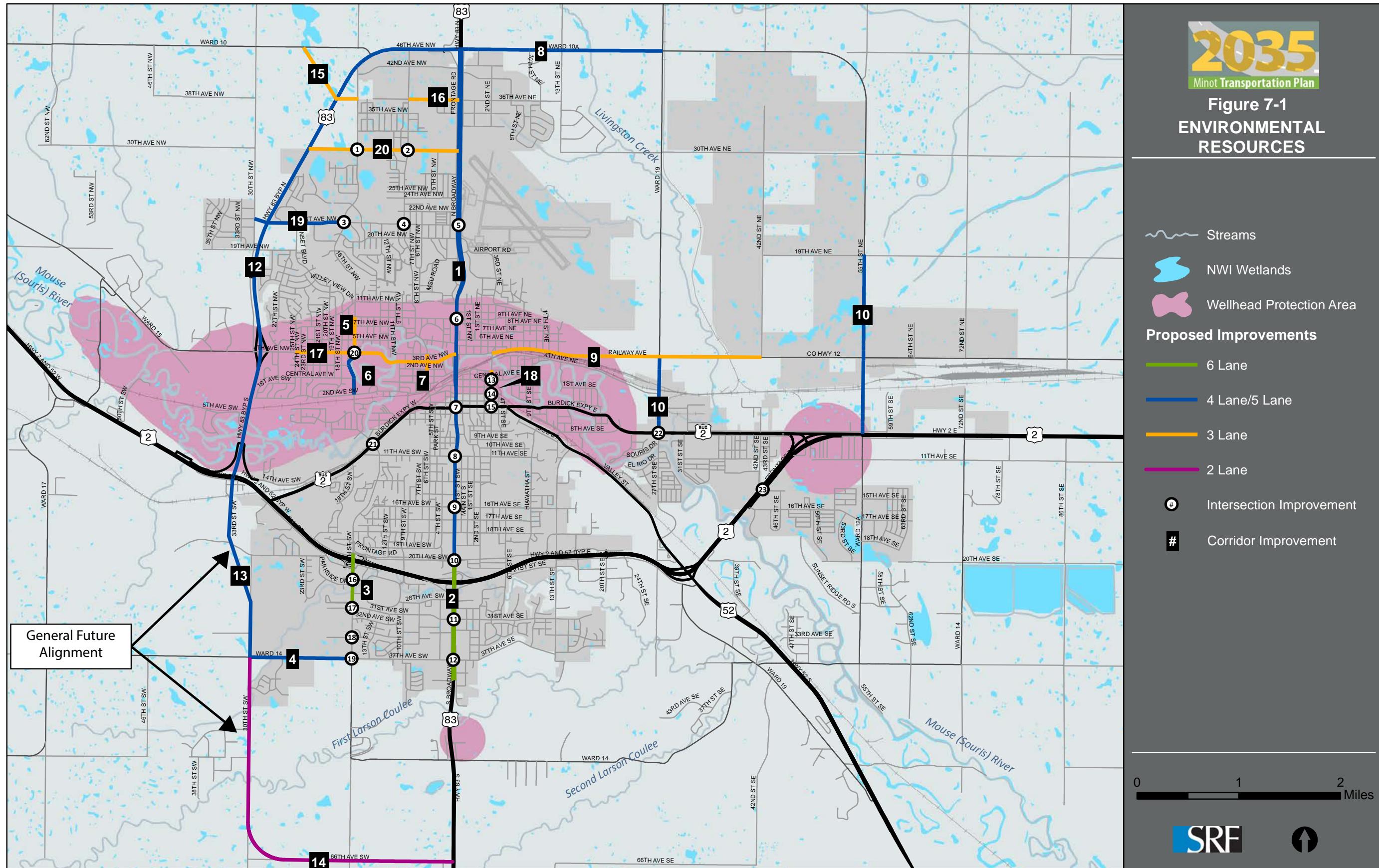
### *Project Specific Considerations*

- Corridor 4 – 37th Avenue SW (Future Southwest Arterial to 16th Street SW) has a medium potential for wetland impacts, because the roadway will be expanded to a five-lane facility and there are several NWI-mapped wetlands along the 37th Avenue SW corridor. Corridor 8 – 46th Avenue NE (Broadway to 27th Street NE) has a medium potential for wetland impacts, because the roadway will be expanded to a four-lane facility and there are several NWI-mapped wetlands along the 46th Avenue NW corridor.
- Corridor 9 – Railway Avenue (3rd Street NE to 42nd Street NE) has a medium potential for wetland impacts, because the roadway will be expanded to a three-lane facility and there are several NWI-mapped wetlands along the Railway Avenue corridor.
- Corridor 10 – 27th Street NE (Burdick Expressway to Railway Avenue NE) has a medium potential for wetland impacts, because the roadway will be expanded to a four-lane facility and there are several NWI-mapped wetlands along the 27th Street NE corridor.
- Corridor 11 – 55th Street NE (US 2 to 19th Avenue NE) has a high potential for wetland impacts, because the roadway will be expanded to a four-lane facility and there are many NWI-mapped wetlands along the 55th Street NE corridor, including two large wetland complexes directly adjacent to the corridor between 19th Avenue NW and County Highway 12.
- Corridor 12 – US 83 NW Bypass (Broadway to US 2) has a high potential for wetland impacts, because the roadway will be expanded to a four-lane facility and there are many NWI-mapped wetlands along the US 83 Bypass corridor, including a large wetland complex near 36th Avenue NE.
- Corridor 13 – Future Southwest Arterial (US 2 to 37th Avenue SW) has a high potential for wetland impacts, because the roadway is a new four-lane facility and there are many NWI-mapped wetlands along the proposed Future Southwest Arterial corridor.
- Corridor 14 – Future Southwest Arterial (37th Avenue SW to US 83) has a high potential for wetland impacts, because the roadway is a new two-lane rural facility and there are many NWI-mapped wetlands along the proposed Future Southwest Arterial corridor.
- Corridor 15 – 36th Avenue NW (County Road 10 to US 83 NW Bypass) has a high potential for wetland impacts, because the roadway is a new three-lane facility, and there are many NWI-mapped wetlands along the proposed future 36th Avenue NW corridor.
- Corridor 16 – 36th Avenue NW (8th Street NW to Broadway) has a high potential for wetland impacts, because the roadway is a new three-lane facility, and there are many NWI-mapped wetlands along the proposed future 36th Avenue NW corridor.

### *Conclusions*

More detailed evaluation of wetlands for future projects will include identification of wetland type, field verification, and discussion of mitigation measures for any impacted wetlands. Coordination with the U.S. Army Corps of Engineers will be required to determine jurisdictional wetlands and waterways subject to Section 404 permitting, including sequencing to avoid, minimize, and mitigate impacts. Coordination regarding SWC permitting will also likely be necessary if impacts to wetlands are identified.

Figure 7-1: Environmental Resources



## Floodplains

### *Regulatory Framework*

Floodplains for the various water bodies and water courses in the study area are regulated under a number of 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 a number of regulatory programs. These statutes were enacted to allow the state's water-related resources to be utilized prudently and minimize flooding.

The City of Minot and Ward County have adopted a Floodplain Zoning Ordinance to protect floodplains and floodways by regulating floodplain alterations, prohibiting unreasonable encroachments into the floodplain, and encouraging open space uses such as agriculture, recreation, and parking facilities.

### *Data and Findings*

FIRMs for Ward County were examined to determine potential floodplain and floodway impacts within the environmental study area. While the 100-year floodplain boundary is not available electronically, it is very similar to the Wellhead Protection Area shown in Figure 7-1. Additionally, the City of Minot evacuation zones were consulted to confirm appropriate boundaries for floodplain analysis (see Figure 7-2).

Since much of Minot was built in the Souris River basin, many of the key roadways servicing the heart of the City are prone to flooding. A significant portion of the valley and parts of downtown experienced a major flood in 2011. However, project-related impacts to the floodplain are only anticipated if a project involves excavating or placing fill within the floodplain area.

### *Project Specific Considerations (See Figure 7-1 for corridor locations)*

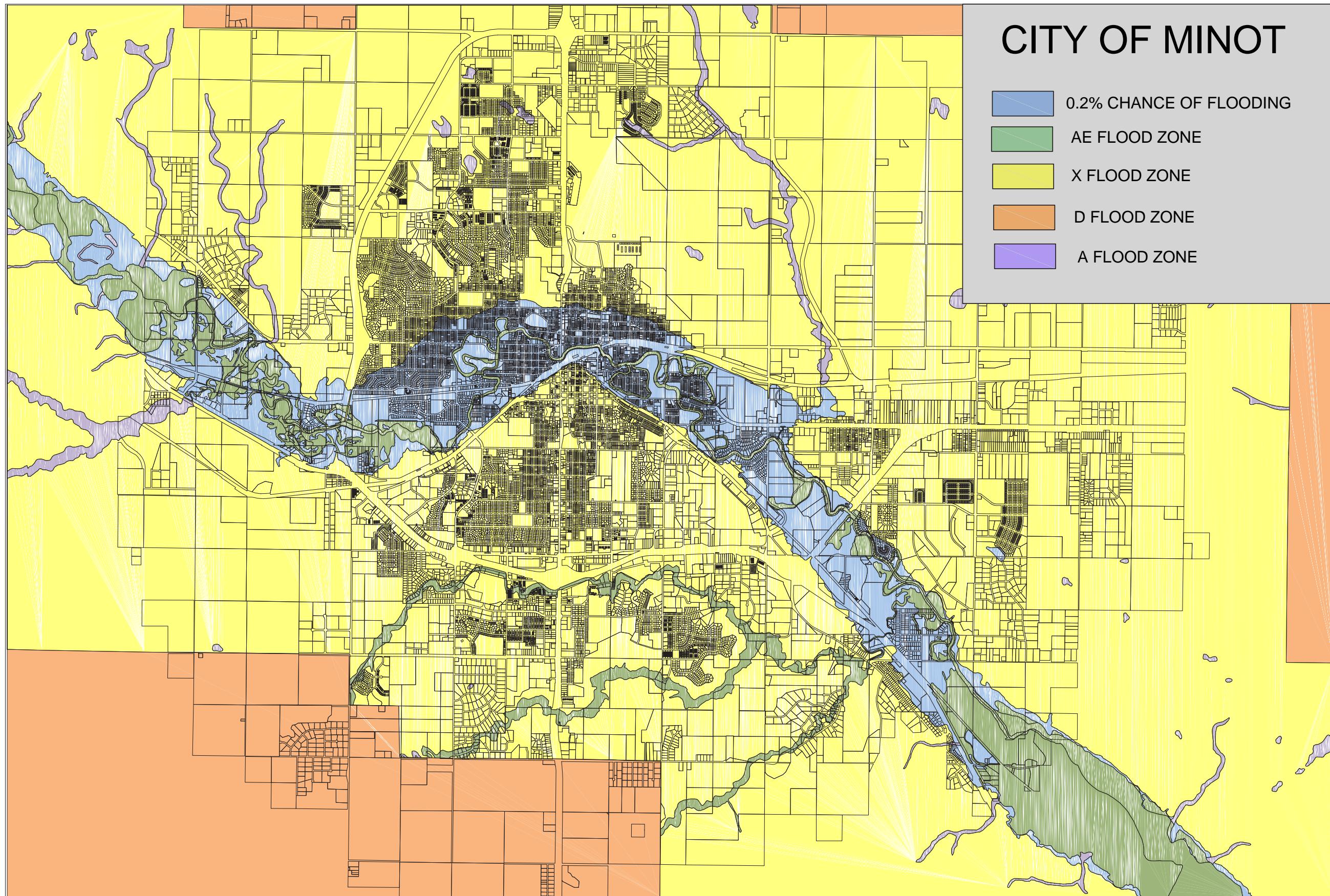
- Corridor 5 – 16th Street NW (University Avenue to 4th Avenue NW) is located within the floodplain of the Souris River. The project will likely require soil excavation and additional impervious surface to accommodate the proposed expansion to a three-lane facility. Efforts to minimize floodplain impacts as much as possible should be anticipated.
- Corridor 6 – 16th Street NW/SW (4th Avenue NW to 2nd Avenue SW) is located within the floodplain of the Souris River. The project will likely require soil excavation and additional impervious surface to accommodate the proposed access management strategies. Efforts to minimize floodplain impacts as much as possible should be anticipated.
- Corridor 7 – 6th Street NW/SW (2nd Avenue SW to 4th Avenue NW) is located within the floodplain of the Souris River. The project will likely require soil excavation and additional impervious surface to accommodate the proposed expansion to a three-lane facility. Efforts to minimize floodplain impacts as much as possible should be anticipated.
- Corridor 9 – Railway Avenue (3rd Street NE to 42nd Street NE) is located within the floodplain of the Souris River at the western portion of the project. The project will likely require soil excavation and additional impervious surface to accommodate the proposed expansion to a three-lane facility. Efforts to minimize floodplain impacts as much as possible should be anticipated.

- Corridor 12 – US 83 NW Bypass (Broadway to US 2) is located within the floodplain of the Souris River at the southern portion of the project. The project will likely require soil excavation and additional impervious surface to accommodate the proposed expansion to a four-lane facility, and fill will likely be required to construct grade-separated interchanges and overpasses along the corridor. Efforts to minimize floodplain impacts as much as possible should be anticipated.

#### *Conclusions*

Future projects that require modifications to existing river crossings, require major soil excavation, or place fill within the floodplain areas identified above will likely require a floodplain assessment as part of future environmental documentation.

Figure 7-2: City of Minot Flood Evacuation Zones



## Water Resources

### Regulatory Framework

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 in order 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.

### Data and Findings

There are five rivers/creeks located within the project area: Livingston Creek, Souris River, Puppy Dog Coulee, First Larson Coulee, and Second Larson Coulee. No new river crossing bridges are proposed as part of any of the projects identified in the Plan. The following roadways have existing crossings of the Souris River:

- 54th Street NW
- US 83 NW Bypass
- 16th Street NW
- 2nd Avenue SW
- 3rd Avenue NW (in two locations)
- 6th Street NW
- North Broadway (US 83)
- 3rd Street NE
- 7th Street NE
- Burdick Expressway E
- 8th Avenue SE
- 27th Street SE
- US 2 E
- 37th Avenue SE

Similar to the rest of North Dakota, the Minot area has a very high water table. Therefore, projects requiring large amounts of soil excavation may require dewatering. It is important to protect the City's groundwater through zoning and permitting, such as the WHPA. The WHPA is identified in Figure 7-1 and is fairly consistent with the floodplain of the Souris River. Impacts to wells within the WHPA are highly regulated and should be avoided.

### Project Specific Considerations (See Figure 7-1 for corridor locations)

- Projects that are within the WHPA include Corridors 1, 5, 6, 7, 9, 12, 17, and 18.
- Corridor expansion projects (Corridors 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12) will likely result in a medium increase of impervious surface due to the planned construction of additional lanes. Roadway runoff and stormwater treatment will need to be considered as part of future environmental documentation.

- Corridor projects that involve construction of a new roadway facility (Corridors 13, 14, 15, and 16) will likely result in the greatest increase of impervious surface due to the planned construction of additional lanes. Roadway runoff and stormwater treatment will need to be considered as part of future environmental documentation.
- Corridor 13 - Future Southwest Arterial (US 2 to 37th Avenue SW) crosses the First Larson Coulee. A new crossing or culvert expansion will likely be required as part of the project. Further consultation with the State Water Commission would be completed as necessary.

#### ***Conclusions***

All projects will need to provide mitigation measures to meet some level of water quality and rate control requirements for stormwater discharging from the project area. Furthermore, all projects will need to be in compliance with erosion control requirements set forth in the NPDES.

Consultation with the State Water Commission should be completed if a new creek crossing or culvert is required.

### **Farmland and Soils**

#### ***Regulatory Framework***

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. For the purpose of 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. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

#### ***Data and Findings***

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 7-3, these noted farmland soils are abundant and mainly located outside of the Minot City limits.

#### ***Project Specific Considerations***

- Corridor expansion projects that are outside of the city limits (Corridor 4, 8, 9, 11, and 12) have medium potential for impacts to farmland soils since the additional ROW required for roadway expansion will be converted to a nonagricultural use.
- Corridor projects that involve construction of a new roadway facility (Corridor 13, 14, 15, and 16) have high potential for impacts to farmland soils since the new ROW required for roadway construction will be converted to a nonagricultural use.

#### ***Conclusions***

If a project is expected to impact areas of prime farmland, unique farmland, and land of statewide or local importance, further coordination with the NRCS and completion of the AD-1006 Farmland Conversion Impact Rating form will be required.

### **Potentially Contaminated Properties**

#### ***Regulatory Framework***

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.

#### *Data and Findings*

The Minot Landfill Superfund Site is located near Burdick Expressway and the US 2/52 bypass (see Figure 7-3). The site was a municipal landfill that operated from 1961 to 1971. Contaminants of concern found at the site after it closed included: benzene and compounds; other volatile organic compounds (VOCs); metals including arsenic, copper, and zinc; and phenol and compounds. Remediation has occurred, including: soil excavation, installation of drains to collect leachate, installation of groundwater monitoring system, capping and control of landfill gas, and land use planning that prohibits the installation of groundwater supply wells on the site or in the immediate vicinity of the site. The site was removed from the EPA's National Priorities List in 1997.

A list of leaking underground storage tanks (LUSTs) in the City of Minot 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 7-3. Based on this list, there are eight 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.

#### *Project Specific Considerations*

- Corridor 1 – Broadway (46th Avenue to 20th Avenue) is adjacent to two identified LUST sites. This project has medium potential to encounter soil or groundwater contamination at these sites, because it may require soil excavation to construct intersection turn lane improvements. Potential for encountering contamination should be further assessed prior to project construction.
- Corridor 2 – Broadway (20th Avenue to 37th Avenue) is adjacent to one identified LUST site. This project has medium potential to encounter soil or groundwater contamination at these sites, because it will likely require soil excavation for expansion to a six-lane facility. Potential for encountering contamination should be further assessed prior to project construction.
- Corridor 5 – 16th Street NW (University Avenue to 4th Avenue NW) is adjacent to one identified LUST site. This project has medium potential to encounter soil or groundwater contamination at these sites, because it will likely require soil excavation for expansion to a three-lane facility. Potential for encountering contamination should be further assessed prior to project construction.
- Corridor 6 – 16th Street NW (4th Avenue NW to 2nd Avenue SW) is adjacent to one identified LUST site. This project has medium potential to encounter soil or groundwater contamination at these sites, because it will likely require soil excavation for expansion to a three-lane facility. Potential for encountering contamination should be further assessed prior to project construction.
- Intersection 6 - Broadway and University Avenue E/W is adjacent to an identified LUST site. This project has medium potential to encounter soil or groundwater contamination at this site, because it will likely require soil excavation to construct turn lane improvements. Potential for encountering contamination should be further assessed prior to project construction.
- Intersection 11 - Broadway and 31st Avenue SE/SW is adjacent to an identified LUST site. This project has medium potential to encounter soil or groundwater contamination at this site, because it will likely require soil excavation to construct turn lane improvements. Potential for encountering contamination should be further assessed prior to project construction.

### ***Conclusions***

A more detailed analysis will be necessary to determine if construction of any of the projects identified in the Plan is likely to encounter contaminated soils or groundwater. A Phase I Environmental Site Assessment (ESA) could be completed for these projects 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 each individual project's construction limits.

### **Parks and Trails**

#### ***Regulatory Framework***

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<sup>2</sup>, 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.

#### ***Data and Findings***

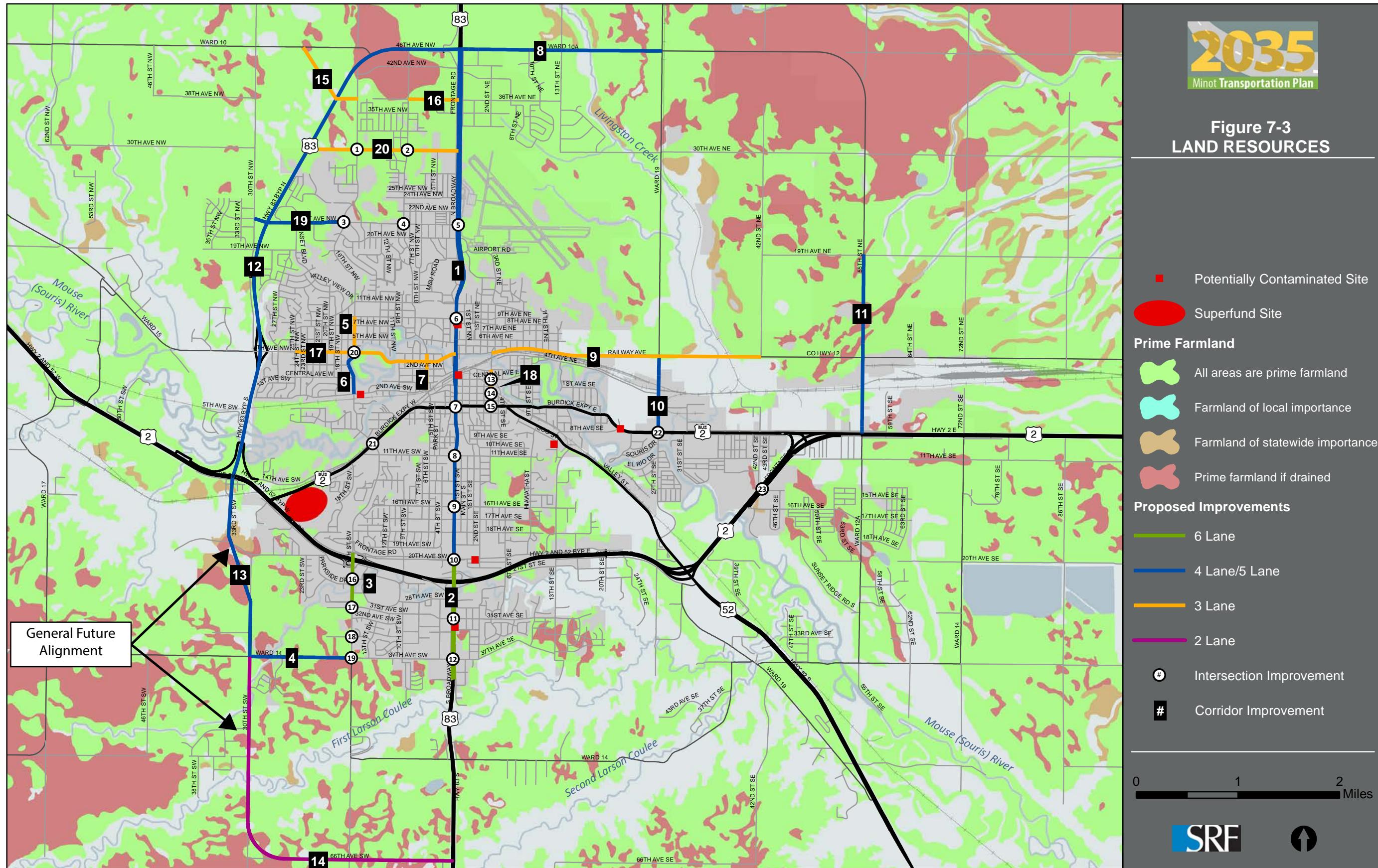
Parks, trails, and other potential Section 4(f) resources were identified using the City of Minot's 2012 Comprehensive Plan. These resources are identified in Figure 7-4.

According to data from the National Park Service, the following four resources identified in Figure 7-4 were funded through the LWCF program: Souris Valley Golf Course, Oak Park, Roosevelt Park swimming pool, and Green Valley Park. These properties are subject to Section 6(f) considerations.

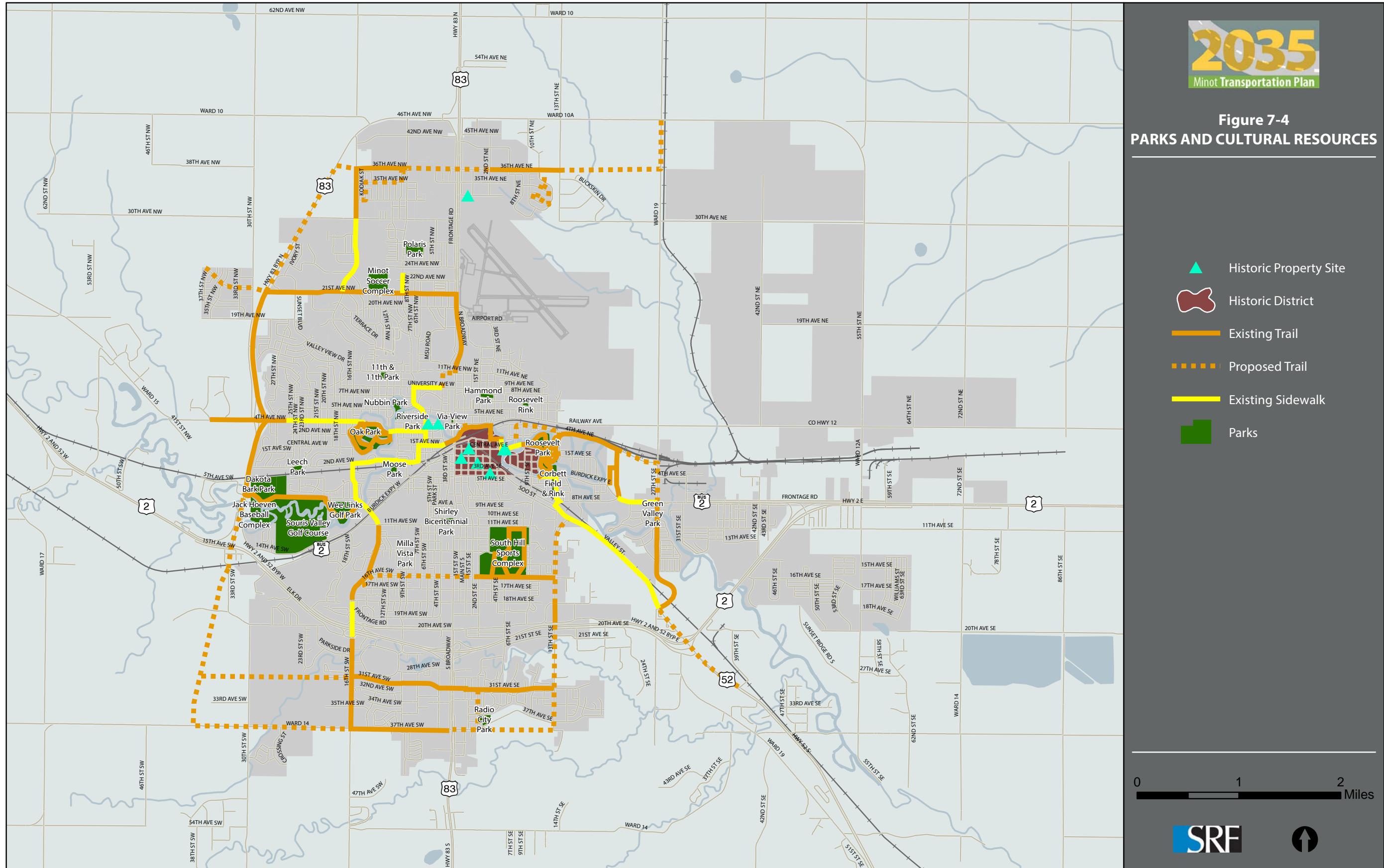
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<sup>2</sup> Section 4(f) legislation provides protection for historic sites (publicly or privately owned) from conversion to transportation use. Historic sites are subject to consideration under both Section 106 and Section 4(f) legislation; however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

Figure 7-3: Land Resources



### **Figure 7-4: Parks and Cultural Resources**



### *Project Specific Considerations*

- Several of the corridor improvement projects are adjacent to or cross routes with existing or proposed trail facilities, including Corridors 1, 2, 3, 10, and 12. These trails may be temporarily impacted during project construction; however, it is unlikely that any of these projects will cause permanent impacts to trails. Temporary detour routes will be provided for bicyclists and pedestrians during construction. If a trail is permanently impacted by roadway expansion, a replacement trail will need to be provided.
- Corridor 17 – 4th Avenue NW (25th Street NW to Broadway) is located adjacent to Oak Park. However, since the project will likely be constructed entirely within existing ROW, it is unlikely that the project will have any impacts to Oak Park.

### *Conclusions*

Potential impacts to Section 4(f) properties will need to be further evaluated during future environmental documentation depending upon the type of work and construction limits of any future projects. The use of any Section 4(f) resource will require further evaluation. The extent of the use will determine the appropriate Section 4(f) evaluation process.

## **Cultural Resources**

### *Regulatory Framework*

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.

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 taken into account during project planning and design. Section 106 requires federal agencies to consider the effects of their actions on historic properties before undertaking a project.

### *Data and Findings*

A scan of National Register for Historic Places (NRHP) information from the National Park Service shows eight NRHP-listed properties and three NRHP-listed historic districts within the study area:

- The Andrew Carr Sr. House is located at 510 4th Avenue NW.
- The Eastwood Park Bridge is located at Central Avenue and 6th Street SE.
- The Minot Carnegie Library is located at 105 2nd Avenue SE.
- The Soo Line Passenger Depot is located at 11 N Main Street.
- The Tufveson House is located at 426 4th Avenue NW.
- The U.S. Post Office is located at 100 1st Street SW.
- The Union National Bank and Annex is located at the corner of Main Street N and Central Avenue.
- The Ward County Courthouse is located at 315 Third Street SE.
- The Westland Oil Filling Station is located at 510 E Central Avenue.
- The Eastwood Park Historic District is bounded by the Souris River oxbow.
- The Minot Commercial Historic District is bounded by Soo Line railroad, Burdick Expressway, and Broadway.

- The Minot Industrial Historic District is bounded by the Souris River, 5th Street NE, 1st Avenue SE, Soo Line railroad, and Broadway.

NRHP properties are identified in Figure 7-4. Note that there may be additional sites within the environmental study area that are eligible but not currently listed on the NRHP. Additional cultural resources studies will likely be needed as part of any future environmental documentation.

#### *Project Specific Considerations*

- Corridor 1 – Broadway (46th Avenue to 20th Avenue) is adjacent to two NRHP-listed properties and the Minot Commercial and Industrial Historic Districts. However, since the project will likely be constructed entirely within existing ROW, it is unlikely that the project will have any impacts to these properties. Additional study and coordination is needed to make an official Section 106 determination.
- Corridor 17 – 4th Avenue NW (25th Street NW to Broadway) is adjacent to two NRHP-listed properties. However, since the project will likely be constructed entirely within existing ROW, it is unlikely that the project will have any impacts to these properties. Additional study and coordination is needed to make an official Section 106 determination.
- Corridor 18 – 3rd Street SE (E Burdick Expressway to 1st Avenue NE) is located within the Minot Commercial and Industrial Historic Districts. However, since the project will likely be constructed entirely within existing ROW, it is unlikely that the project will have any impacts to these historic districts. Additional study and coordination is needed to make an official Section 106 determination.

#### *Conclusions*

Future projects may require more detailed analysis to determine if project construction is likely to adversely affect any of these historic properties. At the time of official environmental documentation, the Section 106 review process will be initiated and necessary surveys and evaluations will be conducted to identify historic properties and archaeological sites eligible for the NRHP, in addition to the properties identified above that are already listed on the NRHP. City staff should work with the State Historic Preservation Office (SHPO) and Tribal Historic Preservation Office (THPO) to determine any potential adverse effects and opportunities to avoid, minimize, and mitigate those effects.

#### **Summary of SEE Scan**

Table 7-1 and Table 7-2 provide a summary of the potential social, environmental, and economic factors that may be associated with identified corridor and intersection improvements.

**Table 7-1: Corridor Evaluation (1 of 3)**

#	Location		1	2	3	4	5	6	7	8
			Wildlife and Vegetation	Wetlands	Floodplains	Water Resources	Farmland and Soils	Potentially Contaminated Properties	Parks and Trails	Cultural Resources
1	Broadway	(46th Ave to 20th Ave)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	No wetland impacts anticipated.	Crosses through floodplain of Souris River. Impacts to floodplain unlikely due to type of improvements.	Existing Souris River crossing. Within wellhead protection area. Minimal increase to impervious surfaces.	Low potential for impacts to farmable soils.	2 identified potentially contaminated sites adjacent to corridor. Soil excavation potentially required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Adjacent to historic district and two NRHP-listed properties but low likelihood for impacts to cultural resources due to type of improvements. Additional study needed.
2	Broadway	(20th Ave SW to 37th Ave)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Low potential for wetland impacts.	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	1 identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
3	16th St SW	(20th Ave SW to 31st Ave SW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Low potential for wetland impacts.	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
4	37th Ave SW	(Future Southwest Arterial to 16th St SW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Medium potential for wetland impacts.	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Medium potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
5	16th St NW	(University Ave to 4th Ave NW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Low potential for wetland impacts.	Within floodplain of Souris River.	Within wellhead protection area. Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	1 identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
6	16th St NW	(4th Ave NW to 2nd Ave SW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Low potential for wetland impacts.	Within floodplain of Souris River.	Within wellhead protection area. Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	1 identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
7	6th St NW	(2nd Ave SW to 4th Ave NW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Low potential for wetland impacts.	Within floodplain of Souris River.	Within wellhead protection area. Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Adjacent to NRHP-listed property. Medium likelihood for impacts to cultural resources. Additional study needed.
8	46th Ave NW	(Broadway to 27th St NE)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Medium potential for wetland impacts.	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Medium potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.

**Table 7-1: Corridor Evaluation (2 of 3)**

#	Location	1	2	3	4	5	6	7	8
		Wildlife and Vegetation	Wetlands	Floodplains	Water Resources	Farmland and Soils	Potentially Contaminated Properties	Parks and Trails	Cultural Resources
9	Railway Ave (3rd St NE to 42nd St NE)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Medium potential for wetland impacts.	Within floodplain of Souris River.	Within wellhead protection area. Medium increase to impervious surfaces.	Medium potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
10	27th St NE (Burdick Expy to Railway Ave NE)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Medium potential for wetland impacts	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
11	55th St NE (US 2 to 19th Ave NE)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	High potential for wetland impacts.	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Medium potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
12	US 83 NW Bypass (Broadway to US 2)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	High potential for wetland impacts.	Southern portion of corridor improvement within floodplain of Souris River.	Existing Souris river crossing. Within wellhead protection area. Medium increase to impervious surfaces.	Medium potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
13	Future Southwest Arterial (US 2 to 37th Ave SW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	High potential for wetland impacts.	Not within floodplain of Souris River.	Greatest increase to impervious surfaces.	High potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
14	Future Southwest Arterial (37th Ave SW to US Hwy 83)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	High potential for wetland impacts.	Not within floodplain of Souris River.	Greatest increase to impervious surfaces.	High potential for impacts to farmable soils	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
15	36th Ave NW (County Road 10 to US 83 NW Bypass)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	High potential for wetland impacts.	Not within floodplain of Souris River.	Greatest increase to impervious surfaces.	High potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
16	36th Ave NW (8th St NW to Broadway)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	High potential for wetland impacts.	Not within floodplain of Souris River.	Greatest increase to impervious surfaces.	High potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Soil excavation likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.

Table 7-1: Corridor Evaluation (3 of 3)

#	Location	1	2	3	4	5	6	7	8
		Wildlife and Vegetation	Wetlands	Floodplains	Water Resources	Farmland and Soils	Potentially Contaminated Properties	Parks and Trails	Cultural Resources
17	4th Ave NW (25th St NW to Broadway)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	No wetland impacts anticipated.	Within floodplain of Souris River. Impacts to floodplain unlikely due to type of improvements.	Existing Souris river crossing. Within wellhead protection area. Minimal increase to impervious surfaces.	Low potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	Park located adjacent to corridor but not permanent impacts anticipated due to nature of work.	Adjacent to two NRHP-listed properties but low likelihood for impacts to cultural resources due to type of improvements. Additional study needed.
18	3rd St SE (E Burdick Expy to 1st Ave NE)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	No wetland impacts anticipated.	Within floodplain of Souris River. Impacts to floodplain unlikely due to type of improvements.	Within wellhead protection area. Minimal increase to impervious surfaces.	Low potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	No park or trail impacts anticipated.	Within historic district but low likelihood for impacts to cultural resources due to type of improvements. Additional study needed.
19	21st Ave NW (30th St NW to 16th St NW)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Low potential for wetland impacts.	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Low potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.
20	30th Ave NW (US 83 NW Bypass to Broadway)	Federal threatened and endangered species identified in Ward County. Future coordination with U.S. Fish and Wildlife Service.	Medium potential for wetland impacts	Not within floodplain of Souris River.	Medium increase to impervious surfaces.	Medium potential for impacts to farmable soils.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed.

No impact
Low likelihood of impact
Medium likelihood of impact
High likelihood of impact

**Table 7-2: Social, Environmental, and Economic Scan - Intersection Evaluation (1 of 3)**

#	Location	1	2	3	4	5	6	7	8
		Wildlife and Vegetation	Wetlands	Floodplains	Water Resources	Farmland and Soils	Potentially Contaminated Properties	Parks and Trails	Cultural Resources
1	16th St NW and 30th Ave NW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	No increase in impervious surface.	No farmland impacts anticipated.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
2	8th St NW and 30th Ave NW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	No increase in impervious surface.	No farmland impacts anticipated.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
3	16th St NW and 21st Ave NW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	No increase in impervious surface.	No farmland impacts anticipated.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
4	8th St NW and 21st Ave NW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
5	Broadway and 21 Ave NW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
6	Broadway and University Ave E/W	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Located within floodplain of Souris River. Impacts to floodplain unlikely due to type of improvements.	Within wellhead protection area. Minimal increase to impervious surface.	No farmland impacts anticipated.	1 potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
7	Broadway and Burdick Expy E/W	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	No increase in impervious surface.	No farmland impacts anticipated.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
8	Broadway and 11th Ave SE/SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	No increase in impervious surface.	No farmland impacts anticipated.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	Adjacent to Bicentennial Park. No permanent park impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.

**Table 7-2: Social, Environmental, and Economic Scan - Intersection Evaluation (2 of 3)**

#	Location	1	2	3	4	5	6	7	8
		Wildlife and Vegetation	Wetlands	Floodplains	Water Resources	Farmland and Soils	Potentially Contaminated Properties	Parks and Trails	Cultural Resources
9	Broadway and 16th Ave SE/SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	No increase in impervious surface.	No farmland impacts anticipated.	No identified potentially contaminated sites adjacent to corridor. Minimal potential to encounter contaminated soils/groundwater because excavation not likely required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
10	Broadway and 20th Ave SE/SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
11	Broadway and 31th Ave SE/SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	1 potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
12	Broadway and 37th Ave SE/SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
13	3rd St NE and Central Ave E	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Located within floodplain of Souris River. Impacts to floodplain unlikely due to type of improvements.	Within wellhead protection area. Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Within historic district but low likelihood for impacts to cultural resources due to type of improvements.
14	3rd St SE and 2nd Ave SE	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Within wellhead protection area. Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Within historic district but low likelihood for impacts to cultural resources due to type of improvements.
15	3rd St SE and Burdick Expy E	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Within historic district but low likelihood for impacts to cultural resources due to type of improvements.
16	16th St SW and 20th Ave SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
17	16th St SW and 22nd Ave SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.

Table 7-2: Social, Environmental, and Economic Scan - Intersection Evaluation (3 of 3)

#	Location	1	2	3	4	5	6	7	8
		Wildlife and Vegetation	Wetlands	Floodplains	Water Resources	Farmland and Soils	Potentially Contaminated Properties	Parks and Trails	Cultural Resources
16	16th St SW and 24th Ave SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
17	16th St SW and 31st Ave	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
18	16th St SW and 35th Ave SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
19	16th St SW and 37th Ave SW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
20	16th St NW and 4th Ave NW	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Located within floodplain of Souris River. Impacts to floodplain unlikely due to type of improvements.	Within wellhead protection area. Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Adjacent to Oak Park. No permanent park impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
21	16th St SW and Burdick Expy W	No impacts to wildlife or vegetation anticipated.	Low potential for wetland impacts.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	Low potential for impacts to farmable soils.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed if work outside of existing ROW.
22	27th St SE and Burdick Expy E	No impacts to wildlife or vegetation anticipated.	No wetland impacts anticipated.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	No farmland impacts anticipated.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	Potential for temporary trail impacts but no permanent impacts anticipated.	Not likely to impact cultural resources because improvements in existing ROW.
23	US Hwy 2 and 42nd St SE	No impacts to wildlife or vegetation anticipated.	Low potential for wetland impacts.	Not within floodplain of Souris River.	Minimal increase to impervious surface.	Low potential for impacts to farmable soils.	No potentially contaminated site identified adjacent to intersection. Minimal soil excavation may be required.	No park or trail impacts anticipated.	Low likelihood for impacts to cultural resources. Additional study needed if work outside of existing ROW.

No impact
Low likelihood of impact
Medium likelihood of impact
High likelihood of impact

## PROJECT EVALUATION

This section summarizes the project evaluation and methodology that was used to aid the development of the Plan's implementation schedule. The project list includes improvements aimed at addressing safety issues, capacity needs, and system management strategies. Each corridor and intersection project was evaluated based upon a wide-range of factors to aid in the prioritization of each project. Factors evaluated included:

- Project Type (e.g., system management, expansion, reconstruction)
- Jurisdiction (e.g., state, county, city, township)
- Functional Classification (e.g., principal arterial, minor arterial, collector)
- Key Issues Addressed (e.g., capacity, deficiencies, level of safety concern)
- Social and Economic Impacts (e.g., ROW, land use, economic development, regional mobility)
- Construction Cost

After all project-related data was compiled and analyzed, the results were reviewed with the PMT to build consensus on the benefits and impacts related to each project. This evaluation process played a key role in the development of the Plan's implementation schedule, as it provided a comprehensive summary of each project.

Table 7-3 provides a summary of the identified corridor projects, while Table 7-4 displays the intersection projects. The project implementation schedule is provided later in this chapter.

Table 7-3: Corridor Project Evaluation (1 of 3)

#	Location	Scope	Improvement Type	Jurisdiction		Functional Classification		Average Daily Traffic			Future Roadway Capacity Deficiencies		Existing Safety Issues *	Supports Economic Development	Enhances Regional Mobility	ROW Impacts	Limits impact to key environmental features	Supports existing and future land use	
				Existing	Planned	Existing	Planned	Existing ADT	Year 2025 ADT	Year 2035 ADT	Year 2025	Year 2035							
1	Broadway	(46th Ave NW to 20th Ave SW)	<ul style="list-style-type: none"> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> <li>Note, this assumes a four-lane facility will be maintained (i.e. no expansion to a six-lane facility due to right-of-way constraints), in conjunction with expansion of the US Hwy 83 NW Bypass</li> </ul>	System Management	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	14,200 - 25,900	22,900 - 33,200	29,500 - 36,900	Approaching to Severe Congestion	Light to Severe Congestion	Over Average (1) Over Critical (6)	■	■	■	■	■
2	Broadway	(20th Ave SW to 41st Ave SW)	<ul style="list-style-type: none"> <li>Expand to a six-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	Reconstruction	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	9,800 - 16,300	14,600 - 28,400	19,050 - 30,700	Approaching to Severe Congestion	Moderate to Severe Congestion	Over Average (1) Over Critical (1)	■	■	■	■	■
3	16th St SW	(20th Ave SW to 31st Ave SW)	<ul style="list-style-type: none"> <li>Expand to a six-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> <li>Note, this assumes construction of the Southwest Arterial</li> </ul>	Reconstruction	City	City	Minor Arterial	Minor Arterial	14,400 - 15,800	36,650	37,650	Light to Severe Congestion	Light to Severe Congestion	Over Average (1) Over Critical (3)	■	■	■	■	■
4	37th Ave SW	(Future Southwest Arterial to 16th St SW)	<ul style="list-style-type: none"> <li>Expand to a five-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	Reconstruction	Ward County	City	Collector	Minor Arterial	2,400	22,650	22,950	Severe Congestion	Severe Congestion	Over Average	■	■	■	■	■
5	16th St NW	(University Ave to 4th Ave NW)	<ul style="list-style-type: none"> <li>Re-stripe for three-lane facility</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	System Management	City	City	Minor Arterial	Minor Arterial	8,425	11,350	11,700	Moderate to Severe Congestion	Severe Congestion	Over Average	■	■	■	■	■
6	16th St NW	(4th Ave NW to 2nd Ave SW)	<ul style="list-style-type: none"> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	System Management	City	City	Minor Arterial	Minor Arterial	11,130	23,650	25,450	Moderate to Severe Congestion	Severe Congestion	Over Average	■	■	■	■	■
7	6th St NW/SW	(3rd Ave NW to 2nd Ave SW)	<ul style="list-style-type: none"> <li>Re-stripe for three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	System Management	City	City	Minor Arterial	Minor Arterial	6,100	13,650	14,000	Moderate to Severe Congestion	Moderate to Severe Congestion	N/A	■	■	■	■	■
8	46th Ave NE	(Broadway to 27th St NE)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	Expansion	Ward County	Ward County	Collector	Minor Arterial	1,800	14,400	19,800	Severe Congestion	Severe Congestion	Over Critical	■	■	■	■	■

Table 7-3: Corridor Project Evaluation (2 of 3)

#	Location		Scope	Improvement Type	Jurisdiction		Functional Classification		Average Daily Traffic			Future Roadway Capacity Deficiencies		Existing Safety Issues *	Supports Economic Development	Enhances Regional Mobility	ROW Impacts	Limits impact to key environmental features	Supports existing and future land use
					Existing	Planned	Existing	Planned	Existing ADT	Year 2025 ADT	Year 2035 ADT	Year 2025	Year 2035						
9	Railway Ave	(3rd St NE to 42nd St NE)	<ul style="list-style-type: none"> <li>Expand to a three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	Reconstruction	Ward County / City	Ward County / City	Collector / Minor Arterial	Minor Arterial	4,500	10,900	12,200	Light Congestion	Moderate Congestion	N/A	 				
10	27th St NE	(Burdick Expy to Railway Ave NE)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	Reconstruction	City	City	Minor Arterial	Minor Arterial	6,300	7,000	14,800	Severe Congestion	Severe Congestion	N/A	 				
11	55th St NE	(US Hwy 2 to 19th Ave NE)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>Select intersection turn lane and traffic control improvements</li> </ul>	Expansion	Ward County	Ward County	Collector	Minor Arterial	2,400	10,100	22,250	Severe Congestion	Moderate to Severe Congestion	N/A	 				
12	US Hwy 83 Bypass	(Broadway to US Hwy 2)	<ul style="list-style-type: none"> <li>Expand to a four-lane facility</li> <li>Restrict access to grade-separated interchanges</li> <li>(Interchange costs not included in estimate)</li> </ul>	Expansion	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	6,400 - 10,600	16,400 - 42,000	25,000 - 48,000	Moderate Congestion	Light to Moderate Congestion	Over Average (2) Over Critical (1)	 				
13	Future Southwest Arterial	(US Hwy 2 to 37th Ave SW)	<ul style="list-style-type: none"> <li>Construct new four-lane urban facility</li> <li>Implement access management strategies, as opportunities arise</li> </ul>	Reconstruction	Township	Ward County	Local	Minor Arterial	N/A	8,900 - 11,900	N/A	N/A	N/A	 					
14	Future Southwest Arterial	(37th Ave SW to US Hwy 83)	<ul style="list-style-type: none"> <li>Construct new two-lane rural facility</li> <li>Implement access management strategies, as opportunities arise</li> </ul>	Reconstruction	Township	Ward County	Local	Minor Arterial	N/A	N/A	1,800	N/A	N/A	N/A	 				
15	36th Ave NW	(46th Ave NW to 16th St NW)	<ul style="list-style-type: none"> <li>Construct new three-lane facility</li> <li>Implement access management strategies, as opportunities arise</li> </ul>	Reconstruction	City	City	Local	Minor Arterial	N/A	N/A	N/A	N/A	N/A	 					
16	36th Ave NW	(8th St NW to Broadway)	<ul style="list-style-type: none"> <li>Construct new three-lane facility</li> <li>Implement access management strategies, as opportunities arise</li> </ul>	Reconstruction	City	City	Local	Minor Arterial	N/A	N/A	N/A	N/A	N/A	 					
17	4th Ave NW	(25th St NW to Broadway)	<ul style="list-style-type: none"> <li>Re-stripe for three-lane facility</li> <li>Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>	System Management	City	City	Minor Arterial	Minor Arterial	5,500	11,750	13,050	N/A	N/A	Over Average	 				
18	3rd St SE	(E Burdick Expy to 1st Ave NE)	<ul style="list-style-type: none"> <li>Re-stripe for</li></ul>																

Table 7-3: Corridor Project Evaluation (3 of 3)

#	Location		Scope	Improvement Type	Jurisdiction		Functional Classification		Average Daily Traffic			Future Roadway Capacity Deficiencies		Existing Safety Issues *	Supports Economic Development	Enhances Regional Mobility	ROW Impacts	Limits impact to key environmental features	Supports existing and future land use
					Existing	Planned	Existing	Planned	Existing ADT	Year 2025 ADT	Year 2035 ADT	Year 2025	Year 2035						
19	21st Ave NW	(30th St NW to 16th St NW)	<ul style="list-style-type: none"> <li>- Expand to a four-lane facility</li> <li>- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>	Reconstruction	City	City	Minor Arterial	Minor Arterial	3,200	6,000 - 10,000	7,000 - 11,000	N/A	N/A	Over Critical/Over Severe	Good	Good	Good	Good	Good
20	30th Ave NW	(US 83 NW Bypass to Broadway)	<ul style="list-style-type: none"> <li>- Expand to a three-lane facility</li> <li>- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>	Reconstruction	City	City	Collector	Minor Arterial	1,200	6,000 - 9,000	7,000 - 10,000	N/A	N/A	Over Average (3) Over Severe	Good	Good	Fair	Fair	Good

Phase 1 (2014-2019) Phase 2 (2020-2035) Phase 3 (2035+)

\* A crash analysis was performed for key intersections within the study area using NDDOT crash and average annual daily traffic data (2008 – 2012). Results from this analysis were used to identify intersections exhibiting above average crash rates (crashes per million vehicle miles).

Good  Fair  Poor 

\* Some rankings are in between scales; such as Good/Fair OR Fair/Poor

Table 7-4: Intersection Project Evaluation (1 of 2)

#	Location	Scope	Jurisdiction		Functional Classification		Address Intersection Capacity Deficiencies		Address Existing Safety Issues*	Supports Economic Development	Enhances Regional Mobility	ROW Impacts	Limits impact to key environmental features	Supports existing and future land use
			Existing	Planned	Existing	Planned	Existing	Year 2035						
1	16th St NW and 30th Ave NW	· Add All-Way Stop Control	City	City	Collector	Minor Arterial	LOS A-B	LOS A-C	Over Critical Crash & Severity Rate	■	■	■	■	■
2	8th St NW and 30th Ave NW	· Add All-Way Stop Control	City	City	Collector	Collector	LOS A-B	LOS D-F	Over Average Crash Rate	■	■	■	■	■
3	16th St NW and 21st Ave NW	· Install a traffic signal	City	City	Minor Arterial	Minor Arterial	LOS A-B	LOS E-F	Over Critical Crash & Severity Rate	■	■	■	■	■
4	8th St NW and 21st Ave NW	· Install a traffic signal · Install eastbound and westbound left-turn lanes · The eastbound and westbound left-turn signal phasing would operate protected/permissive	City	City	Minor Arterial	Minor Arterial	LOS A-C	LOS E-F	Over Average Crash Rate	■	■	■	■	■
5	Broadway and 21st Ave NW	· Install a traffic signal · Lengthen the southbound right-turn lane · Lengthen the northbound left-turn lane	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS A-C	LOS E-F	Over Critical Crash & Severity Rate	■	■	■	■	■
6	Broadway and University Ave E/W	· Install eastbound and westbound right-turn lanes · Implement access management, as opportunities arise · Signal Modification to implement protected/permitted left-turn phasing in the eastbound, westbound, and southbound directions	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS C	LOS C	Over Critical Crash Rate	■	■	■	■	■
7	Broadway and Burdick Expy E/W	· Implement access management, as opportunities arise	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS C	LOS E-F	Over Critical Crash & Severity Rate	■	■	■	■	■
8	Broadway and 11th Ave SE/SW	· Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions · Implement access management, as opportunities arise	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS C	LOS C	Over Average Crash Rate & Over Critical Severity Rate	■	■	■	■	■
9	Broadway and 16th Ave SE/SW	· Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions · Implement access management, as opportunities arise	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS C	LOS A-B	Over Critical Crash & Severity Rate	■	■	■	■	■
10	Broadway and 20th Ave SE/SW	· Install eastbound and westbound right-turn lanes · Implement access management, as opportunities arise	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS A-B	LOS C	Over Critical Crash & Severity Rate	■	■	■	■	■
11	Broadway and 31st Ave SE/SW	· Note, this assumes Broadway is expanded to a six-lane facility · Install eastbound and westbound right-turn lanes · Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions · Signal Modification to implement protected-only phasing for northbound and southbound left-turns · Implement access management, as opportunities arise	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS C	LOS E-F	Over Average Crash Rate	■	■	■	■	■
12	Broadway and 37th Ave SE/SW	· Free southbound right-turn · Install new traffic signal · Allow only one westbound through lane	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS A-B	LOS C	Study Intersection	■	■	■	■	■
13	3rd St NE and Central Ave E	· Note, this assumes 3rd Street is converted from a four-lane undivided section to a three-lane section · Install eastbound and westbound left-turn lanes · Signal Modification to implement protected/permitted left-turn phasing in all directions	City	City	Minor Arterial	Minor Arterial	LOS A-B	LOS A-B	Over Critical Crash & Severity Rate	■	■	■	■	■
14	3rd St SE and 2nd Ave SE	· Note, this assumes 3rd Street is converted from a four-lane undivided section to a three-lane section · Install eastbound and westbound left-turn lanes · Close Front Street	City	City	Minor Arterial	Minor Arterial	LOS A-C	LOS A-B	Over Critical Crash & Severity Rate	■	■	■	■	■

Table 7-4: Intersection Project Evaluation (2 of 2)

#	Location	Scope	Jurisdiction		Functional Classification		Address Intersection Capacity Deficiencies		Address Existing Safety Issues*	Supports Economic Development	Enhances Regional Mobility	ROW Impacts	Limits impact to key environmental features	Supports existing and future land use
			Existing	Planned	Existing	Planned	Existing	Year 2035						
15	3rd St SE and Burdick Expy E	<ul style="list-style-type: none"> <li>Note, this assumes 3rd Street is converted from a four-lane undivided section to a three-lane section</li> <li>Signal Modification to implement protected/permitted left-turn phasing in the northbound and southbound directions</li> </ul>	State of North Dakota	State of North Dakota	Minor Arterial	Minor Arterial	LOS A-B	LOS C	Over Critical Crash & Severity Rate	Good	Good	Good	Good	Good
16	16th St SW and 24th Ave SW	<ul style="list-style-type: none"> <li>Install a traffic signal</li> <li>Provide dual southbound left-turn lanes <ul style="list-style-type: none"> <li>(Associated cost included in 16th St SW reconstruction)</li> </ul> </li> </ul>										Fair	Poor	Good
17	16th St SW and 31st Ave	<ul style="list-style-type: none"> <li>Install northbound right-turn lanes <ul style="list-style-type: none"> <li>(Associated cost included in 16th St SW reconstruction)</li> </ul> </li> <li>Provide southbound right-turn lanes</li> <li>Signal Modification to implement protected/permitted left - turn phasing in the eastbound and westbound directions</li> </ul>	City	City	Minor Arterial	Minor Arterial	LOS A-B	LOS D	Over Critical Crash & Severity Rate	Good	Good	Fair	Good	Good
18	16th St SW and 35th Ave SW	<ul style="list-style-type: none"> <li>Install a traffic signal</li> <li>Install an eastbound right-turn lane</li> </ul>										Fair	Good	Good
19	16th St SW and 37th Ave SW	<ul style="list-style-type: none"> <li>Note, this assumes 37th Avenue (west of the intersection) is expanded to a five-lane section</li> <li>Install a westbound right-turn lane</li> <li>Signal Modification to implement protected/permitted left-turn phasing in all directions</li> </ul>	City	City	Collector	Minor Arterial	LOS A-B	LOS E-F	Over Average Crash Rate	Good	Good	Good	Good	Good
20	16th St NW and 4th Ave NW	<ul style="list-style-type: none"> <li>Note, this assumes 4th Avenue NW is converted from a four-lane undivided section to a three-lane section</li> <li>Install eastbound and westbound left-turn lanes</li> <li>Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> </ul>										Good	Good	Good
21	16th St SW and Burdick Expy W	<ul style="list-style-type: none"> <li>Install a northbound right-turn lane</li> <li>Signal Modification to implement protected/permitted left-turn phasing in all directions</li> </ul>	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	LOS A-B	LOS E-F	Over Critical Crash & Severity Rate	Good	Good	Fair	Good	Good
22	27th St SE and Burdick Expy E	<ul style="list-style-type: none"> <li>Lengthen northbound left-turn lane and install southbound right-turn lane</li> <li>Install eastbound and westbound right-turn lanes</li> <li>Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> <li>Implement access management, as opportunities arise</li> </ul>										Good	Fair	Good
23	US Hwy 2 and 42nd St SE	<ul style="list-style-type: none"> <li>Install a traffic signal</li> <li>Lengthen the turn northbound right-turn lane and southbound left-turn lane along US Highway 2</li> <li>Install a dual left-turn lane and right-turn lane along the southeast 42nd Street SE approach</li> <li>Install a left- and right-turn lane along the northwest 42nd Street SE</li> <li>Implement protected left-turn phasing from 42nd Street SE</li> <li>Implement protected/permitted left-turn phasing along US Highway 2</li> <li>Re-align intersection to improve operations</li> </ul>	State of North Dakota	State of North Dakota	Principal Arterial	Principal Arterial	N/A	LOS E-F	14	Good	Good	Fair	Poor	Good

Phase 1 (2014-2019) Phase 2 (2020-2035) Phase 3 (2035+)

Good  Fair  Poor 

\* Some rankings are in between scales; such as Good/Fair OR Fair/Poor

\* A crash analysis was performed for key intersections within the study area using NDDOT crash and average annual daily traffic data (2008 – 2012). Results from this analysis were used to identify intersections exhibiting above average crash rates (crashes per million vehicle miles).

## REVENUE FORECASTS

This financial analysis has taken a fiscally conscious approach, by forecasting anticipated revenue streams for expansion projects based on past funding levels and revenue that can reasonably be expected in the future. A locally-derived methodology (approved by the PMT) for estimating street and highway revenue was developed using the steps outlined below and is discussed in greater detail throughout this section:

- A baseline funding level was calculated for the City of Minot's key funding streams based on available sources, including the City's Capital Improvement Program (CIP), planning documents, as well as PMT input.
- Annual revenue growth rates were determined after consultation with NDDOT.
- Forecasted funding for short-term (2015–2019) and long-term (2020–2035) time bands was calculated based on baseline revenue levels and agreed upon growth rates.

### FUNDING FORECAST METHODOLOGY

Estimating future transportation funding levels for the City of Minot was much like the process of forecasting land development or future traffic levels. The process required a number of assumptions be made, and a methodology be cooperatively developed by the City and its planning partners. Thus, the methodology used was developed specifically for the metropolitan area, and was coordinated with and reviewed by the PMT. The approach to forecasting future funding, as noted above, relied on reviewing historical revenue streams, establishing funding growth rates and calculated future revenue projections, and summarizing these results into time bands. This process occurred in three steps and its methodology is discussed on the following pages.

#### Step 1: Evaluate Historical Transportation Improvement Funding

The Plan reviewed past CIP funding from 2008-2014 to establish a "reasonable" baseline for forecasting future revenue streams. The CIP assessment took into account past obligated dollars for expansion projects that occurred on the city roadway system dating back to 2008. Historically, budgeted funds for operations and maintenance of the system were not used to forecast future expansion project revenue. Funds from these projects came from local city funds, state gas tax, along with federal, regional, and urban Surface Transportation project funds, miscellaneous grants, and local bonds.

The revenue data was further analyzed to ascertain if past funding sources could reasonably be expected to continue into this Plan's time horizon. All funding sources mentioned above were expected to continue. The methodology also assumed the City will continue to periodically bond for future expansion projects. In that respect, this analysis determined a seven-year average (\$1,918,654), which was used to determine an annual bond debt payment in Step 3.

Finally, the methodology assumed that the City will continue to secure a reasonable level of special funds (e.g., miscellaneous federal grants, National High Priority Program, Transportation Alternative Projects, Highway Safety Improvement Projects, Federal Emergency Management Agency, or future Congressionally Directed Funds) over the next twenty years. The baseline revenue (e.g., annual average expenditures for the last seven years) for each funding category is presented in Table 7-5.

*Table 7-5: Revenue Forecasting Baseline - Annual Average Expenditure Level*

FUNDING SOURCE	BASELINE ASSUMPTION AMOUNT
Local Funds	\$2,588,784
Regional Surface Transportation Project Funds	\$2,028,935
Urban Surface Transportation Project Funds	\$1,800,000
State Gas Tax	\$2,468,988
Special Funding Sources (e.g., grants/earmarks)	\$2,018,571
<b>TOTAL</b>	<b>\$10,905,278</b>

### Step 2: Establish Revenue Growth Rates

The City of Minot worked with the NDDOT to establish agreed upon revenue assumptions. Forecasts of potential funding changes beyond the 2019 levels were based on available state plans, policy documents, and discussions with the PMT. During these deliberations, it was agreed that the City could anticipate the following annual revenue growth rates for each funding category (Table 7-6):

*Table 7-6: Revenue Assumptions –Annual Growth Rate Projections*

FUNDING SOURCE	ANNUAL GROWTH RATE PROJECTION
Local Funds	3.0%
Regional Surface Transportation Funds	1.5%
Urban Surface Transportation Funds	1.5%
State Gas Tax	0.0% (annual allocations will remain the same as base year)
Miscellaneous Grants	0.0% (annual allocations will remain the same as base year)

### Step 3: Determine Future Revenue Streams

Using the established revenue forecast baseline (shown in Table 7-5) and the growth projections (shown in Table 7-6), the future revenue forecasts were prepared through the 2035 planning horizon. This information provided year-by-year revenue forecasts (see Table 7-7), which were later used during the Plan's project prioritization and fiscal constraint analysis. Funds allocated through federal pass through programs were based on the anticipated reauthorization of future transportation bills, and as noted earlier, state funds were related to continuation of gas tax/tab fees, while local funds continuation were assumed to rely on the current revenue sources (e.g., property tax and sales tax).

As noted earlier, the City has historically bonded for source projects and it was assumed this will continue periodically into the future. In that respect, the future revenue stream needed to account for an annual bond payment. Bond debt expenditures between year 2015 and 2019 were based on planned payments for past bond issuances (a total of \$5,000,000). After 2019, it was assumed that bond payments would hold steady at a seven-year average of \$1,918,654 as noted in Step 1.

Table 7-7: Revenue Assumptions and Forecasts (2015-2035)

	LOCAL	REGIONAL STP <sup>1</sup>	URBAN STP <sup>1</sup>	GAS TAX	MISC. GRANTS	BOND DEBT <sup>2</sup>	TOTAL
Baseline	\$2,588,784	\$2,028,935	\$1,800,000	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,905,278
Growth Assumption	3.0%	1.5%	1.5%	0.0%	0.0%	-	-
<b>Phase 1: 2015 - 2019</b>							
2015	\$2,666,448	\$2,059,369	\$1,827,000	\$2,468,988	\$2,018,571	\$0	\$11,040,376
2016	\$2,746,441	\$2,090,260	\$1,854,405	\$2,468,988	\$2,018,571	\$0	\$11,178,665
2017 <sup>3</sup>	\$2,828,835	\$2,121,613	\$1,882,221	\$2,468,988	\$2,018,571	-\$5,500,000	\$5,820,228
2018	\$2,913,700	\$2,153,438	\$1,910,454	\$2,468,988	\$2,018,571	-\$1,918,654	\$9,546,497
2019	\$3,001,111	\$2,185,739	\$1,939,111	\$2,468,988	\$2,018,571	-\$1,918,654	\$9,694,866
<b>Sub Total:</b>	<b>\$14,156,534</b>	<b>\$10,610,419</b>	<b>\$9,413,192</b>	<b>\$12,344,938</b>	<b>\$10,092,857</b>	<b>-\$9,337,308</b>	<b>\$47,280,632</b>
<b>Phase 2: 2020 - 2035</b>							
2020	\$3,091,144	\$2,218,525	\$1,968,198	\$2,468,988	\$2,018,571	-\$1,918,654	\$9,846,772
2021	\$3,183,878	\$2,251,803	\$1,997,721	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,002,307
2022	\$3,279,395	\$2,285,580	\$2,027,687	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,161,566
2023	\$3,377,777	\$2,319,864	\$2,058,102	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,324,647
2024	\$3,479,110	\$2,354,662	\$2,088,973	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,491,650
2025	\$3,583,483	\$2,389,982	\$2,120,308	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,662,678
2026	\$3,690,988	\$2,425,832	\$2,152,113	\$2,468,988	\$2,018,571	-\$1,918,654	\$10,837,837
2027	\$3,801,717	\$2,462,219	\$2,184,394	\$2,468,988	\$2,018,571	-\$1,918,654	\$11,017,236
2028	\$3,915,769	\$2,499,152	\$2,217,160	\$2,468,988	\$2,018,571	-\$1,918,654	\$11,200,986
2029	\$4,033,242	\$2,536,640	\$2,250,418	\$2,468,988	\$2,018,571	-\$1,918,654	\$11,389,204
2030	\$4,154,239	\$2,574,689	\$2,284,174	\$2,468,988	\$2,018,571	-\$1,918,654	\$11,582,007
2031	\$4,278,866	\$2,613,310	\$2,318,437	\$2,468,988	\$2,018,571	-\$1,918,654	\$11,779,517
2032	\$4,407,232	\$2,652,509	\$2,353,213	\$2,468,988	\$2,018,571	-\$1,918,654	\$11,981,859
2033	\$4,539,449	\$2,692,297	\$2,388,511	\$2,468,988	\$2,018,571	-\$1,918,654	\$12,189,162
2034	\$4,675,633	\$2,732,681	\$2,424,339	\$2,468,988	\$2,018,571	-\$1,918,654	\$12,401,558
2035	\$4,815,902	\$2,773,671	\$2,460,704	\$2,468,988	\$2,018,571	-\$1,918,654	\$12,619,182
<b>Sub Total:</b>	<b>\$62,307,823</b>	<b>\$39,783,416</b>	<b>\$35,294,452</b>	<b>\$39,503,801</b>	<b>\$32,297,143</b>	<b>-\$30,698,467</b>	<b>\$178,488,169</b>
<b>Total</b>	<b>\$76,464,358</b>	<b>\$50,393,835</b>	<b>\$44,707,644</b>	<b>\$51,848,739</b>	<b>\$42,390,000</b>	<b>-\$40,035,775</b>	<b>\$225,768,801</b>

## FUNDING ESTIMATES

Based on the Plan's revenue assumptions, the City of Minot can reasonably anticipate approximately \$225.8 million dollars of revenue for expansion projects over the next 25 years. These forecasted funds have been allocated into two time-bands: Phase 1 (2015–2019) and Phase 2 (2020–2035) (see Table 7-8). The first phase should be utilized as a guide in helping prioritize needs in upcoming CIPs. The second phase provides direction in prioritizing longer-term needs, which is discussed later in this chapter.

*Table 7-8: Funding Estimates by Time Bands*

TIME BAND	EXPANSION REVENUE FORECASTS
Phase I (2015 – 2019)	\$47,280,632
Phase II (2020 -2035)	\$178,488,169
<b>Total</b>	<b>\$225,768,801</b>

## IMPLEMENTATION SCHEDULE

This section provides an overview of the process used to develop the Plan's project programming for each implementation period using the identified corridor and intersection roadway improvements. A total of three implementation phases were defined during the planning process, including: Short-Term (2015-2019), Mid-Term (2020-2035) and Long-Term (post-2035).

A major element of this activity was the completion of a project prioritization schedule. The process of developing the project list included coordination and outreach with local and state DOT staff aimed at addressing identified system deficiencies, as well as maintaining consistency with state and local planning policies. Importantly, the project list was developed to be consistent with the Plan's goals, objectives, and system vision. As such, the project list emphasized increased mobility and connectivity along the City's arterial roadway network.

Projects were assigned to implementation phases based upon needs that were identified as a part of the traffic forecasting and traffic operations tasks. These improvements were assigned to the implementation phases to efficiently address system needs in a coordinated manner that sought to address system needs as warranted by technical analysis.

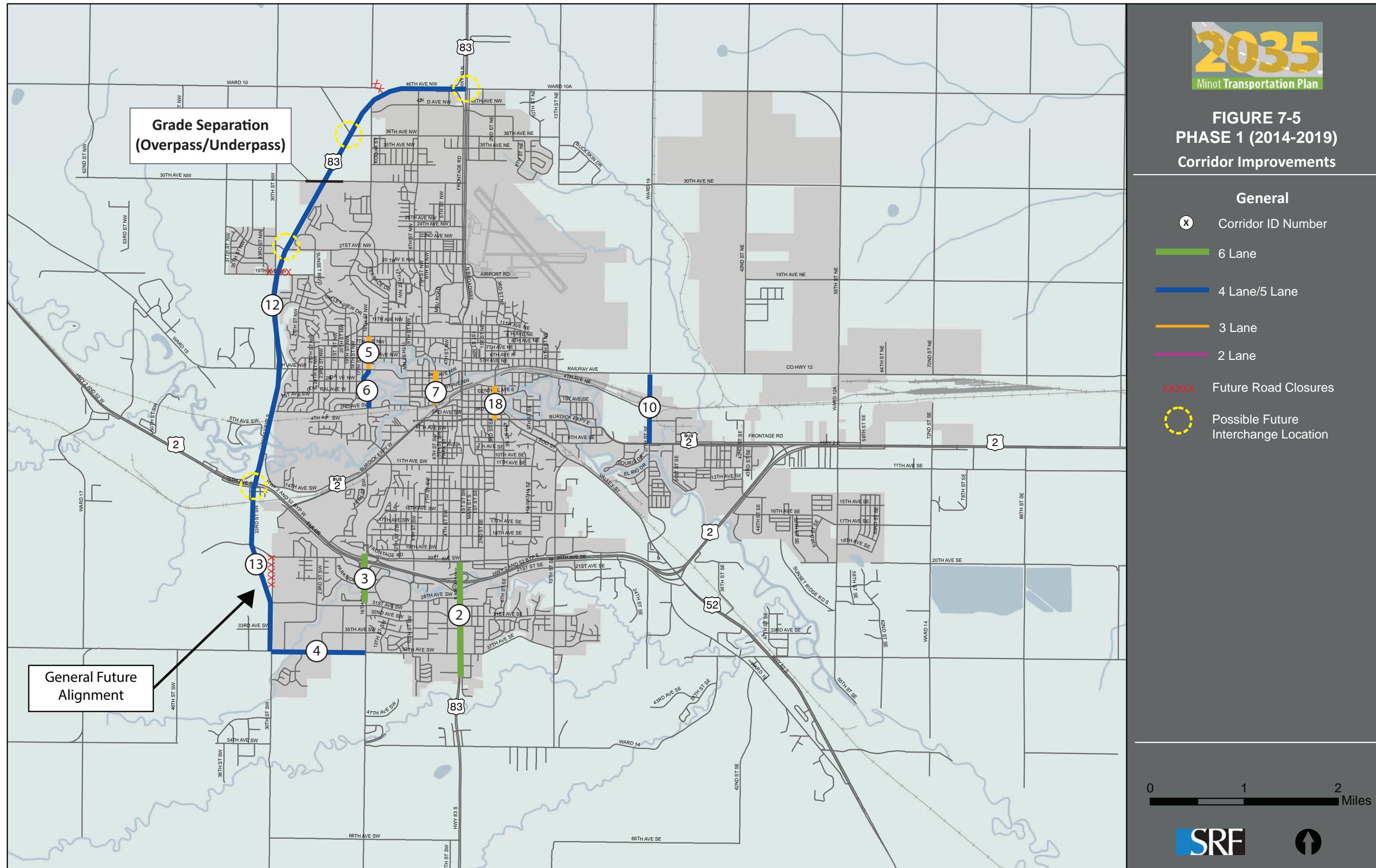
It was assumed that the current operation and maintenance revenues are sufficient to accommodate future needs, but City and County staff should be aware of these expenditures when programming projects with local funds. Therefore, this Plan does not specifically identify or address preservation and maintenance projects. Any updates to this Plan to meet future Metropolitan Planning Organizations (MPO) designation will require a more detailed analysis of operations and maintenance. The staging by implementation phase was required to estimate construction costs for the year of expenditure (YOE) costs, using an agreed upon 4 percent inflation factor. Project construction costs were developed using planning-level cost per unit estimates, which were coordinated with City staff to maintain consistency with other local construction projects that have been recently completed.

The corridor expansion identified for the US 83 NW Bypass (ID #12) does not include costs associated with grade-separated interchanges in the early phases. Further study is required to identify the appropriate location and design of potential grade-separated facilities along the corridor.

Corridor expansion would provide the additional needed capacity along the corridor, while the grade-separated facilities would address operational and access issues as they arise over time along the corridor to maintain a suitable bypass facility. It is anticipated that access along the US 83 NW Bypass corridor can be managed in the early phases with at-grade traffic controlled (signalization) intersections to facilitate access to/from the corridor. Under later phases grade-separation will be necessary; therefore, a project is identified with costs under Phase 3.

Figures 7-5 through 7-10 illustrate the corridor and intersection improvements for the following phases: Phase 1 (2015-2019), Phase 2 (2020-2035) and Phase 3 (post 2035). Table 7-9 through Table 7-14 summarize the corridor and intersection improvement projects by phase, including present year and year of expenditure cost.

Figure 7-5: Phase 1 (2014-2019) Corridor Improvements

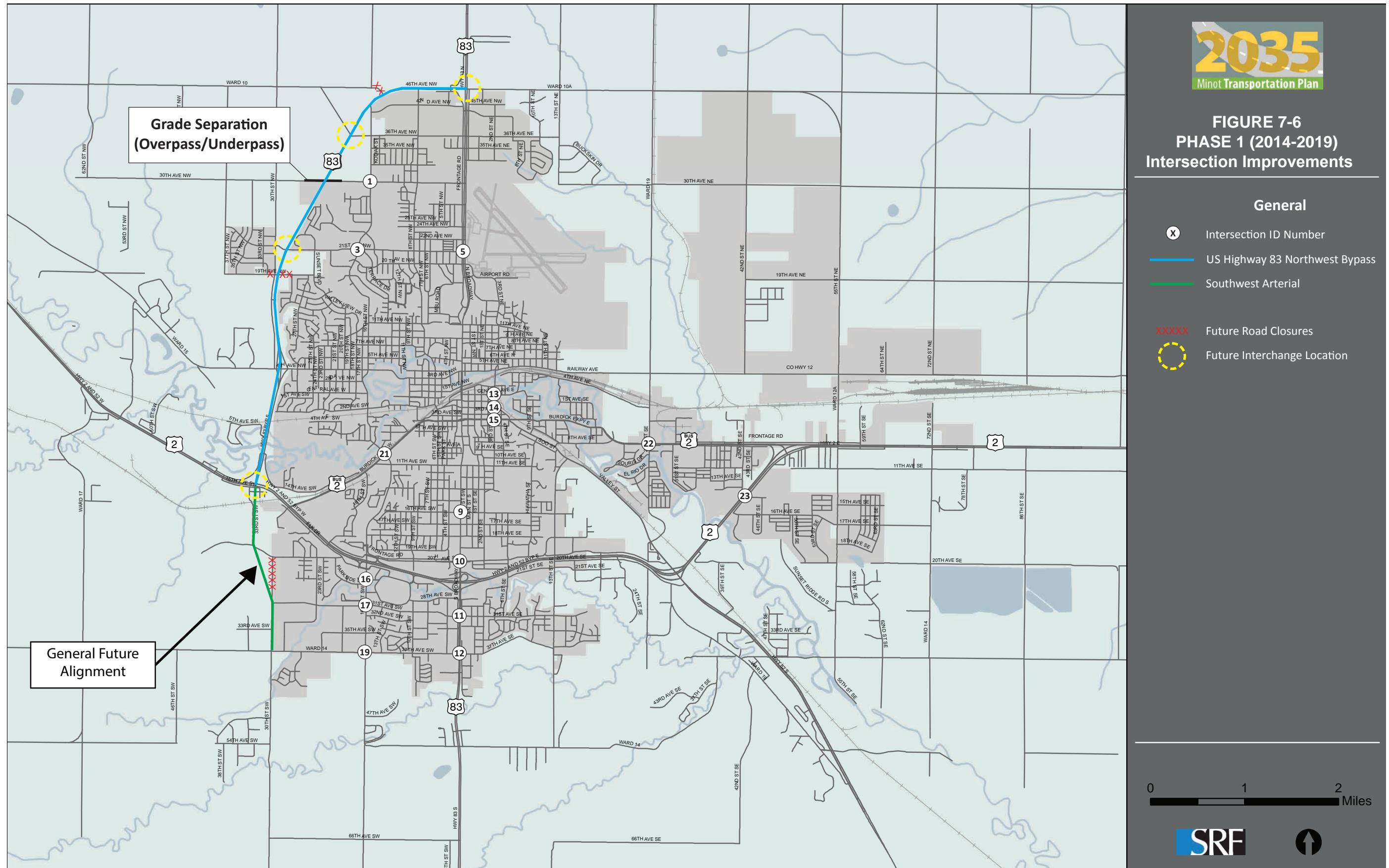


**Table 7-9: Phase 1 - Corridor Improvement Evaluation**

#	Location		Scope	Improvement Type	Cost (Yr 2014)	Timeframe	YOE (based on Phase)
6	16th St NW	(4th Ave NW to 2nd Ave SW)	- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)	System Management	\$0	Phase 1	\$0
			- Select intersection turn lane and traffic control improvements*				
7	6th St NW/SW	(3rd Ave NW to 2nd Ave SW)	- Re-stripe for three-lane facility	System Management	\$10,000	Phase 1	\$11,000
			- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			- Select intersection turn lane and traffic control improvements*				
5	16th St NW	(University Ave to 4th Ave NW)	- Re-stripe for three-lane facility	System Management	\$20,000	Phase 1	\$22,500
			- Select intersection turn lane and traffic control improvements*				
18	3rd St SE	(E Burdick Expy to 1st Ave NE)	- Re-stripe for three-lane facility	System Management	\$20,000	Phase 1	\$22,500
			- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
10	27th St NE	(Burdick Expy to Railway Ave NE)	- Expand to a four-lane facility	Reconstruction	\$8,590,000	Phase 1	\$9,650,000
			- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			- Select intersection turn lane and traffic control improvements*				
4	37th Ave SW	(Future Southwest Arterial to 16th St SW)	- Expand to a five-lane facility	Reconstruction	\$15,680,000	Phase 1	\$17,650,000
			- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			- Select intersection turn lane and traffic control improvements*				
3	16th St SW	(20th Ave SW to 31st Ave SW)	- Expand to a six-lane facility	Reconstruction	\$19,010,000	Phase 1	\$21,400,000
			- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			- Select intersection turn lane and traffic control improvements*				
2	Broadway	(20th Ave SW to 41st Ave SW)	- Expand to a six-lane facility	Reconstruction	\$21,000,000	Phase 1	\$23,600,000
			- Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			- Select intersection turn lane and traffic control improvements*				
13	Future Southwest	(US Hwy 2 to 37th Ave SW)	- Construct new four-lane urban facility	Reconstruction	\$37,500,000	Phase 1	\$42,200,000
			- Implement access management strategies, as opportunities arise				
12	US Hwy 83 Bypass	(Broadway to US Hwy 2)	- Expand to a four-lane facility	Expansion	\$46,150,000	Phase 1	\$51,900,000
			- Construct at-grade signalized intersections, at up to two (2) locations (if necessary)				

\*Costs associated with intersection improvements are documented in the "Intersection Improvement" matrices.

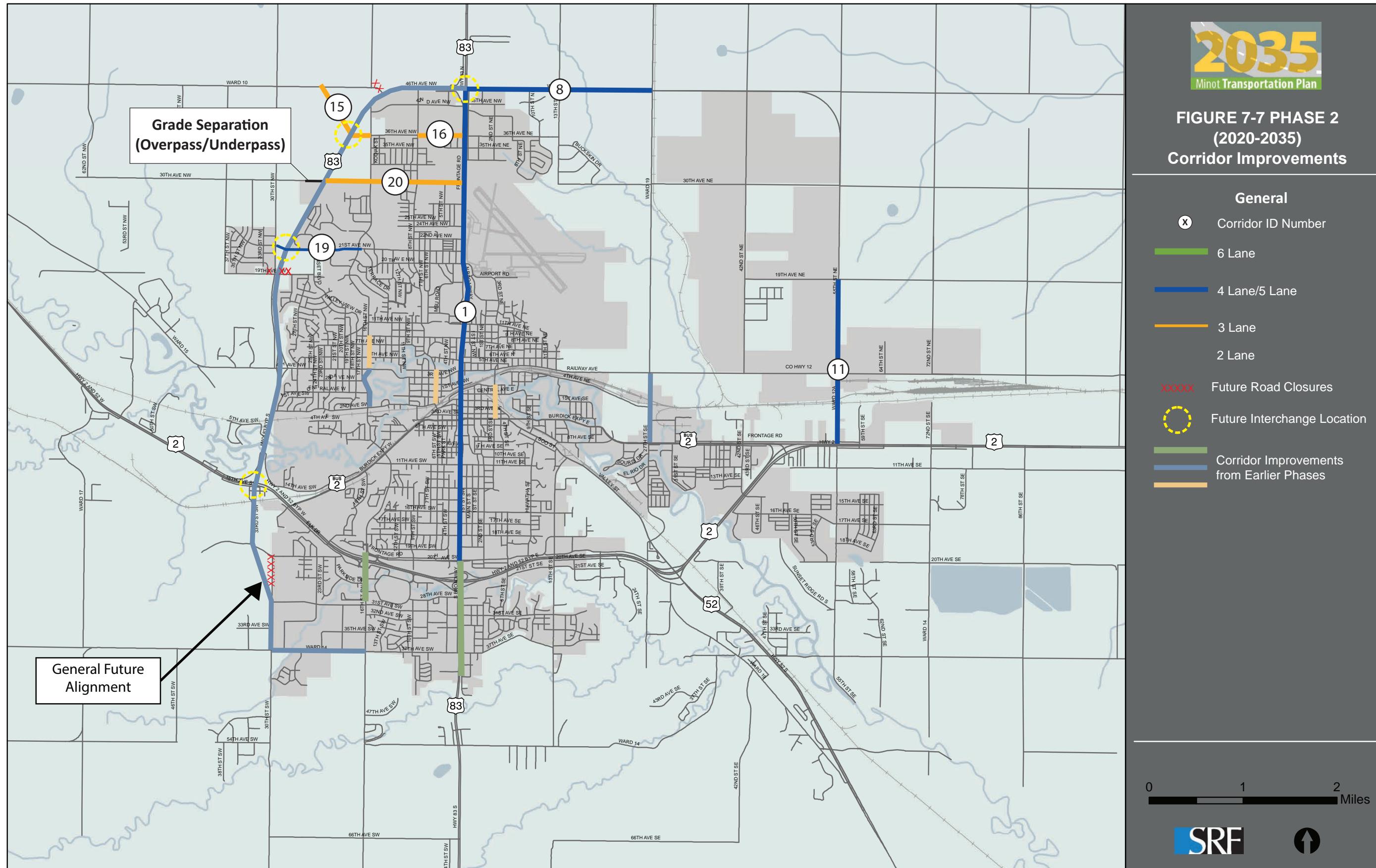
Figure 7-6: Phase 1 (2014-2019) Intersection Improvements



**Table 7-10: Phase 1 - Intersection Improvement Evaluation**

#	Location	Scope	Cost (Yr 2014)	Timeframe	YOE (based on Phase)
1	16th St NW and 30th Ave NW	· Add All-Way Stop Control	\$1,000	Phase 1	\$1,100
9	Broadway and 16th Ave SE/SW	· Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions · Implement access management, as opportunities arise	\$10,000	Phase 1	\$11,200
15	3rd St SE and Burdick Expy E	· Note, this assumes 3rd Street is converted from a four-lane undivided section to a three-lane section · Signal Modification to implement protected/permitted left-turn phasing in the northbound and southbound directions	\$20,000	Phase 1	\$22,500
14	3rd St SE and 2nd Ave SE	· Note, this assumes 3rd Street is converted from a four-lane undivided section to a three-lane section · Install eastbound and westbound left-turn lanes · Close Front Street	\$160,000	Phase 1	\$180,000
13	3rd St NE and Central Ave E	· Note, this assumes 3rd Street is converted from a four-lane undivided section to a three-lane section · Install eastbound and westbound left-turn lanes · Signal Modification to implement protected/permitted left-turn phasing in all directions	\$320,000	Phase 1	\$360,000
17	16th St SW and 31st Ave	· Install northbound right-turn lanes o (Associated cost included in 16th St SW reconstruction) · Provide southbound right-turn lanes · Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions	\$350,000	Phase 1	\$394,000
19	16th St SW and 37th Ave SW	· Note, this assumes 37th Avenue (west of the intersection) is expanded to a five-lane section · Install a westbound right-turn lane · Signal Modification to implement protected/permitted left-turn phasing in all directions	\$360,000	Phase 1	\$405,000
3	16th St NW and 21st Ave NW	· Install a traffic signal	\$400,000	Phase 1	\$450,000
10	Broadway and 20th Ave SE/SW	· Install eastbound and westbound right-turn lanes · Implement access management, as opportunities arise	\$460,000	Phase 1	\$517,000
11	Broadway and 31st Ave SE/SW	· Note, this assumes Broadway is expanded to a six-lane facility · Install eastbound and westbound right-turn lanes · Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions · Signal Modification to implement protected-only phasing for northbound and southbound left-turns · Implement access management, as opportunities arise	\$480,000	Phase 1	\$540,000
12	Broadway and 37th Ave SE/SW	· Free southbound right-turn · Install new traffic signal · Allow only one westbound through lane	\$480,000	Phase 1	\$540,000
16	16th St SW and 24th Ave SW	· Install a traffic signal · Provide dual southbound left-turn lanes o (Associated cost included in 16th St SW reconstruction)	\$480,000	Phase 1	\$540,000
21	16th St SW and Burdick Expy W	· Install a northbound right-turn lane · Signal Modification to implement protected/permitted left-turn phasing in all directions	\$680,000	Phase 1	\$765,000
22	27th St SE and Burdick Expy E	· Lengthen northbound left-turn lane and install southbound right-turn lane · Install eastbound and westbound right-turn lanes · Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions · Implement access management, as opportunities arise	\$680,000	Phase 1	\$765,000
5	Broadway and 21st Ave NW	· Install a traffic signal · Lengthen the southbound right-turn lane · Lengthen the northbound left-turn lane	\$850,000	Phase 1	\$956,000
23	US Hwy 2 and 42nd St SE	· Install a traffic signal · Lengthen the turn northbound right-turn lane and southbound left-turn lane along US Highway 2 · Install a dual left-turn lane and right-turn lane along the southeast 42nd Street SE approach · Install a left- and right-turn lane along the northwest 42nd Street SE · Implement protected left-turn phasing from 42nd Street SE · Implement protected/permitted left-turn phasing along US Highway 2 · Re-align intersection to improve operations	\$3,740,000	Phase 1	\$4,205,000

Figure 7-7: Phase 2 (2020-2035) Corridor Improvements

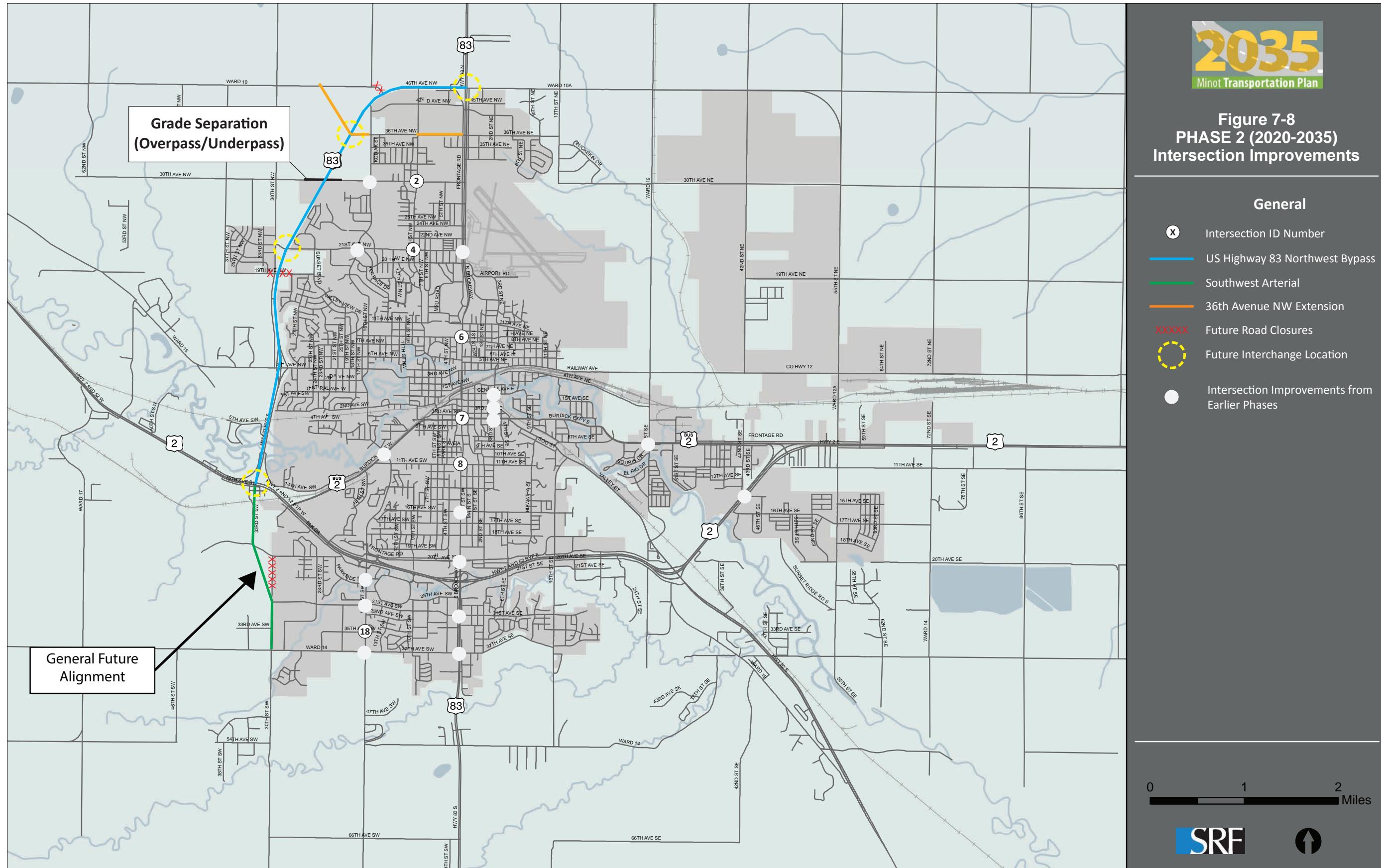


**Table 7-11: Phase 2 - Corridor Improvement Evaluation**

#	Location		Scope	Improvement Type	Cost (Yr 2014)	Timeframe	YOE (based on Phase)
1	Broadway	(46th Ave NW to 20th Ave SW)	· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)	System Management	\$0	Phase 2	\$0
			· Select intersection turn lane and traffic control improvements*				
			· Note, this assumes a four-lane facility will be maintained (i.e. no expansion to a six-lane facility due to right-of-way constraints), in conjunction with expansion of the US Hwy 83 NW Bypass				
16	36th Ave NW	(8th St NW to Broadway)	· Construct new three-lane facility	Reconstruction	\$5,930,000	Phase 2	\$9,850,000
			· Implement access management strategies, as opportunities arise				
15	36th Ave NW	(46th Ave NW to 16th St NW)	· Construct new three-lane facility	Reconstruction	\$8,750,000	Phase 2	\$14,550,000
			· Implement access management strategies, as opportunities arise				
8	46th Ave NE	(Broadway to 27th St NE)	· Expand to a four-lane facility	Expansion	\$10,970,000	Phase 2	\$18,250,000
			· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			· Select intersection turn lane and traffic control improvements*				
11	55th St NE	(US Hwy 2 to 19th Ave NE)	· Expand to a four-lane facility	Expansion	\$13,490,000	Phase 2	\$22,450,000
			· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
			· Select intersection turn lane and traffic control improvements*				
19	21st Ave NW	(30th St NW to 16th St NW)	· Expand to a four-lane facility	Reconstruction	\$7,600,000	Phase 2	\$12,650,000
			· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				
20	30th Ave NW	(US 83 NW Bypass to Broadway)	· Expand to a three-lane facility	Reconstruction	\$16,940,000	Phase 2	\$28,200,000
			· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)				

\* Project costs are included as a part of the intersection improvements

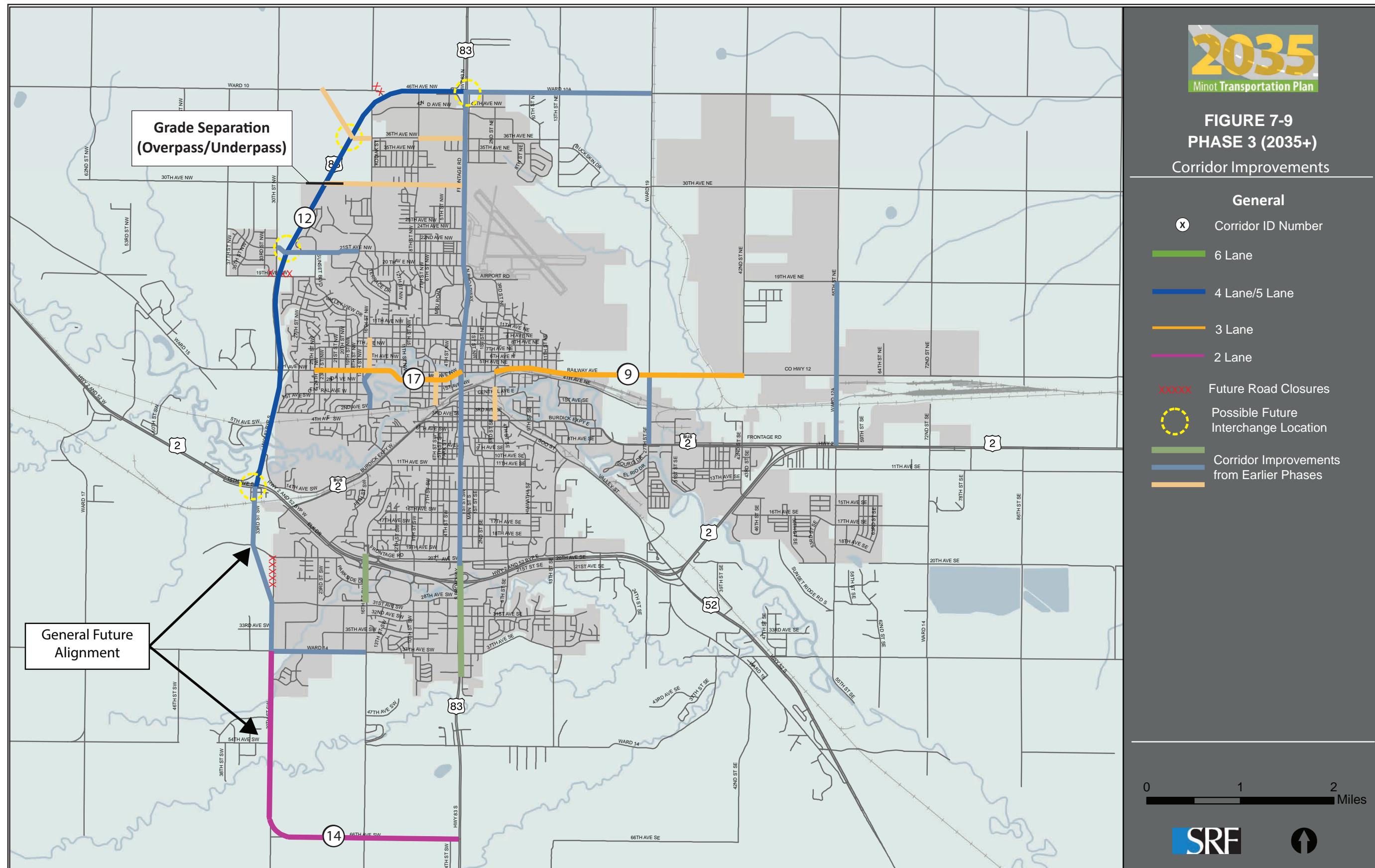
Figure 7-8: Phase 2 (2020-2035) Intersection Improvements



**Table 7-12: Phase 2 - Intersection Improvement Evaluation**

#	Location	Scope	Cost (Yr 2014)	Timeframe	YOE (based on Phase)
7	Broadway and Burdick Expy E/W	· Implement access management, as opportunities arise	\$0	Phase 2	\$0
2	8th St NW and 30th Ave NW	· Add All-Way Stop Control	\$1,000	Phase 2	\$1,700
8	Broadway and 11th Ave SE/SW	· Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions	\$10,000	Phase 2	\$16,500
		· Implement access management, as opportunities arise			
6	Broadway and University Ave E/W	· Install eastbound and westbound right-turn lanes	\$380,000	Phase 2	\$633,000
		· Implement access management, as opportunities arise			
		· Signal Modification to implement protected/permitted left-turn phasing in the eastbound, westbound, and southbound directions			
4	8th St NW and 21st Ave NW	· Install a traffic signal	\$400,000	Phase 2	\$666,000
		· Install eastbound and westbound left-turn lanes			
		· The eastbound and westbound left-turn signal phasing would operate protected/permissive			
18	16th St SW and 35th Ave SW	· Install a traffic signal	\$630,000	Phase 2	\$1,049,000
		· Install an eastbound right-turn lane			

Figure 7-9: Phase 3 (2035+) Corridor Improvements



**Table 7-13: Phase 3 - Corridor Improvement Evaluation**

#	Location		Scope	Improvement Type	Cost (Yr 2014)	Timeframe	YOE (based on Phase)	
17	4th Ave NW	(25th St NW to Broadway)	<ul style="list-style-type: none"> <li>· Re-stripe for three-lane facility</li> <li>· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> </ul>		System Management	\$90,000	Phase 3	\$205,000
9	Railway Ave	(3rd St NE to 42nd St NE)	<ul style="list-style-type: none"> <li>· Expand to a three-lane facility</li> <li>· Implement access management strategies, as opportunities arise (i.e. consolidate and/or modify access)</li> <li>· Select intersection turn lane and traffic control improvements*</li> </ul>		Reconstruction	\$31,920,000	Phase 3	\$72,750,000
14	Future Southwest	(37th Ave SW to US Hwy 83)	<ul style="list-style-type: none"> <li>· Construct new two-lane rural facility</li> <li>· Implement access management strategies, as opportunities arise</li> </ul>		Reconstruction	\$32,210,000	Phase 3	\$73,400,000
12	US Hwy 83 Bypass	(Broadway to US Hwy 2)	<ul style="list-style-type: none"> <li>· Construct grade-separated interchanges, assumed at up to two (2) locations</li> <li>· Further analysis is necessary to determine additional interchange needs beyond the two (2) identified here</li> </ul>		Reconstruction	\$27,800,000	Phase 3	\$63,350,000

\* Project costs are included as a part of the intersection improvements

Figure 7-10: Phase 3 (2035+) Intersection Improvements

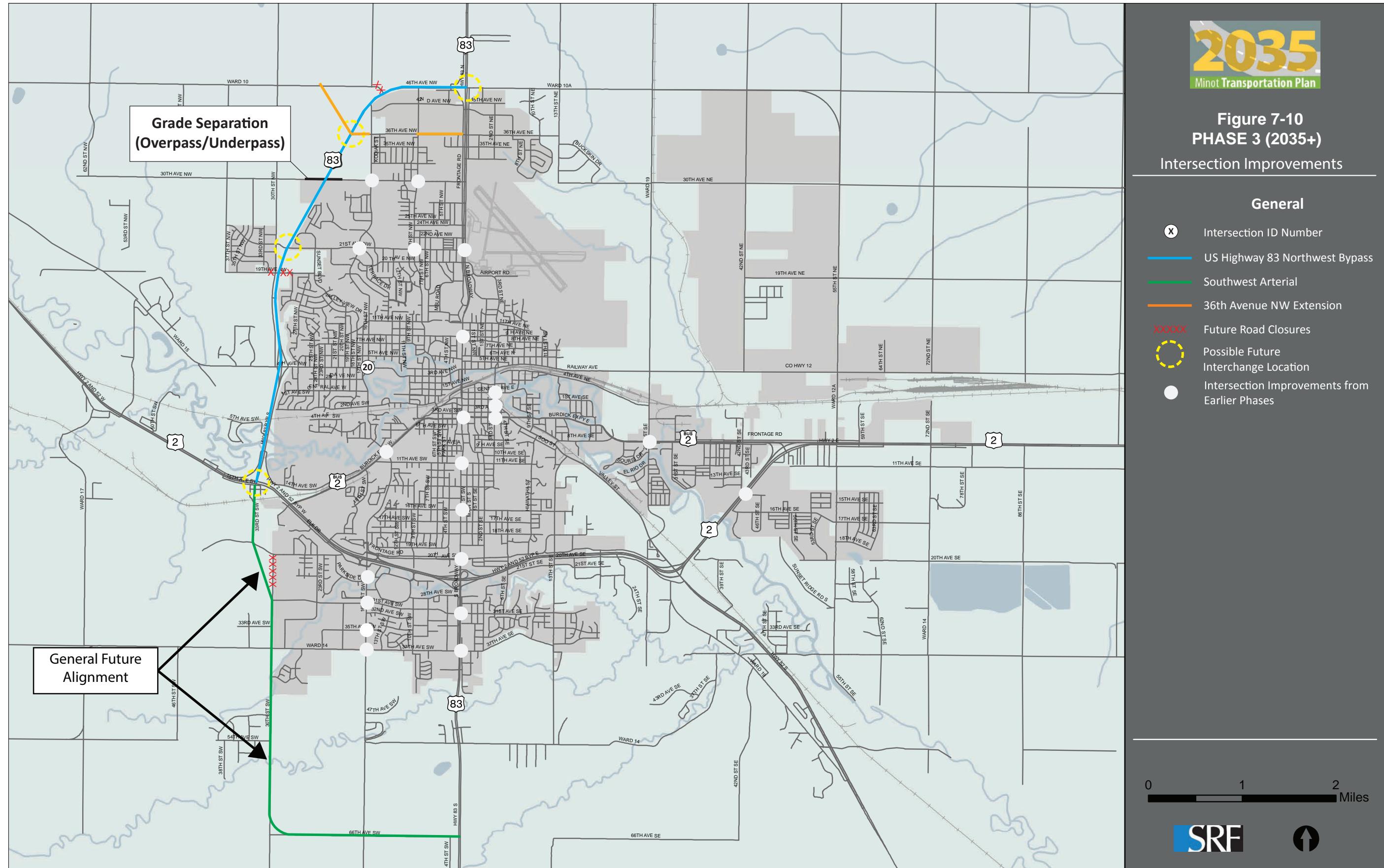


Table 7-14: Phase 3 - Intersection Improvement Evaluation

#	Location	Scope	Cost (Yr 2014)	Timeframe	YOE (based on Phase)
20	16th St NW and 4th Ave NW	<ul style="list-style-type: none"> <li>· Note, this assumes 4th Avenue NW is converted from a four-lane undivided section to a three-lane section</li> <li>· Install eastbound and westbound left-turn lanes</li> <li>· Signal Modification to implement protected/permitted left-turn phasing in the eastbound and westbound directions</li> </ul>	\$510,000	Phase 3	\$1,160,000

## FUNDING GAPS

This section provides an overview of the process used to evaluate the Plan's forecasted revenue and projected expenditures for each implementation period. The identification of potential funding gaps provides valuable information for local stakeholders and decision-makers that will help guide the successful implementation of the Plan's corridor and intersection projects, while establishing the need to evaluate alternative revenue or funding strategies.

Although the projects included as a part of this evaluation/prioritization process considered construction and ROW costs, the Plan was not developed to meet FHWA fiscally-constrained guidelines and did not include an evaluation of pavement preservation or maintenance needs as required for Metropolitan Planning Areas, since Minot has not received this designation.

As previously discussed, revenue forecasts were completed in an effort to take a fiscally conscious approach by forecasting anticipated revenue streams for expansion projects based on past funding levels and anticipated growth rates. Using this approach, revenue forecasts were derived to determine what may reasonably be expected in the future. This data was compared against the Plan's project prioritization schedule to identify potential funding gaps that may inhibit the implementation of the identified prioritization schedule.

Figure 7-11 summarizes the Plan's anticipated revenue stream through year 2035 compared to the proposed roadway improvement projects, identified by the project prioritization schedule. This summary indicates that there will be nearly a \$270M revenue shortfall over the life of the Plan.

*Figure 7-11: Expenditure and Revenue Comparison and Funding Shortfall*

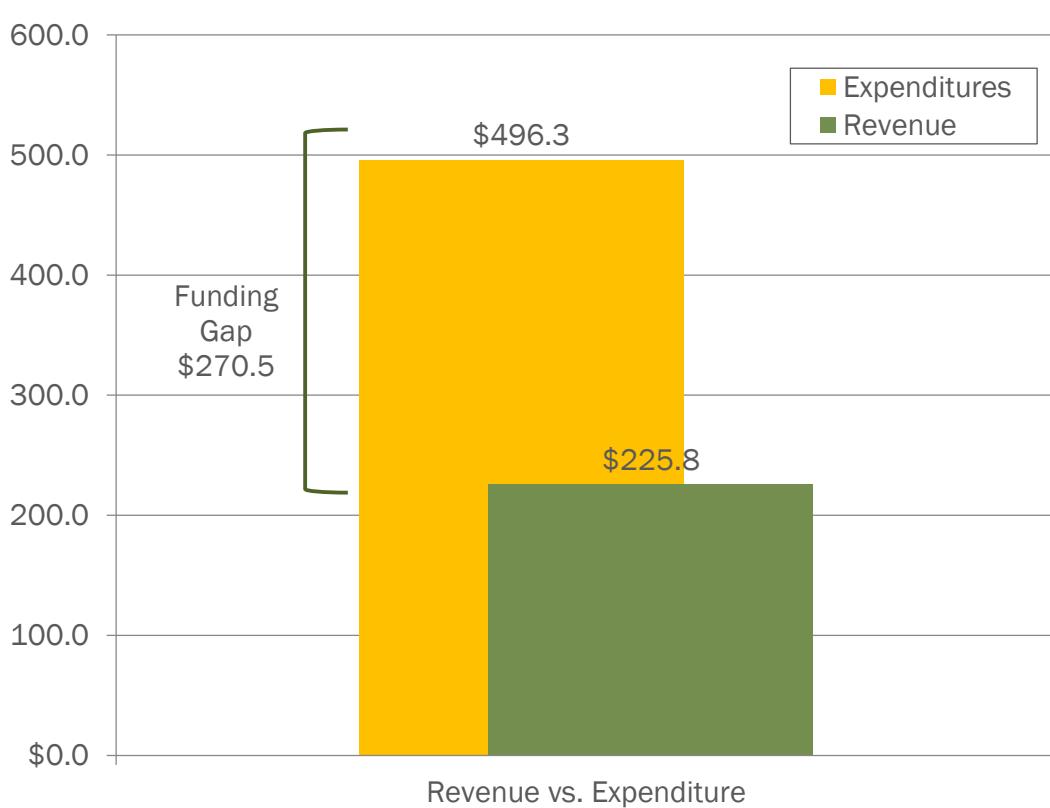
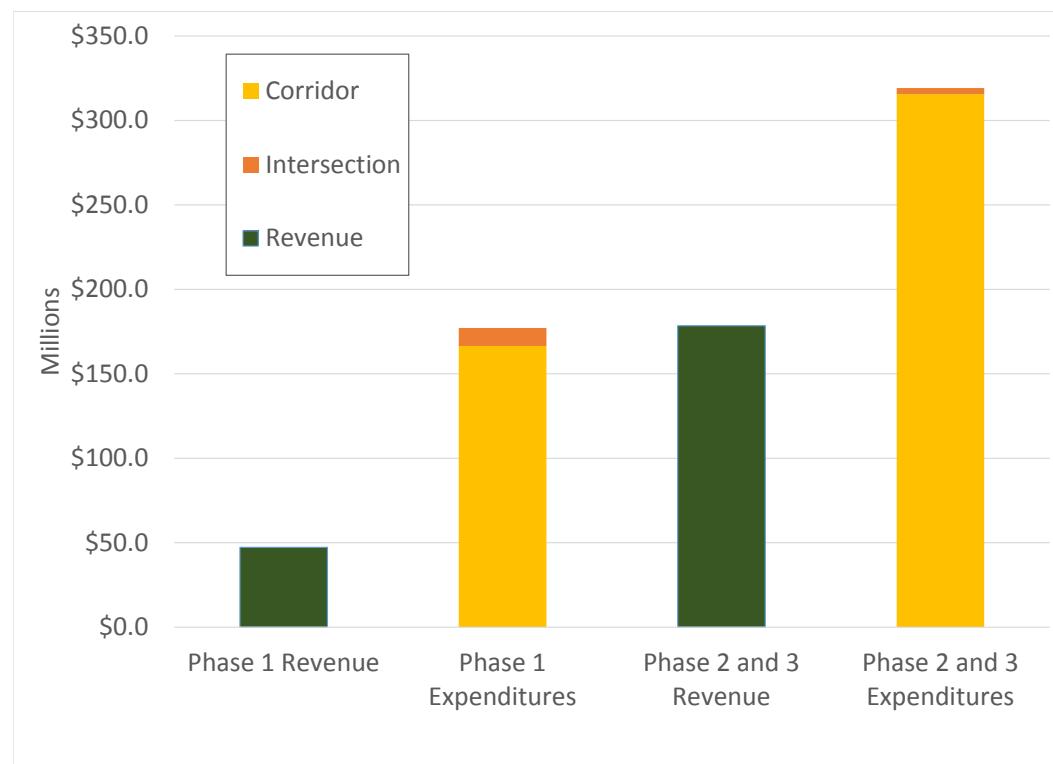


Table 7-15 and Figure 7-12 illustrate the total anticipated project costs and anticipated revenue for the implementation schedule phases. Note that the expenditures for Phases 2 and 3 were combined to match revenue forecasts for similar time horizons. Due to the rapid development and growth pressures within the Minot region, a large proportion of roadway improvement projects were identified in Phase 1 to meet the immediate needs of the region. This project prioritization resulted in a funding gap of nearly \$130M in Phase 1, which is primarily the result of four “Mega Projects.”

*Table 7-15: Expenditure and Revenue Summary by Implementation Phase*

	PHASE 1	PHASE 2 AND 3
Revenue Total	\$47,300,000	\$178,500,000
Expenditure Total	\$177,100,000	\$319,200,000
Corridor Expenditure	\$166,500,000	\$315,600,000
Intersection Expenditure	\$10,600,000	\$3,600,000

*Figure 7-12: Expenditure and Revenue Summary by Implementation Phase*



## MEGA PROJECTS

A total of four projects in Phase 1 account for approximately \$141 million in expenditures and have been defined as “mega projects.” These projects represent major expansion or new roadway construction projects that facilitate and enhance regional connectivity, safety, and mobility. The proposed improvements and costs for each of the four “mega projects” are summarized below:

- US 83 NW Bypass – Four-Lane Expansion
  - Project extends from North Broadway to US 2, staged with signalized at-grade intersections, transitioning to grade separations at select locations in the future
  - Estimated Project Cost: \$51.9M (YOE Estimate 2017)
- Southwest Arterial – Stage 1
  - Stage 1 extends from US 2 to 37th Avenue SW as a four-lane divided urban arterial
  - Estimated Project Cost: \$42.2M (YOE Estimate 2017)
- US 83 (South Broadway) – Six-Lane Expansion
  - Project extends from 20th Avenue SW to 41st Avenue SW
  - Estimated Project Cost: \$23.6M (YOE Estimate 2017)
- 16th Street SW – Six-Lane Expansion
  - Project extends from 20th Avenue SW to 31st Avenue SW
  - Estimated Project Cost: \$21.4M (YOE Estimate 2017)

Based upon the funding gap evaluation, the City of Minot can expect an approximate \$94 million shortfall in revenues trying to meet these four critical regional project needs. It is anticipated state assistance will be needed in the short-term to help implement the project prioritization schedule as planned. Each of the identified “mega projects” directly benefits the federal and state system and has been coordinated with other local improvement projects to enhance the regional transportation system as a whole.

This analysis indicates that additional assistance will be needed from other stakeholders to accomplish the Plan’s vision (i.e., NDDOT, State Legislative appropriations, special federal programs, etc.). If these mega projects were funded wholly by the NDDOT with a combination of federal and other funds over the implementation time period, it would still leave an approximate \$36M revenue shortfall for all of Phase 1 improvements that the City will need to address through innovative funding strategies (or deferring projects). However, even if the City was able to address most of its current local system projects, such investments will not achieve their full operational benefits identified in the Plan unless the regional “mega projects” are undertaken also.

## ALTERNATIVE FUNDING STRATEGIES

In order to address existing and future transportation infrastructure system needs, Minot officials must increase ongoing capital funding to address the identified revenue shortfalls.

Minot leaders should embrace the following general guiding principles as they seek to reduce funding shortfalls:

- Leverage funds and seek private sector partnerships. While continuing to pursue appropriate external sources, including federal and state programs, investigate collaboration opportunities with the NDDOT and Ward County to maximize/leverage resources; and based on the philosophy that “growth should help pay for its infrastructure”, promote greater public/private cooperation on projects of mutual benefit.
- Adapt policy to changing conditions. Continue to maximize all funding sources within the City’s control (internal sources) and evaluate the appropriate funding mix (general fund revenues, bonding, assessments, etc.) for specific infrastructure project types on an ongoing basis.
- Pursue legislative authorization to allow new funding methods, which can minimize the anticipated funding shortfalls.
- Educate area legislators and upper NDDOT management staff on the four mega projects identified by this Plan, which directly benefit or serve NDDOT facilities, and seek oil and gas extraction tax funds to offset such energy-driven transportation needs. It is important to note that oil and gas extraction tax fund distribution is not determined by the NDDOT.

Recommended below are three specific strategies (and eight sub activities) that City officials can examine in the future, as means of implementing the guiding principles noted above. Undertaking any of these recommendations will help reduce Minot’s anticipated twenty year funding gap as identified by the Plan.

### SPECIAL FUNDING OPPORTUNITIES

#### North Dakota Energy Funds for Impacted Communities

Since the 1980s, the State has taxed gross oil extraction and production at about 11.5 percent, with an effective rate near 10.5 percent. With production exceeding one million barrels per day in 2014, a substantial revenue base has been generated for use in assisting energy impacted areas.

Seventy percent of these funds are allocated by the Legislature bi-annually. Of the funds, in the recent past, the Legislature has provided approximately \$1.2 billion to the NDDOT for needed transportation improvements in the “oil patch.” It is anticipated that future set-asides will continue. Projects for this Special Oil Infrastructure Fund are selected by NDDOT officials.

The remainder of the gross gas production and oil extraction taxes are directed to the North Dakota Legacy Fund.

This Fund was created in 2010 when the voters of North Dakota approved a constitutional amendment such that 30 percent of oil and gas gross production and oil extraction taxes (on oil and gas produced after June 30, 2011) be transferred to the Legacy Fund. The principal and earnings of the Legacy Fund may not be spent until after June 30, 2017, and any expenditure of principal after that date will require a vote of at least two-thirds of the members elected to each house of the Legislative Assembly. Not more than 15 percent of the principal of the Legacy Fund may be spent during a biennium. The Legislative Assembly may transfer funds from any source to the Legacy Fund and such transfers become part of the principal of the Fund. The State Investment Board is

responsible for investment of the principal of the Legacy Fund. Interest earnings accruing after June 30, 2017, will be transferred to the general fund at the end of each biennium.

Based on the fluctuating per barrel price of oil, it is estimated the fund may have \$5-6 billion in it by 2017, at which time some level of drawdown can be determined by the Legislative Assembly.

In both cases, there appears to be a substantial amount of funding available in the future to assist energy-impacted communities, such as Minot, in addressing their transportation and other infrastructure needs. It is anticipated that any of the mega projects identified earlier will qualify for this potential assistance, especially since each benefit the region and state, and each can be directly tied to energy-related growth.

### **Congressional Authorized Programs**

Congress periodically funds special programs aimed at certain national objectives. For example, in 2009 and 2010, Congress appropriated funds through the American Reinvestment and Recovery Act (ARRA) to stimulate the economy and create jobs, and since 2009, Congress has appropriated funds for the Transportation Investment Generating Economic Recovery Grant (TIGER) program for transportation projects that create national, regional, or metropolitan transportation or economic benefits. Minot received ARRA funds, and a TIGER grant in 2010. The TIGER grant funds, \$14 million, helped construct the 55th Street NE Grade-Separation. Therefore, based on recent experience it would be wise for Minot to have one or two projects shovel-ready, just in case.

Such funding can usually be used for a wide range of construction activities, such as roadway and bridge reconstruction, intermodal facilities, interchange construction, ROW, intersection improvements, trails/pedestrian improvement, etc.

### **Congressionally Designated High Priority Projects or New Programs**

Congressional funding is sometimes directed to specific projects that will have significant impact on a community's transportation system, are identified as a high priority on a regional or national basis, or achieve targeted national objectives. Typically such projects require congressional authorization and appropriation action that are most frequently accomplished every five to six years, during reauthorization of the federal transportation program. Congress recently has shown a declining tendency to "earmark" funds for state and local projects during its periodic reauthorization of the US DOT programs (i.e., no earmarks were funded by MAP-21). The new 2015 reauthorization process is underway and it is unlikely to include congressionally directed project funding; nonetheless, in the future this Congressional practice may again be applied.

While reauthorization may not provide any earmarked funds, it may provide new programs that Minot's projects might compete - for example, a national freight improvement program. Any final legislation should be reviewed for new/modified programs that may be applicable to the transportation needs identified by the City.

Typically, to be eligible for this type of federal assistance, projects must represent a significant need in terms of safety, congestion, mobility, or economic development; provide relief to the federal National Highway System (NHS); reduce the impact of federal actions; or, fulfill a national or regional objective.

## **VALUE CAPTURE ANALYSIS AND METHODS**

### **Benefit Study of Infrastructure Improvements**

A promising new strategy to help local governments address transportation system funding gaps is value capture. This method aims to document and recover the value of benefits received by property

owners and developers as a result of infrastructure improvements. Most often the value of enhanced accessibility provided by a transportation improvement is never evaluated. Therefore, because such value is not known or understood, no effort is made to capture a portion of such revenue to help finance the improvements that create the increased value. In turn, any enhanced value that does come from a transportation improvement is a windfall enjoyed by property owners, and to a lesser extent local property tax gains. By estimating the value of transportation improvements and implementing strategies to capture that revenue, a city can supplement project financing and expedite project completion. Researchers at the University of Minnesota have developed a model which evaluates the estimated market value (EMV \$/acre) of nearby land before and after a major transportation improvement (i.e., new interchange on a freeway). The model is designed to isolate the so-called "highway premium." Using this methodology, the researchers found significant evidence of a highway premium (Value Increase and Value Capture: TH 610 Case Study, Jerry Zhao, Humphrey School of Public Affairs) on a specific state trunk highway in Maple Grove, MN.

This highway premium can be captured by short term, direct private participation (see Public-Private partnership section) through voluntary developer cash or land contributions for a projects funding package, or by longer term, indirect participation (See Tax Increment Financing below).

### **Tax Increment Financing (TIF)**

Tax increment financing is a method of funding infrastructure improvements (including roadways) that are needed immediately, using the additional tax revenue to be generated in future years from a specific development to pay-off public bonds. This future tax revenue, which is dedicated for a period of years to the repayment of the bonds or to other improvements within the TIF project area, reverts back to the city, county, and school district after the bonds are retired. TIFs can provide an innovative funding method for the capture of enhanced property value generated by the construction of a major transportation facility, or access on to arterial, or internal street systems for certain development or redevelopment areas.

## **PUBLIC/PRIVATE PARTNERSHIPS**

### **Private Donations and Dedicated Right-of-Way**

Private donations/cooperation and dedicated ROW are important methods that can supplement public infrastructure expenditures. In some instances, developers will donate ROW, accept special assessment, or make cash contributions necessary for the key street system improvements or interchange footprints during the platting process because of their desire to develop a site and secure the necessary public infrastructure needed to increase its marketability and value. All agencies, especially cities, should make efforts to preserve ROW for future arterial capacity expansion. Early corridor preservation actions can avoid costly land purchases after development has increased property values.

Other forms of private participation may include providing cash contributions for the funding package in general, or accepting the special assessment needed to construct the prerequisite transportation infrastructure that will serve the private development. In other metropolitan areas there is growing interest in these joint funding efforts, usually involving state and city funds, or private contributions. Such cooperation can advance the construction of a project (for example a new interchange) well ahead of when it could have otherwise been programmed, based exclusively on the availability of public funding availability.

## Negotiated Fees for Specific Developments

While North Dakota does not currently have enabling legislation to permit cities to implement impact fees, it is possible using a rational impact fee system to “negotiate” with developers as part of the municipal permit approvals. If the negotiated fee is consistently applied, is based on a defensible technical analysis, and uses the fees exclusively for infrastructure improvements related to the development, these methods have been accepted by the private sector in other locations. This form of developer participation relies on negotiating fees for desired or necessary roadway improvements, based on an assessment of the additional traffic that will be generated by a development and its impact on the local transportation system.

This method uses a cost allocation analysis to distribute future transportation improvement costs in an area to the appropriate contributing existing and future development and redevelopment. The premise of this analysis is that while existing development uses a percentage of the transportation system’s capacity, and thus indirectly contributes to future capacity constraints, future redevelopment or development consumes the remaining available capacity of an intersection, interchange, or subarea roadway system.

The following general process and assumptions are typically used to conduct this type of analysis:

- Review existing traffic volumes
  - Existing traffic volumes include both detailed intersection turning movement counts and roadway link volumes.
  - Existing properties that are to be developed under future conditions are subtracted from the base traffic volume data set.
  - Special consideration is given to properties that are currently not producing the typical amount of trips generated, per the ITE Trip Generation handbook.
- Review future traffic volumes
  - Based on projected land use density and type, future traffic volumes are developed.
  - An operations and trip distribution software package is used to determine the trip allocation percentages by intersection. The model results provide a detailed breakdown of the percent of trips at a given intersection, based on the trip source (e.g., existing trips at an intersection or a particular development’s trips passing through the same intersection).
- Allocate improvement costs
  - Improvement costs resulting from the redevelopment or development plans are allocated based on the anticipated percent of vehicles from each future development or redevelopment using the intersection, interchange, or roadway.
  - Existing volumes are associated with specific developments where applicable.
  - Existing volumes that cannot be associated with an existing development are identified as a public cost (city/county).
  - Each existing and future development/redevelopment parcel’s share of future transportation improvement costs is identified and documented using a matrix. These costs then provide the basis on which local officials can negotiate the appropriate amount from all properties in the redevelopment/development area.

If Minot wishes to pursue a negotiated impact fee program for specific development areas, it should first establish the following basic procedures:

- Select a local government “control” tool or method (e.g., access permits for all new road access requests and/or for a change in the land use associated with current access).
- Establish a development threshold (e.g., number of units, trips generated and acres to be developed) that triggers the negotiated impact fee process, and possibly provides a waiver procedure when impact fees are not required.
- Establish the purpose and content of the impact study (e.g., traffic operations, access spacing, circulation, pedestrian/bicycle facilities, street layout and design parameters, traffic volumes/flows, impact to public streets/intersections, roadway capacity, safety improvements, costs of public infrastructure improvements needed to accommodate development) and identify who completes/pays for the study (e.g., professional traffic engineering firm hired by or approved by the city and paid by the developer).
- Explain the local review process and time frame, and assign city personnel to negotiate with the developer.

However, it should be noted that if a negotiated impact fee program is going to be pursued by the city, more research is needed to determine the proper course of action, given the rules and regulation of the state of North Dakota.

### Third Party Agreements

Developer agreements can also be expanded to include third parties such as other jurisdictions that are affected by the development program. Usually, in the case of third party agreements, the City acts as the negotiator that pulls together common interests, often the City, County, State DOT or developer. Such agreements often pertain to the need for turning lanes, or traffic signals in which the private developer accepts certain responsibilities as a result of the development's impact on the public roadway. However, such agreements can be used to accelerate economic development projects by leveraging public and private resources to bring major planned projects online faster than programmed, thereby creating new jobs and various economic benefits to all parties. Each party to the agreement agrees to provide a negotiated amount of funding to advance the particular improvement. Sometimes, the developer is permitted to either provide cash for the improvement and it is constructed by the city, or the developer is allowed to perform the work according to established standards.

### Summary

Unfortunately, there are no easy solutions to addressing Minot's emerging funding gaps. In order to close its financial gap, Minot will need to increase its past success in securing various external sources of funds. To increase external funding, Minot will need to continue to investigate and pursue a range of currently available funding programs, as well as any new programs that may arise over time. In addition to external funding sources, Minot will need to expand and pursue new internal revenue sources, which generally take the form of increased fees, taxes, or expand partnership funding efforts etc. As the City transportation network changes over time, it is probable that some of these current and future programs may become more or less applicable.

## 8. NEXT STEPS



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# 8. NEXT STEPS



## OVERVIEW

This transportation plan should be looked at as a living document, and a number of monitoring and planning activities should be carried forward following its adoption.

This chapter identifies important future ongoing activities, multimodal planning studies, and MPO preparations that should be undertaken by the City of Minot and its planning partners. The efforts were identified as priorities to ensure the Plan remains useful and valid, and positions the City for MPO status in the future.

## ONGOING ACTIVITIES

Several monitoring and planning activities are recommended to be undertaken by City staff over the next five years following the Plan's adoption. These activities are intended to enhance regional planning, facilitate future updates of the transportation plan, and monitor impact of policy recommendations or roadway improvements, as identified in the Plan.

### STANDARDS AND POLICIES

Educate city leaders on the importance of the Plan's transportation policies and standards, and encourage them to maintain a consistent approach and use of these transportation tools, such as:

- Corridor visions, purpose and need
- Future functional classification and jurisdiction
- Access management
- Level of Service (LOS) strategies
- Corridor preservation
- Subdivision regulation
- ROW guidelines
- Building setbacks
- Typical roadway sections
- Complete Streets
- Transit enhancements
- Travel Demand Management
- Funding alternatives
- Land use (comprehensive plan)
- Minot US 83 NW Bypass Development Policy

## DATA MAINTENANCE

- Commit staff resources to:
- Collect and share GIS information to promote the regularity, compatibility and reliability of data inputs.
- Establish a pavement management system to maintain system preservation needs and uniform operation and maintenance investments.
- Establish a protocol to maintain and update the City's regional travel demand forecast model to enhance forecast methods, identify new techniques, review development assumptions, and identify data needs.

## SYSTEM PERFORMANCE MONITORING

Commit staff resources to:

- Develop an annual surveillance and monitoring program to evaluate the status of the Plan's short-term and long-term projects and track progress toward project completion.
- Incorporate performance-based planning, using the measures identified in the Plan to monitor and assess the effectiveness of transportation investments and progress towards the Plan's long-term goals. The establishment of benchmarks will provide a method to evaluate and quantify progress over time.

## FUTURE STUDIES

Commit resources and coordinate with City and County planning staff to:

- Conduct sub-area traffic and corridor studies to address specific transportation needs and urban growth issues in more detail as they have been identified in the Plan.
- Evaluate ongoing and anticipated developments regularly to determine if land use policy varies from what has been identified in the Plan (and the City's Comprehensive Plan), which may require a reassessment of the recommendations and changes in the travel demand model inputs.

## PROJECT PRIORITIZATION UPDATES

Commit staff resources to:

- Continue to evaluate ongoing developments, planned roadway improvements, and maintenance needs leading to project prioritization to efficiently manage the transportation system.
- Monitor short-term and long-term project needs and prepare plan amendments, if justified by new information, need, local priorities, or evaluation criteria.
- Program short-term projects into the CIP, based upon local and NDDOT support.

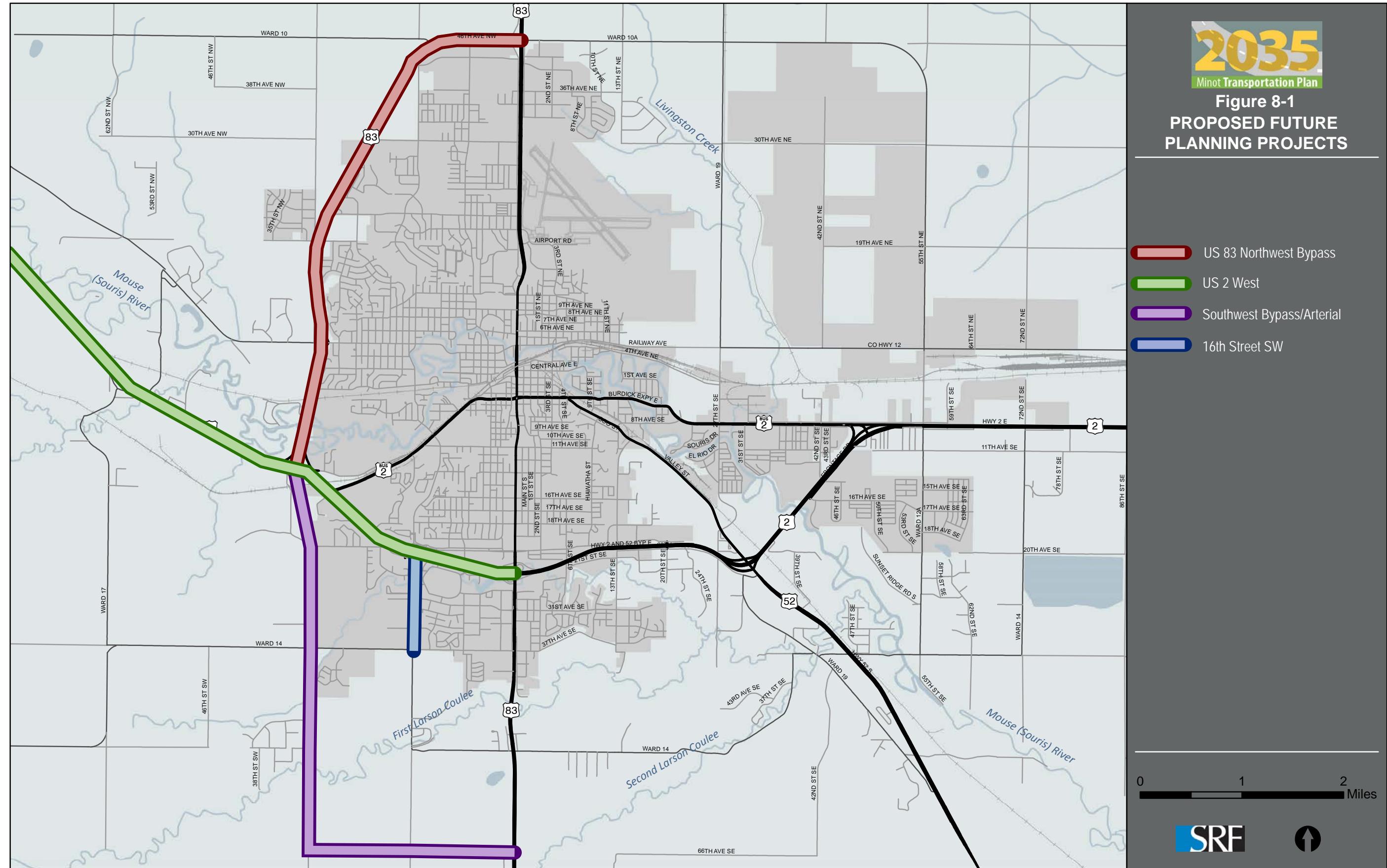
## PLANNING STUDIES FOR FUTURE CONSIDERATION

During the long-range planning process, four major transportation corridor studies were identified as having regional significance that justify further detailed analysis and will require additional planning funds. Each of the corridors were evaluated in some way during the planning process, but more detailed study will be needed to identify feasibility, environmental impacts, design, project sequencing/phasing, and a number of other components. It is customary, prior to the inclusion of projects in an MPO's Transportation Improvement Program (TIP) or the NDDOT's STIP, that prerequisite studies be completed (i.e., corridor studies, Documented Categorical Exclusion (DCE), and other environmental documentation). This section provides an overview of the work that was completed as part of this planning process, a description of the future study needs, and components that should be included as part of future study scope of work. Below is a list of corridors that were identified for further study:

- US 83 NW Bypass
- Southwest Bypass/Arterial Corridor
- US 2/US 52 West
- 16th Street Southwest

An overview of the project locations is provided in Figure 8-1.

## **Figure 8-1: Proposed Future Planning Projects**



## US 83 NW BYPASS

The US 83 NW Bypass operates as the north-south principal arterial route in Minot, primarily serving regional mobility needs and providing vital intra- and inter-state connections. The US 83 NW Bypass also serves military movement as part of its major strategic highway network (STRAHNET) designation. As a limited-access two-lane highway, this facility currently provides a bypass route around the west side of the City between Broadway and US 2. Regional traffic growth and planned developments along the corridor are expected to result in significant traffic volume increases and place a great amount of strain on the corridor, if maintained as a two-lane highway with at-grade intersections.

As the City grows and expands, the City, County, and NDDOT are committed to ensuring that the US 83 NW Bypass continues to fulfill its intended regional connectivity function. Further, the City will plan land use development in a manner that is compatible with a bypass facility, agree to maintain its major STRAHNET designation, manage access along the corridor to limit conflicts with regional traffic (Minot US 83 Bypass Development Policy), and generally assist in maintaining the public's perception that this corridor is Minot's northwest bypass.

Due to the prominent function of this regional corridor, additional analyses were completed as part of this planning process and included the following:

- Intersection operations were analyzed for existing, two-lane facility with at-grade intersections under existing and future no build conditions.
- Intersection operations were analyzed for four-lane expressway with at-grade intersections under future conditions.
- Intersection operations were analyzed for four-lane expressway with grade-separated intersections (interchanges), for two grade-separated scenarios under future conditions.
- Planning-level evaluation were conducted for corridor alternatives, to identify social, environmental, and engineering impacts.
- High-level interchange concepts were developed to provide potential impact to adjacent properties and connectivity with local roadway system.

### Study Description

A future study is needed to provide more detailed traffic operations analysis, transportation and environmental planning, and preliminary design engineering to solidify the long-range vision for the US 83 NW Bypass in the City of Minot. This work will provide NDDOT and Minot with the framework to maintain a highly-functional bypass route that meets regional freight, military, and mobility needs.

In order to maintain the operational benefits of a regional bypass route within the Minot region, a systems approach should be used to evaluate future access control and land use developments along the corridor. The analysis and documentation will be used to establish the location, feasibility, optimal sequencing of improvements, any environmental mitigation, land use development patterns, and cost for the identified corridor improvements.

### Study Components

The overall scope of work for the NW Bypass corridor should include documentation of the process and study recommendations. Anticipated work tasks would include, but are not limited to, the following:

- Conduct a regional origin-destination study to establish regional mobility to gain a better understanding of regional mobility, freight, and military needs.

- Establish the long-term vision for the bypass.
- Develop corridor alternatives to address future needs, including specific corridor land use development plans, and needed improvements to the supporting local roadway network.
- Evaluate capacity, access, and intersection control needs along the corridor.
- Identify potential right-of-way and environmental impacts and coordinate right-of-way preservation with development plans.
- Coordinate corridor needs and functionality with local government stakeholders, neighborhoods, land owners, and the private sector.
- Evaluate alternatives with respect to feasibility, system benefits, and sequencing of improvements.
- Develop preliminary alignment, including access controls, typical sections, train needs, and ROW. Further, determine if 30% preliminary design is appropriate.

## SOUTHWEST ARTERIAL/BYPASS

The southwest area of Minot is home to the Dakota Square Mall, three major developments that will experience a significant amount of commercial and residential growth (e.g., Southgate, Magic Meadows, Prairie Grass Addition, and Highlander Estates), and the future site of a new major medical center. Based upon the traffic forecasts and future “no build” operations analyses, the Plan determined that the current roadways in the southwest area of Minot will require significant improvement to meet the future traffic demand. Improvements to the current roadway network will result in significant impacts to existing land uses; therefore, implementing these improvements were not considered feasible. Other options were explored during the planning process to develop new corridor alternatives for the southwest area.

Due to the regional connectivity that this future corridor provides to expanding residential neighborhoods and major commercial centers, additional analyses were completed as a part of the Plan and included the following:

- Four alternatives were identified to increase connectivity and mobility between the northwest and southwest areas of Minot.
- A purpose and need summary was prepared.
- Potential typical cross-sections were developed.
- A “planning-level” evaluation for each corridor alternative was completed to identify possible social, environmental, and engineering impacts.

### Study Description

A future corridor study should address the need for more specific traffic operations analysis, additional transportation and environmental planning, and further refinement of the concept alternatives. This work will provide Minot with the framework to address existing and future deficiencies along nearby corridors and is intended to encourage local governments and key stakeholders to plan roadway improvements and developments appropriately.

This Plan acknowledges the need to further evaluate alternatives for the Southwest Bypass/Arterial, by providing a connection between the US 83 NW Bypass and US 83 near 66th Avenue. Forecasted traffic associated with growth and development in the northwest and southwest areas of Minot will continue to present considerable challenges to maintaining the safe and efficient travel along key regional corridors in the western part of the City.

In order to fully understand future corridor needs, a detailed corridor study should be considered to evaluate potential corridor alignments. The analysis and documentation provided by the study will be used to establish the function, feasibility, optimal sequencing of improvements, and environmental mitigation and costs for the identified corridor improvements.

#### *Study Components*

The overall scope of work for the Southwest Arterial/Bypass corridor should include documentation of the process and study recommendations. Anticipated work tasks would include, but are not limited to, the following:

- Conduct a regional origin-destination study to establish regional mobility to gain a better understanding of regional mobility and freight needs.
- Establish the long-term vision (arterial or bypass) for the corridor.
- Develop alternatives to address future needs, including specific corridor development plans, and improvements to the local supporting roadway network.
- Evaluate capacity, access, and intersection control needs along the corridor.
- Identify potential ROW and pertinent environmental impacts and coordinate ROW preservation with development plans.
- Coordinate corridor needs and functionality with local government stakeholders, neighborhoods, land owners, and the private sector.
- Evaluate feasibility, system benefits, and sequencing of improvements.
- Develop corridor alignments that include ROW needs, access control and management, trail needs, and typical sections; the design detail of these corridor alignments will be determined at the time this project is undertaken.

#### **US 2 WEST**

Significant future local traffic growth is expected along US 2, especially through the US 83 NW Bypass and W Burdick Expressway intersections. Additionally, a potential connection with the future Southwest Arterial/Bypass at the south leg of the US 83 intersection is expected to further contribute to congestion issues along the US 2 corridor.

In addition to these local growth pressures, the City of Burlington (located five miles west of Minot along US 2) is also experiencing substantial growth, which will contribute to the traffic issues along the US 2 corridor. Further, there are plans for at least four large developments (e.g., Harvest Heights, Highlands Ranch, Energy Park West, and Behm's) along the US 2 corridor between Minot and Burlington. These developments will provide additional residential, commercial, industrial, and retail employment sites, as well as a new government center within the area.

Due to the regional mobility and connectivity that this corridor provides for the Minot area and western North Dakota, additional analyses were completed as a part of the Plan and included the following:

- Assessed potential interchanges at US 83 NW Bypass and W Burdick Expressway, as identified as part of the 2001 Transportation Plan
- Developed several conceptual interchange configurations for the US 2/83 intersection
- Developed access and roadway reconfigurations for the W Burdick Expressway corridor, as part of US 83 interchange concept development process

- These additional analyses, as well as recently completed traffic operations studies for the aforementioned developments, have identified the need to further evaluate and determine a future vision, and design parameters for the US 2 corridor.

### Study Description

A future corridor study is needed to provide specific traffic operations analysis, transportation and environmental planning, and conceptual corridor design (including interchange concept refinement) to develop a long-range vision for the US 2 corridor between US 83 South and the City of Burlington. This planning study will provide NDDOT and Minot with a framework to address existing and future deficiencies along the corridor and is intended to allow local governments and stakeholders to plan appropriately.

The Plan documents the need to further evaluate interchange and access configurations along US 2 at the US 83 NW Bypass, W Burdick Expressway, and 16th Street SW intersections, while recent traffic operations analysis have identified intersection control and safety improvements between Minot and Burlington. Forecasted traffic growth (from both local and regional developments) will continue to present considerable challenges in maintaining the safe and efficient travel along this important regional and national corridor.

In order to fully understand future corridor needs, a systems approach should be used to examine intersection functions, in light of all development and improvements. The analysis and documentation provided by this study will be used to establish the feasibility, optimal sequencing of improvements, any environmental mitigation, and costs for the identified corridor improvements.

### Study Components

The overall scope of work for the US 2 corridor study should include documentation of the process and study recommendations. Anticipated work tasks should include, but are not limited to, the following:

- Establish a long-term vision for the corridor.
- Prepare alternatives to address future needs, including land use/development plans and supporting local infrastructure improvements along the corridor.
- Evaluate safety, access, and intersection control needs along the corridor (signalization, J-turns, interchanges, etc.).
- Identify potential ROW and pertinent environmental impacts, and coordinate ROW preservation with development plans.
- Coordinate corridor needs and functionality with local government stakeholders, land owners, and the private sector.
- Evaluate feasibility, system benefits, and sequencing of improvements.
- Develop refined interchange (and intersection) concepts including ROW needs, other system modifications, cost, etc.

## 16TH STREET SOUTHWEST

The 16th Street SW corridor between 18th Avenue SW and 37th Avenue SW, including the US 2/52 and 16th Street SW interchange, will experience an increase in volumes and congestion by year 2035 under both no build, and to a lesser extent, the modified network conditions. With the increase in traffic volumes, the current buttonhook interchange configuration and roadway capacity are not expected to accommodate demand along the corridor.

Due to the connectivity that this corridor provides to major commercial and medical facilities, additional analyses were completed as a part of the Plan and included the following:

- Possible future interchange and corridor expansion configurations were reviewed to determine interchange configurations that best fit the corridor in terms of ROW impacts and roadway capacity.
- Three interchange configurations were tested using FHWA's CAP-X tool, which evaluates interchange configurations using volume to capacity ratio.
- A corridor expansion concept was developed to better understand ROW impacts.

### Study Description

A future corridor study is needed to provide more specific traffic operations analysis, transportation and environmental planning, and preliminary design engineering so that a long-range vision for the 16th Street SW corridor between 18th Avenue SW and 66th Avenue SW can be developed. This planning study will provide NDDOT and Minot with the framework to address existing and future deficiencies along the corridor, and is intended to allow local governments and key stakeholders to plan the corridor appropriately as it transitions between urban and rural environments.

The Plan supports the need to further evaluate interchange and access configurations at the 16th Street SW/US 2 intersection as part of any expansion. Forecasted growth in traffic (associated with growth and development in the area) will continue to present considerable challenges in maintaining the safe and efficient travel along the 16th Street SW corridor, which provides access to rapidly growing areas of Minot.

In order to fully understand the impacts to the 16th Street SW corridor, a systems approach should be used to examine how the corridor will function. The analysis and documentation provided by the study will be used to establish the functionality, feasibility, optimal sequencing of improvements, any environmental mitigation, and cost for the identified corridor improvements.

### Study Components

The overall scope of work for the entire corridor should include documentation of the process and study recommendations. Anticipated work tasks would include, but are not limited to, the following:

- Develop alternatives to address future needs, including specific corridor development land use plans, including improvements to the supporting roadway network.
- Establish the long-term vision for the corridor.
- Evaluate access and intersection control needs along the corridor (signalization, J-turns, etc.).
- Identify potential ROW and pertinent environmental impacts and coordinate ROW preservation with development plans.
- Coordinate corridor needs and functionality with local governments, key stakeholders, and the private sector.
- Evaluate feasibility, system benefits, and sequencing of improvements.
- Develop the corridor alignment including ROW needs, access control and management, trail needs, and typical sections; the design detail of the corridor alignment will be determined at the time this project is undertaken.

## PREPARATION FOR MPO STATUS

Minot is nearing the 50,000 population threshold needed to attain MPO status, which is accompanied by various financial benefits and numerous responsibilities that are associated with MPO status. In fact, the Comprehensive Plan anticipates the urban area population will exceed 50,000 within the next few years. For these reasons, the City should be prepared to transition this Plan to meet federal MPO rules.

Some items that City staff and the NDDOT may want to discuss and prepare for as the City approaches MPO status include:

- Review and discuss Minot's planning area boundaries and future Plan horizons to ensure they meet federal requirements.
- Expand upon current Plan elements or add new initiatives usually included or required by MPO plans so that the Plan reflects all of the eight MPO planning factors required by FHWA/FTA (e.g., livability/ sustainability initiatives, NEPA policies affecting programming, freight planning, system management and operations planning, ITS, Complete Streets, land use and transportation scenario planning, micro-simulation/visualization techniques, federal emphasis areas, safety/security studies, evaluation criteria, etc.).
- Discuss plan coordination activities needed to comply with MPO rules (e.g., consistency with other plans including state safety plan, public transit plan, regional transportation security and disaster plans, state and regional ITS architecture).
- Discuss agency outreach and coordination activities (e.g., consult appropriate state, regional, tribal, and local agencies responsible for land use, natural resources, environmental protection, conservation, historic preservation, and other modes including bicycle, pedestrian, transit, and rail).
- Complete the MPO project documentation process and financial constraint requirements and methodologies, including consideration of operations and maintenance costs in future revenue and expenditure forecasting.
- Address requirements for presentation and publication activities to meet MPO long-range transportation planning requirements.
- Develop a public participation plan to ensure public participation and outreach with traditionally underserved, economically disadvantaged, minorities, elderly, and disabled populations.
- Standardize and document criteria for the prioritization and selection of projects to meet MPO long-range transportation planning requirements.

## *City of Minot, ND* **2035 Transportation Plan**

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prepared by

