WILLISTON AREA TRANSPORTATION PLAN

CORRIDOR STUDY
for

CORRIDOR C

US Highway 2/85

US Highway 85/US Highway 85B
to
US Highway 85 (at 13-Mile Corner)

Williston, ND

December 16, 2016

Prepared for: City of Williston, Williams County, and NDDOT
Written By: SRF Consulting Group, Inc.

SRF:
0158658

SRF Consulting Group, Inc. | Engineers Planners Designers

CORRIDOR STUDY

for

CORRIDOR A

US Highway 2/85

US Highway 85/US Highway 85B
to
US Highway 85 (at 13-Mile Corner)

CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of North Dakota. This document was originally issued and sealed by Matthew R Pacyna, Registration number PE-7630 on 12/16/2016 and the original document is stored at SRF Consulting Group, Inc.

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Matthew R Pacyna, P.E. Date

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1.0 Introduction

As part of the City Comprehensive Plan and Transportation Plan update process, five specific corridors were identified for more in-depth study. The goals of these corridor studies are to identify the short- and long-term needs of each corridor, particularly from a traffic operations perspective, to ensure safe and efficient operations within the study area. The analysis includes and focuses on access, crashes, roadway and intersection capacity, and any other issues identified through stakeholder involvement. The purpose of the study is to help prioritize the needs within each study corridor, lay the framework for specific project development, and provide stakeholders with a vision to build upon as opportunities arise.

This document focuses on Corridor C, which includes US Highway 2/85 from US Highway 85/ US Highway 85B (at Love's Corner) to US Highway 85 (at 13-Mile Corner) to as shown in Figure 1. It should be noted that the US Highway 2 and US Highway 85/US Highway 85B intersection was included as part of the Corridor A study, and is not specifically addressed as part of this study.

Corridor C is approximately 6.5-miles in length and is generally a four-lane divided roadway with a rural cross-section. The posted speed limit is primarily 70 miles per hour (mph), but transitions to 55 mph approximately 1,500 feet north of US Highway 85/US Highway 85B. In recent years, several developments and roadway/access improvements have been implemented. The biggest known issues are with respect to access, both in terms of side-street delay and safety. Therefore, the Corridor C study will address both existing and future access, safety, and operations. The following information summarizes the results of the Corridor C study.

Figure 1 – Study Corridor Overview

2.0 Existing Conditions

The following sections outline the data collection, roadway characteristics, crash analysis, access inventory, and capacity analysis conducted as part of the existing conditions analysis.

2.1 Data Collection

To understand current conditions along the study corridor, various data collection efforts were conducted. The following data was collected.

Traffic Volumes

Weekday a.m. and p.m. peak period turning movement counts were collected at approximately seven (7) locations along Corridor C within the study area. These data collection locations, which are graphically shown in Figure 2, were collected using a variety of methods. First, SRF reviewed historical and existing traffic counts provided by the NDDOT. Based on the available data, SRF collected supplemental intersection turning movement counts during August 2014. These supplemental counts were collected either using CountCam video equipment or manual short-duration (i.e. pulse) counts. The purpose of the pulse counts are to identify general travel patterns and the traffic volume order of magnitude.

Once completed, SRF compiled the available traffic volume data and developed existing traffic volumes for all of Corridor C. To rectify any differences in the data sets, modifications were made to balance traffic volumes along the corridor based on engineering judgment. The resultant existing traffic volumes are shown in Figure 3.

Select intersection turning movement counts from two locations along the study corridor were utilized to obtain a daily traffic volume profile and vehicle classification information. The two locations were chosen to achieve a representative sample of the entire corridor. The locations included:

- Location 1: US Highway 2/85 south of 58th Street NW
- Location 2: US Highway 2/85 south of US Highway 85 (at 13-Mile Corner)

Figure 4 represents the traffic volume profile by hour for the selected locations along the corridor. As shown in Figure 4, traffic volumes begin to increase around 5:00 a.m. and continue to be relatively steady until approximately 7:00 p.m. The only noticeable peak period generally occurs during the evening (4:00 p.m. to 6:00 p.m.) timeframe. The relatively steady traffic volumes along US Highway 2/85 are primarily a result of the specific land uses and oil related activity within the region, as well as the more rural nature of this segment of US Highway 2/85.

In addition to the intersection turning movement counts, historical average daily traffic (ADT) volumes within the study area were also provided by the NDDOT. In locations where data was not available from the NDDOT, ADT volumes were estimated based on existing traffic volumes and engineering judgment. Existing ADT volumes along US Highway 2/85 within the study area range from approximately 11,000 to 17,000 vehicles per day (vpd). It should be noted that traffic volumes fluctuate based on the time of year and level of oil related activity within this corridor.

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Data Collection Locations

Williston Area Transportation Plan Corridor Study (Corridor C)

City of Williston, Williams County, and NDDOT

Figure 2

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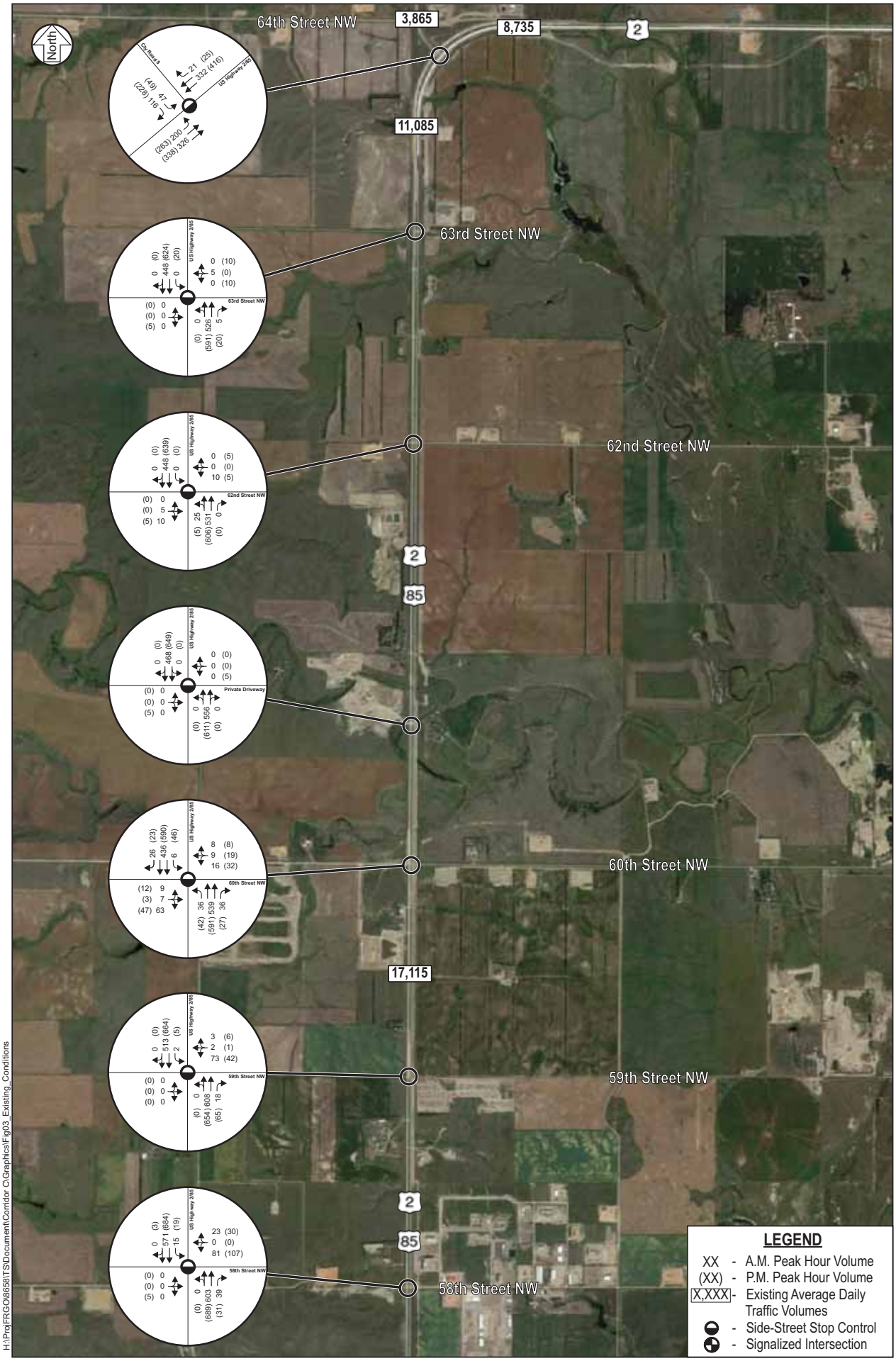

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Existing Conditions

Williston Area Transportation Plan Corridor Study (Corridor C)
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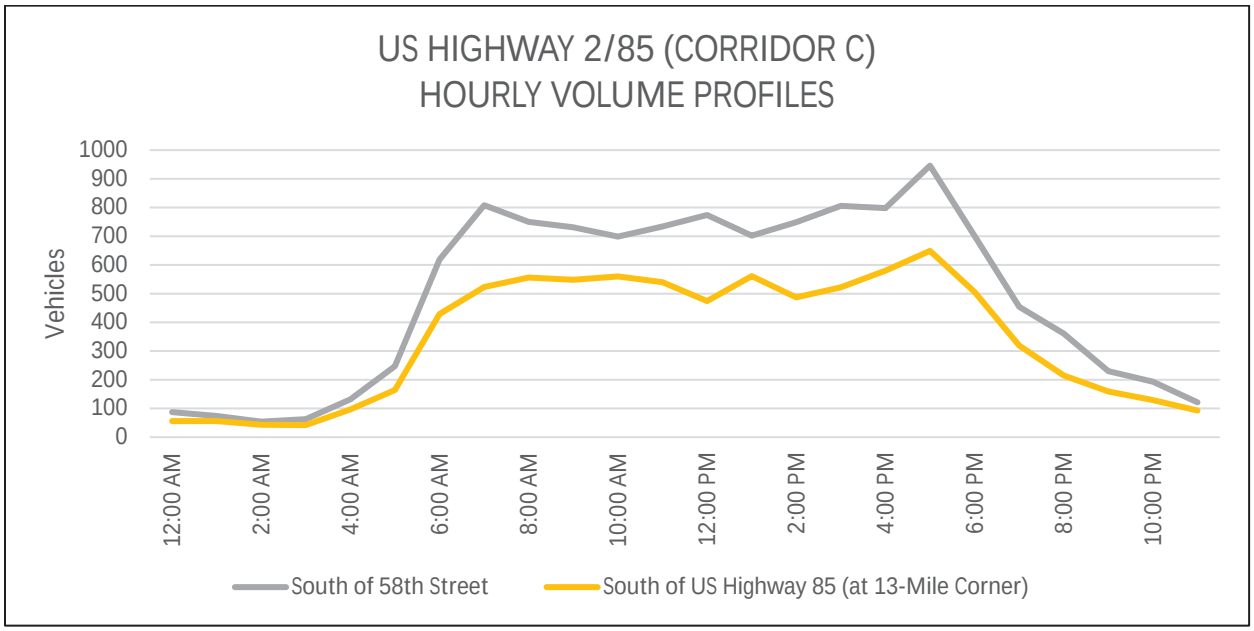
Figure 3

Figure 4 – Traffic Volume Profile



Vehicle Classification

Utilizing the selected locations noted earlier, the existing and average vehicle classification data was summarized. The Federal Highway Administration (FHWA) Vehicle Classifications criteria was used, and is shown in Table 1. In general, classifications one through three were considered passenger vehicles/light trucks, classifications four through seven medium trucks, and classifications eight through 13 heavy/ articulated trucks. Figure 5 represents the daily vehicles per classification at the selected locations reviewed, as well as the overall corridor average. In general, there are approximately five to 10 percent medium trucks and 15 to 20 percent heavy/articulated trucks along the study corridor. The higher end of the truck percentages occur towards the northern end of the study corridor, which is more rural.

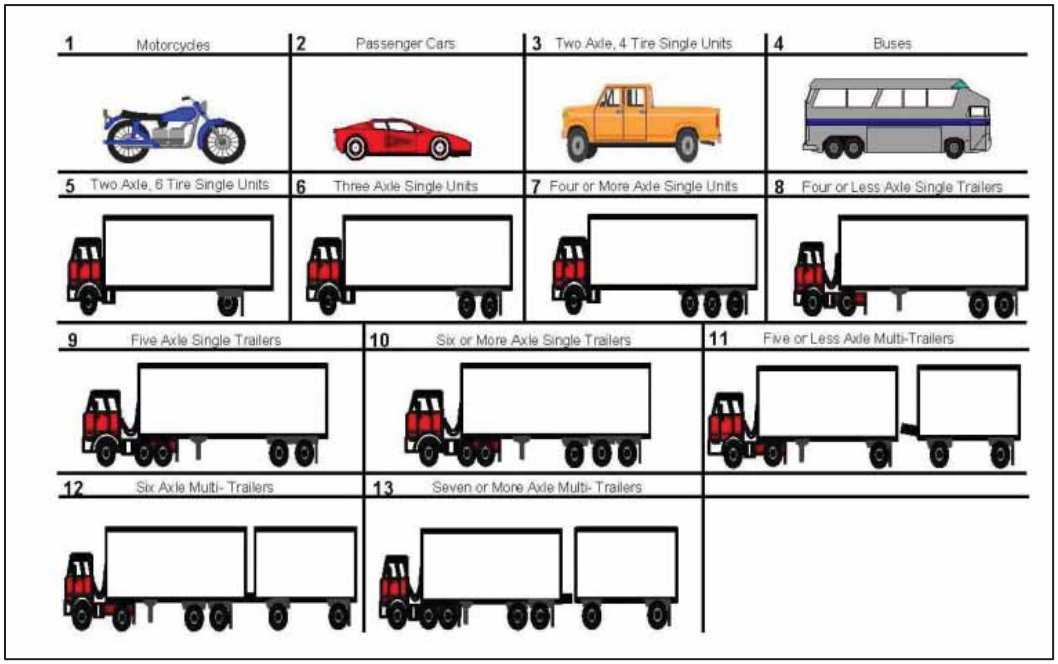
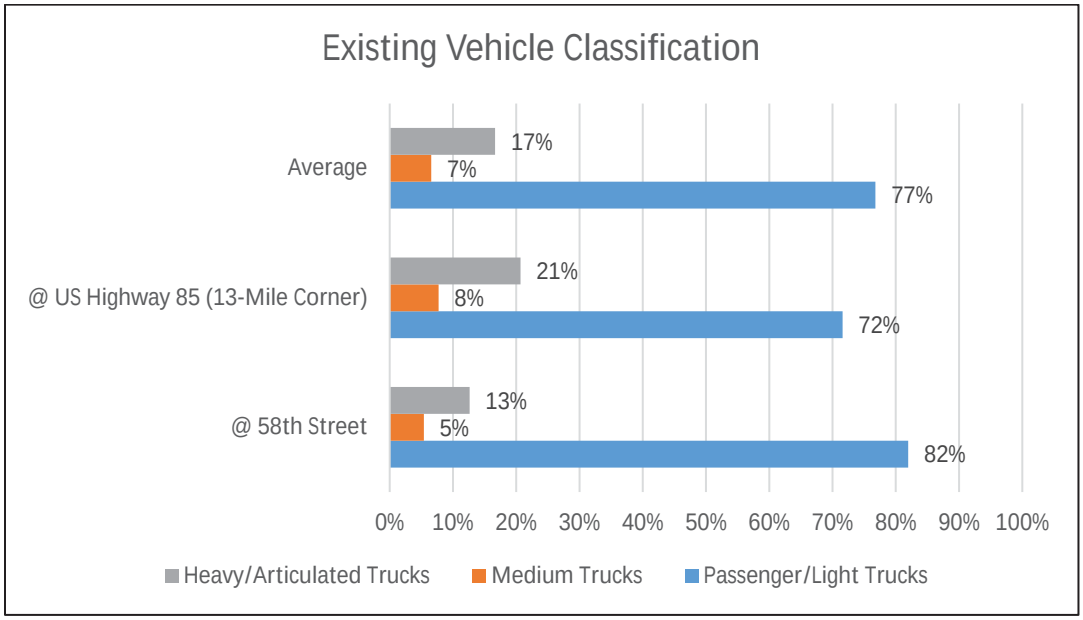


Table 1 - FHWA Vehicle Classifications

Note: #9 represents a standard Semi-Truck

Figure 5 – Existing Vehicle Classification



Travel Speeds

Vehicular speed data was not collected as part of this study due to safety concerns with respect to the data collection process.

2.2 Roadway Characteristics

In addition to traffic data collection, the following observations were completed to identify roadway characteristics within the study area (i.e. roadway geometry, posted speed limits, and traffic controls).

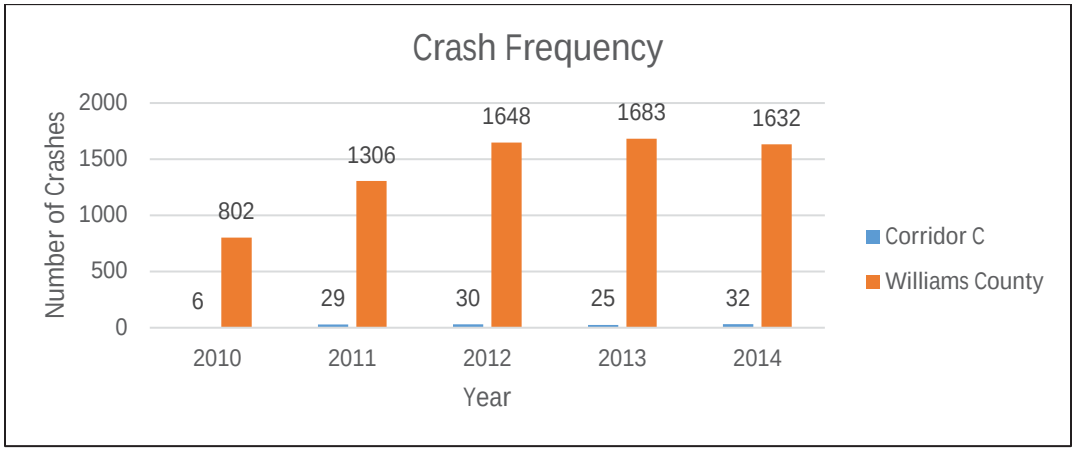
US Highway 2/85 from US Highway 85 (at 13-mile corner) to US Highway 85/US Highway 85B is a principal arterial roadway and primarily a four-lane divided facility with a rural cross-section (i.e. no curb and gutter). The posted speed limit along US Highway 2/85 within the study corridor is generally 70 miles per hour (mph), but transitions to 55 mph approximately 1,500 feet north of US Highway 85/US Highway 85B.

Traffic controls along the study corridor are all side-street stop control, with the exception of the US Highway 85/US Highway 85B intersection. It should be noted that the southbound US Highway 85 to westbound US Highway 2/85 (at 13-Mile Corner) is a large channelized movement that has a high speed merge south of this location. A summary of the existing conditions is shown in Figure 3.

2.3 Crash History

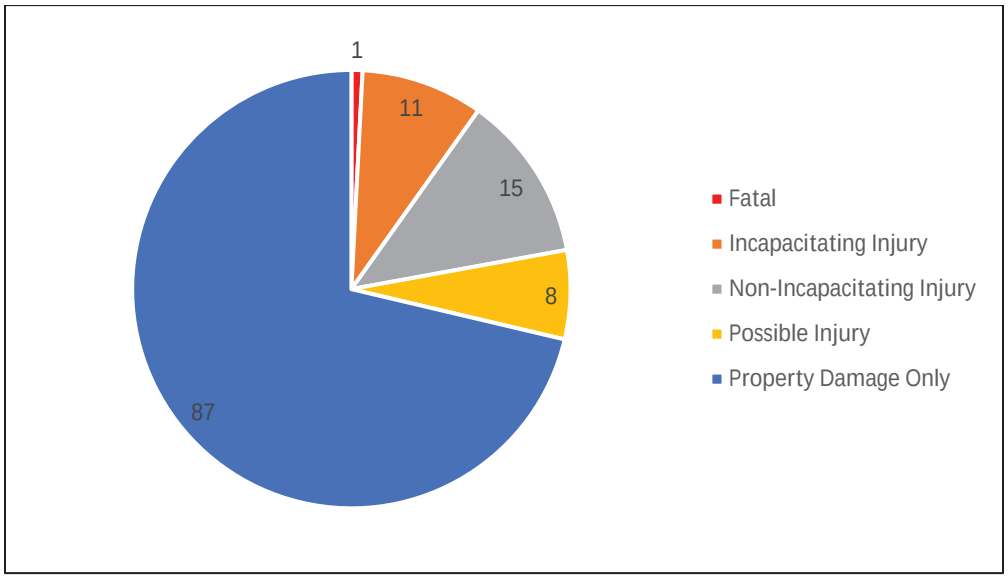
Crash data was provided by the NDDOT from January 1, 2010 through December 31, 2014, which represents the most recent five-year period available at the beginning of this study. This data was used to establish current crash trends and issues along Corridor C. Based on this review, there has been approximately 125 reported crashes along US Highway 2/85 between US Highway 85/US Highway 85B and US Highway 85 (at 13-Mile Corner). A summary of the reported crashes by year for Corridor C is shown in Figure 6, as well as the overall reported crashes for all of Williams County during the same time period.

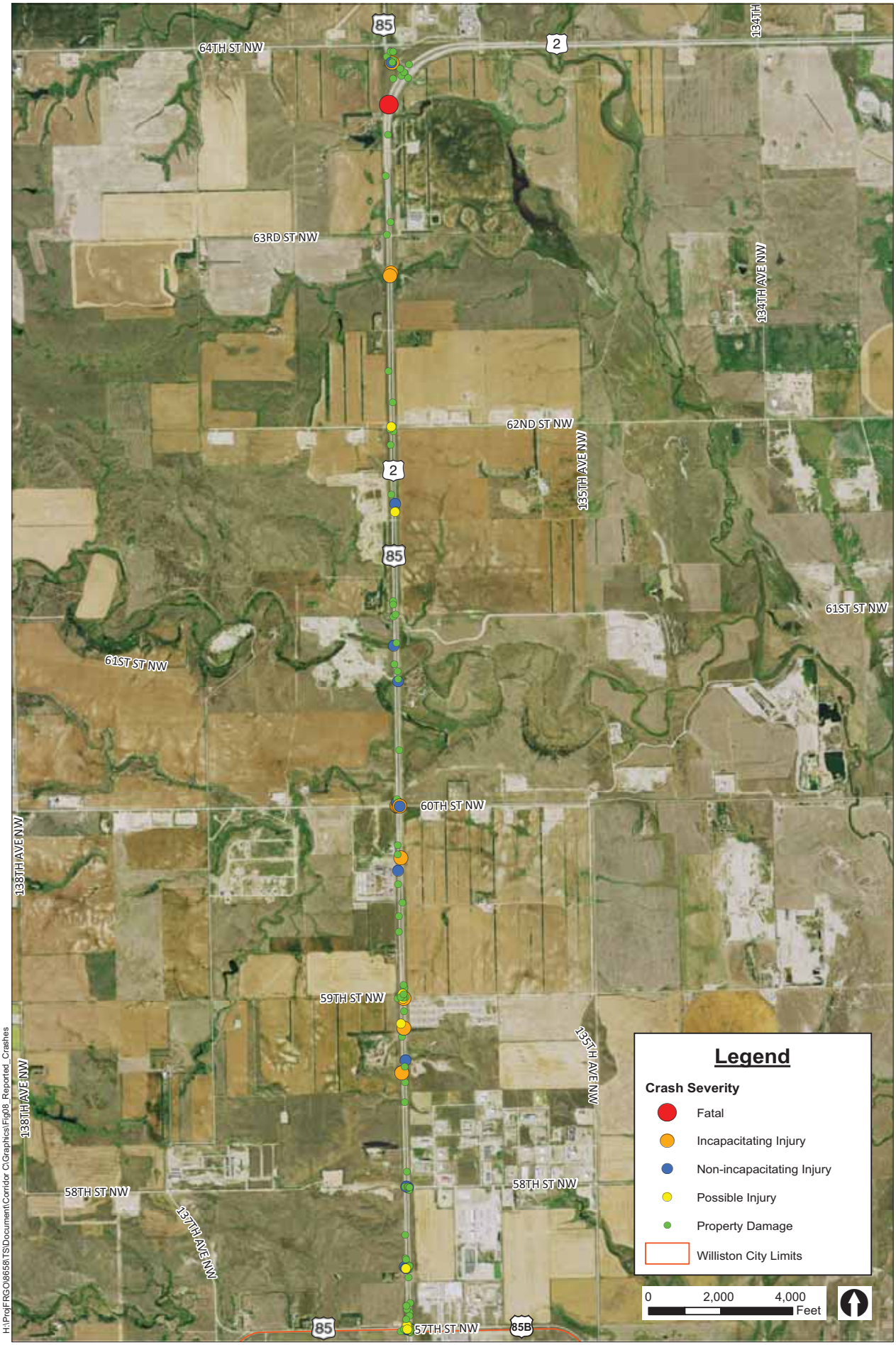
Figure 6 – Crash Frequency by Year



In addition to the overall crash frequency along the study corridor, a more detailed crash analysis was completed that reviewed segment and intersection crashes. This review focused on both the frequency in relation to the roadway characteristics (i.e. crash rates) and the type and general severity of the crashes. The location of the reported crashes within the study period along Corridor C is illustrated in Figure 8. This also illustrates the crash severity (i.e. fatal, incapacitating injury, non-incapacitating injury, possible injury, and property damage), which is summarized in Figure 7.

Figure 7 – Crash Severity Summary





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Reported Crashes

Williston Area Transportation Plan Corridor Study (Corridor C)

City of Williston, Williams County, and NDDOT

Figure 8

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The next step in the crash analysis was to review segment and intersection crash rates. The purpose of reviewing crash rates is to determine the statistical significance of the number of crashes. Crash rates were calculated and then compared to typical crash rates for intersections/segments with similar characteristics. Since the NDDOT does not publish crash rates by roadway type or traffic control, published crash rates from the Minnesota Department of Transportation (MnDOT) were referenced for comparison purposes. Crash rates are per million entering vehicles (MEV) for intersections and per million vehicle miles (MVM) for segments.

It should be noted that a higher than typical crash rates do not necessarily indicate a significant crash problem. Therefore, the critical crash rate was calculated to determine the statistical significance of the above average crash rates. If the calculated crash rates are below the critical crash rates, crashes that occurred are likely due to the random nature of crashes and not necessarily a geometric design or traffic control issue. If the calculated crash rates are above the critical crash rates, there are generally a significant number of crashes above normal to warrant further review or mitigation.

Based on review of both segment and intersection crash rates, the following intersections were identified as having an existing crash rate above the critical crash rate for locations with similar characteristics.

1) US Highway 2 and 60th Street NW
2) US Highway 2 and 59th Street NW

No segments were identified with a crash rate above the critical crash rate. However, the entire segment of US Highway 2/85 from US Highway 85 (at 13-Mile Corner) to US Highway 85/US Highway 85B, as well as the US Highway 2/85 intersection at 58th Street NW have above average crash rates.

To determine if there are any trends associated with the types of crashes occurring at these locations, a more detailed crash analysis was completed. Results of the crash type summary for the locations with a statistically significant amount of crashes are summarized in Table 2.

Table 2 - Crash Type Summary

Intersection	Left Turn / Right Angle	Rear End	Sideswipe	Head On	NCWMV(1)	Total
@ 60th Street NW (2)	7 (47%)	3 (20%)	1 (6%)	0 (0%)	4 (27%)	**15**
@ 59th Street NW (2)	6 (46%)	5 (38%)	1 (8%)	0 (0%)	1 (8%)	**13**

(1) Represents a non-collision with a moving vehicle type crash
(2) Indicates an unsignalized intersection with side-street stop control

Review of the crash types at the key intersections indicate that the majority of the crashes that are occurring are angle crashes, which are generally the most common at unsignalized intersection. It should be noted that a northbound right-turn lane and a southbound left-turn lane were added in approximately 2012/2013 at the 59th Street NW intersection. Since that time, there were three (3) reported crashes in 2014, the majority of which were angle-crashes and not correctable by the turn lane improvements. At 60th Street NW, a southbound right-turn lane was constructed in 2013. In 2014, there were five (5) reported crashes at 60th Street NW, which included two angle-, two NCWMV-, and one sideswipe type crash. At these two intersections, there were a total of five incapacitating injury crashes reported (four at 60th Street NW; one at 59th Street NW).

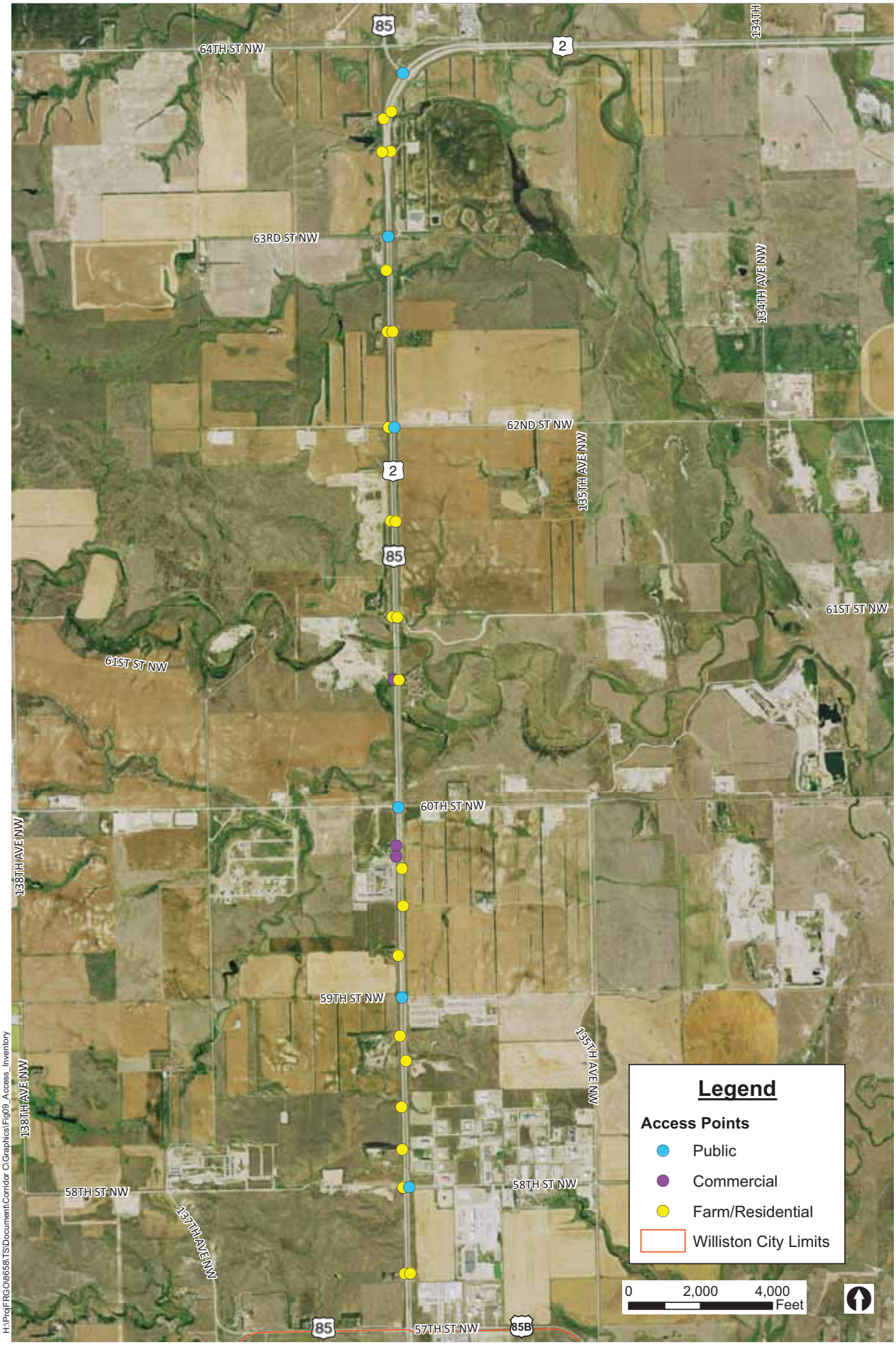
2.4 Access

To determine the existing level of access along US Highway 2/85, an access inventory was completed and is presented in Figures 9. In addition to the study intersections previously mentioned, other access locations along the corridor include public (roadways), commercial (retail and office), and farm/residential type uses. The US Highway 2/85 corridor (from US Highway 85 (at 13-Mile Corner) to US Highway 85/ US Highway 85B) is approximately 6.5-miles in length and has a total of 32 access locations (6 public, 3 commercial, and 23 farm/residential). This equates to an access density of approximately five (5) accesses per mile.

In addition to the overall corridor access, a compliance review of the existing access with respect to current guidance was conducted. This review looked at both the NDDOT and City of Williston guidance, which included:

1) NDDOT
    a. Intersections should be spaced at least 400 to 600 feet apart.
    b. No more than five (5) access points per side per mile.
2) City of Williston
    a. Principal arterial intersection spacing no less than 1/4 mile.

Based on this criteria, all access along Corridor C currently falls within existing guidance. However, private and farm access should be removed as opportunities arise to maintain safe and efficient operations along US Highway 2/85, as well as to reduce potential conflicts. These types of access modifications are generally consistent with the *Transportation Research Board's (TRB) Access Management Manual*. All access locations will be reviewed further as part of the mitigation analysis.



Access Inventory

Williston Area Transportation Plan Corridor Study (Corridor C)

City of Williston, Williams County, and NDDOT

Figure 9

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2.5 Capacity Analysis

To establish and quantify current operations along the study corridor, a detailed intersection capacity analysis was completed. Traditionally, both a planning-level ADT volume review and a detailed intersection/corridor capacity analysis would be completed. However, given the higher than normal heavy commercial vehicles percentages, the planning level ADT review was not completed as part of this study. Although it should be noted that the ADT volume ranges from approximately 8,400 vpd to 13,200 vpd along the study corridor. Therefore, only the detailed intersection/corridor capacity analysis was completed. This analysis utilized Synchro/SimTraffic (version 8.0) to evaluate the existing a.m. and p.m. peak hours.

Capacity analysis results identify a Level of Service (LOS), which indicates the quality of traffic flow through an intersection. Intersections are given a ranking of LOS A through LOS F. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values shown in Table 3. 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. An overall LOS A through C is considered acceptable traffic flow conditions based on the NDDOT.

Table 3 - Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

For side-street stop intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these 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. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay (i.e. poor level of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing intersection capacity analysis shown in Table 4 indicate that all study intersections currently operate at an acceptable overall LOS A during a.m. and p.m. peak hours with the existing geometric layout and traffic control. However, there are several side-streets where access to US Highway 2 is challenging, although the average delays are still within the acceptable range (i.e. LOS C or better). The wide median allows motorists to cross/access US Highway 2/85 in two stages, waiting in the median for a gap in traffic. However, this movement was observed to be challenging for heavy commercial vehicles and often created confusion with other motorists.

Table 4 - Existing Peak Hour Intersection Capacity Analysis

US Highway 2/85 Intersection	Level of Service (Delay)	
	A.M. Peak Hour	P.M. Peak Hour
@ US Highway 85 (13-Mile Corner) (1)	A/B (13 sec.)	A/C (16 sec.)
@ 63rd Street NW (1)	A/B (14 sec.)	A/B (13 sec.)
@ 62nd Street NW (1)	A/C (15 sec.)	A/B (13 sec.)
@ 60th Street NW/County Road 8 (1)	A/C (16 sec.)	A/C (20 sec.)
@ 59th Street NW (1)	A/C (18 sec.)	A/C (19 sec.)
@ 58th Street NW (1)	A/C (19 sec.)	A/C (24 sec.)

(1) Indicates an unsignalized intersection with side-street stop control where the overall LOS is shown followed by the worst approach LOS.

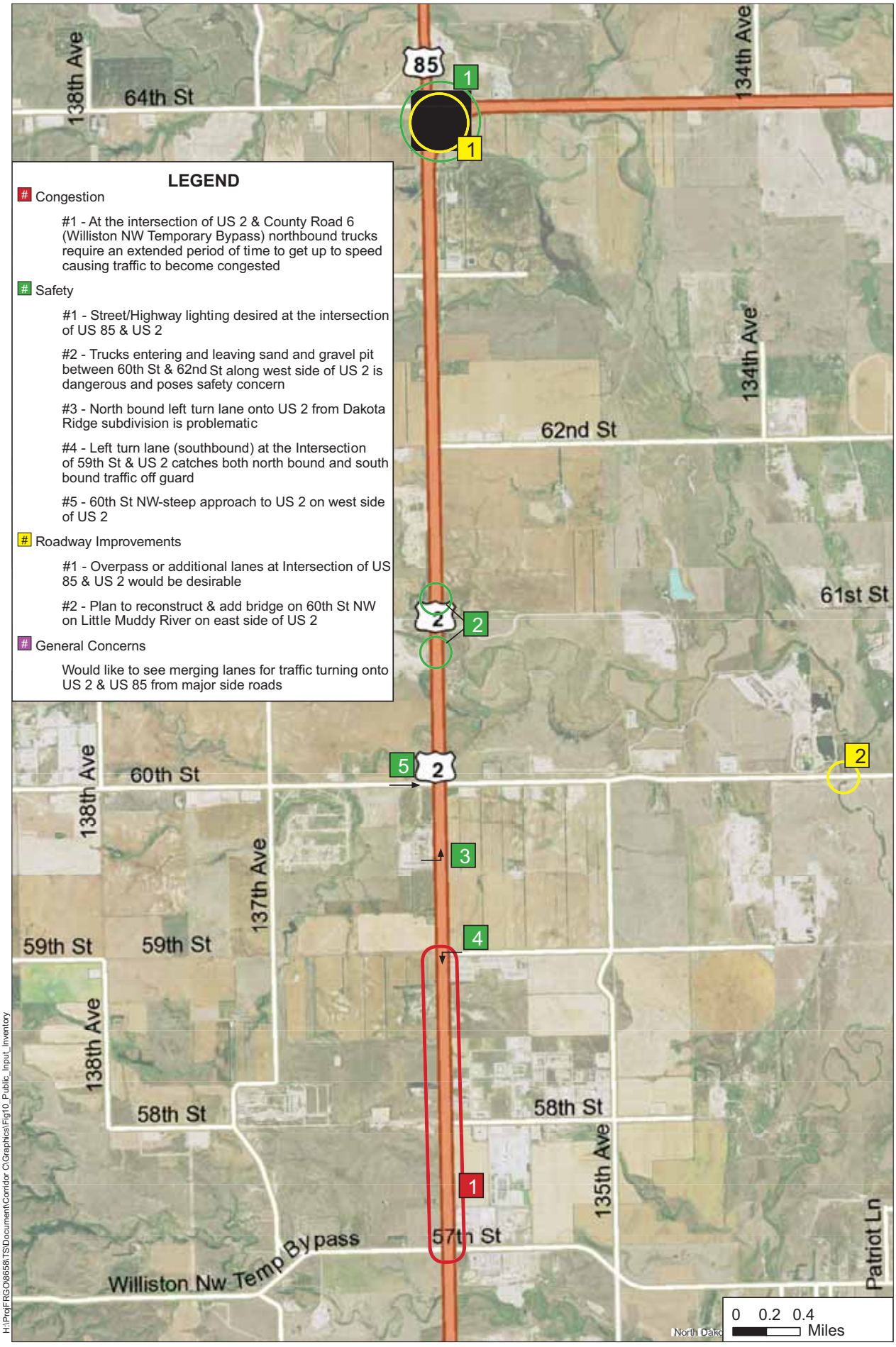
2.6 Travel Time

Corridor travel time was reviewed to establish a baseline condition in which future operations can be compared. The corridor travel times were based on the existing intersection capacity analysis. Since there are no stops along US Highway 2/85 for through vehicles, the average corridor travel time was calculated to be approximately 5.5 minutes.

2.7 Public Input

A preliminary public input meeting was held in February 2015. The purpose of the meeting was to introduce the corridor study, provide preliminary traffic and safety information, and receive feedback regarding current issues/concerns. Based on the feedback received at this meeting, an issues map was developed that summarized the key questions and concerns, which is shown in Figure 10.

The most common issues noted were with respect to heavy vehicle operations, particularly with respect to trucks entering/existing the highway in several locations and the speed differential. Access from both 60th Street NW and 59th Street NW were also noted as challenging, which corresponds with the existing conditions analysis conducted as part of this study. Further review of these issues will be conducted as part of the mitigation alternatives section within this document.



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Public Input Summary

Williston Area Transportation Plan Corridor Study (Corridor C)

City of Williston, Williams County, and NDDOT

Figure 10

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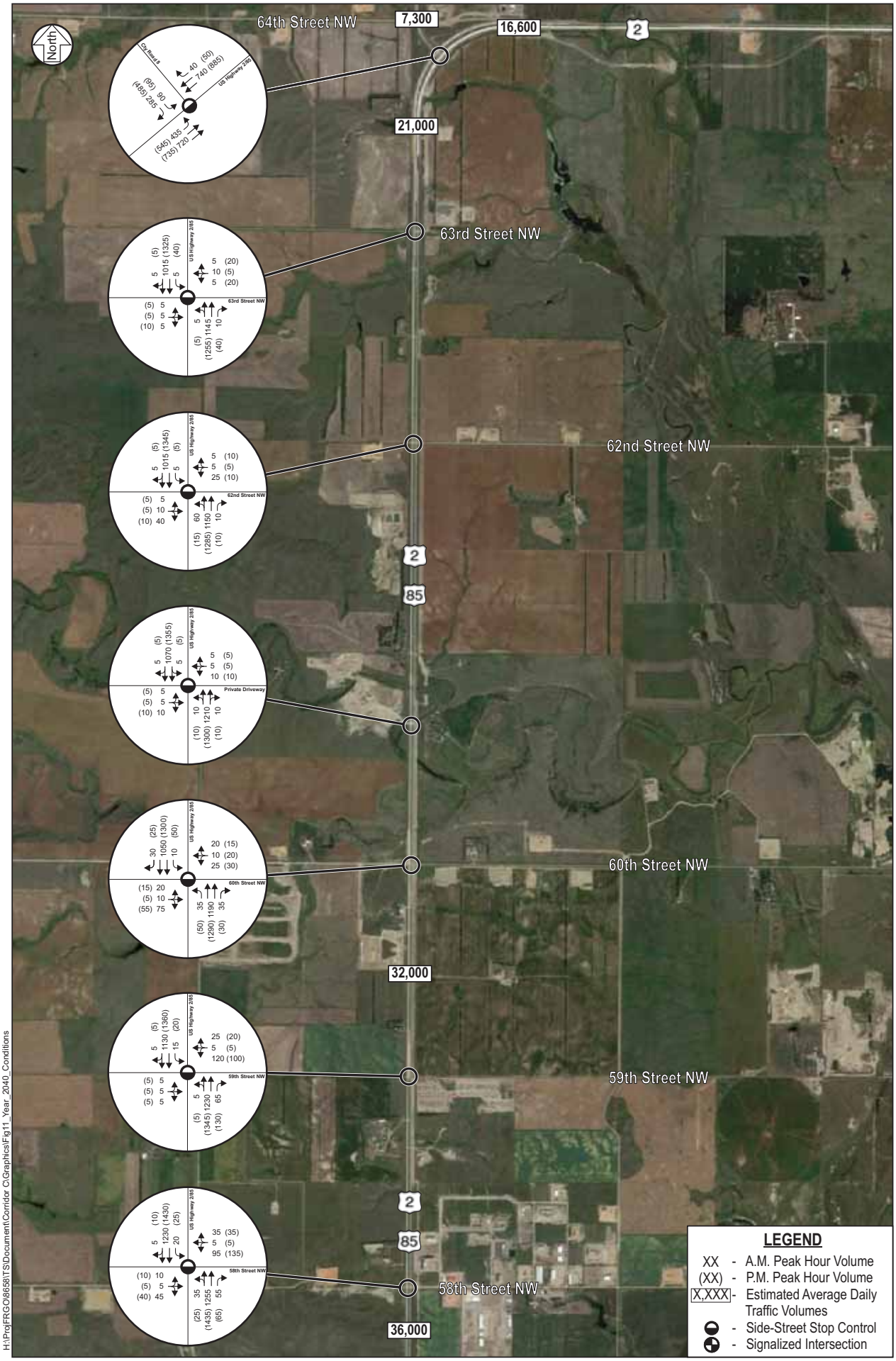
3.0 Traffic Forecasts

Traffic forecasts were developed for year 2040 conditions as part of the *Williston Transportation Plan and Comprehensive Plan Update*. The forecasts incorporate both updated land use within and near the Williston City limits, as well as planned transportation improvements. A key development that has a direct impact along the study corridor includes the Williston Airport relocation.

This development was assumed to be completed under year 2040 conditions. No direct traffic control or roadway improvements along Corridor C were included. Detailed assumptions, methods, and results are provided in the *Williston Transportation Plan and Comprehensive Plan Update*.

Based on the forecasts, traffic volumes are expected to increase along the study corridor. The ADT volumes along US Highway 2/85 are expected to range from approximately 21,000 vpd to 36,000 vpd, with the higher totals near the southern segment of this study corridor (i.e. north of US Highway 85/ US Highway 85B (at Love's Corner)). The percentage of heavy commercial vehicles is expected to remain relatively steady within this study corridor (i.e. approximately 25 to 30 percent).

The forecast average daily traffic volumes were then modified to reflect year 2040 a.m. and p.m. peak hour conditions, which are summarized in Figures 11. The peak hour volumes, which also account for the change in heavy commercial vehicles, were utilized to determine the future year 2040 intersection capacity and ultimately the future capacity needs of the transportation network.



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Year 2040 Conditions

Williston Area Transportation Plan Corridor Study (Corridor C)
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Figure 11

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4.0 Year 2040 Conditions

4.1 Capacity Analysis

To determine how the existing and planned transportation system will be able to accommodate the future year 2040 traffic forecasts, a detailed intersection capacity analysis was completed. The planned transportation improvements noted as part of the traffic forecast development were included as part of this analysis. Once again, the analysis was conducted using Synchro/SimTraffic software.

Results of the year 2040 peak hour intersection capacity analysis, shown in Table 5, indicates that two intersections along US Highway 2/85 (i.e. at US Highway 85 (13-Mile Corner); at 58th Street NW) are expected to operate at an overall LOS D or worse during the a.m. and p.m. peak hours assuming the current geometric layout and traffic control. The poor operations in these locations are the result of increased volumes along US Highway 2/85, which are expected to make left-turn and through maneuvers from the side-street challenging. In addition to these two locations, side-street access is expected to be difficult for the entire corridor, even with the two-stage crossings that occur today. Multiple mitigation alternatives to address these issues are presented later in this study.

Table 5 - Year 2040 Peak Hour Intersection Capacity Analysis

US Highway 2/85 Intersection	Level of Service (Delay)	
	A.M. Peak Hour	P.M. Peak Hour
@ US Highway 85 (13-Mile Corner) (1)	D/F (~ 2.5 min.)	E/F (110 sec.)
@ 63rd Street NW (1)	A/D (30 sec.)	A/E (43 sec.)
@ 62nd Street NW (1)	A/F (80 sec.)	A/E (44 sec.)
@ 60th Street NW/County Road 8 (1)	A/E (46 sec.)	A/F (~ 2.7 min.)
@ 59th Street NW (1)	B/F (> 3 min.)	B/F (> 3 min.)
@ 58th Street NW (1)	D/F (> 3 min.)	F/F (> 3 min.)

(1) Indicates an unsignalized intersection with side-street stop control where the overall LOS is shown followed by the worst approach LOS.

4.2 Travel Times

Given that no changes to existing traffic controls area planned, the corridor travel time is expected to be minimally impacted when compared to existing conditions. However, potential mitigation alternatives are likely to have a bigger impact with respect to corridor travel time. Further discussion regarding specific mitigation alternatives is presented later in this study.

5.0 Issues Summary and Mitigation Alternatives

5.1 Issues and Mitigation

Based on the results of the existing conditions analysis, which looked at current issues with respect to access, safety, and roadway capacity as well as the future year 2040 capacity analysis, several locations along the corridor need or are expected to need mitigation to ensure safe and efficient operations. The necessary mitigation alternatives comprise of a combination of access modifications, traffic control changes, and/or turn lane/roadway reconfigurations, including potential interchange needs and further study.

One of the primary issues along this section of US Highway 2/85 is access and how getting from the side-streets onto US Highway 2/85 will become more and more challenging as traffic volumes increase. This is especially true for heavy commercial vehicles, where the size of these vehicles limits the availability of utilizing the median area to complete a two-stage crossing or access US Highway 2/85. Therefore, a big question is with respect to balancing the needs of access versus mobility within this section of roadway. In particular, should traffic signals be considered for any locations along this section of US Highway 2/85?

Therefore, a variety of mitigation alternatives were identified to address both the access and operational challenges with and without traffic signals. The following issues summary and mitigation alternatives were developed and offered for consideration as part of this corridor study, which are also shown in Figures 12. These improvements are expected to provide overall intersection LOS C or better operations.

1) General Access Consideration:
    a. Issue(s): Private access along US Highway 2/85
    b. Mitigation: All private access should be removed along US Highway 2/85 once alternative access can be provided.

2) 58th Street NW
    a. Issue(s): Intersection capacity issues under year 2040 a.m. and p.m. peak hour conditions (due to difficult side-street access).
    b. Mitigation: Contingent upon interchange decision at US Highway 85/US Highway 85B:
        i. *If at-grade intersection at US Highway 85/US Highway 85B:*
            - Option A: Install a traffic signal and turn lane improvements along 58th Street NW
            - Option B: Construct an RCUT intersection with left-turn maneuvers from US Highway 2/85.
            - Option C: Construct a new roadway connection east of US Highway 2/85 to provide business access and close 58th Street NW access to US Highway 2/85.
        ii. *If interchange at US Highway 85/US Highway 85B:*
            - Construct a new roadway connection east of US Highway 2/85 to provide business access and close 58th Street NW access to US Highway 2/85.

3) 59th Street NW
    a. Issue(s): Statistically significant amount of crashes and intersection capacity issues under year 2040 a.m. and p.m. peak hour conditions (due to difficult side-street access).
    b. Mitigation:
        - Option A: Install a traffic signal and turn lane improvements along 59th Street NW
        - Option B: Construct an RCUT intersection with left-turn maneuvers from US Highway 2/85.

4) 60th Street NW
    a. Issue(s): Statistically significant amount of crashes and intersection capacity issues under year 2040 a.m. and p.m. peak hour conditions (due to difficult side-street access).
    b. Mitigation:
        - Option A: Install a traffic signal and turn lane improvements along 60th Street NW
        - Option B: Construct an RCUT intersection with left-turn maneuvers from US Highway 2/85.

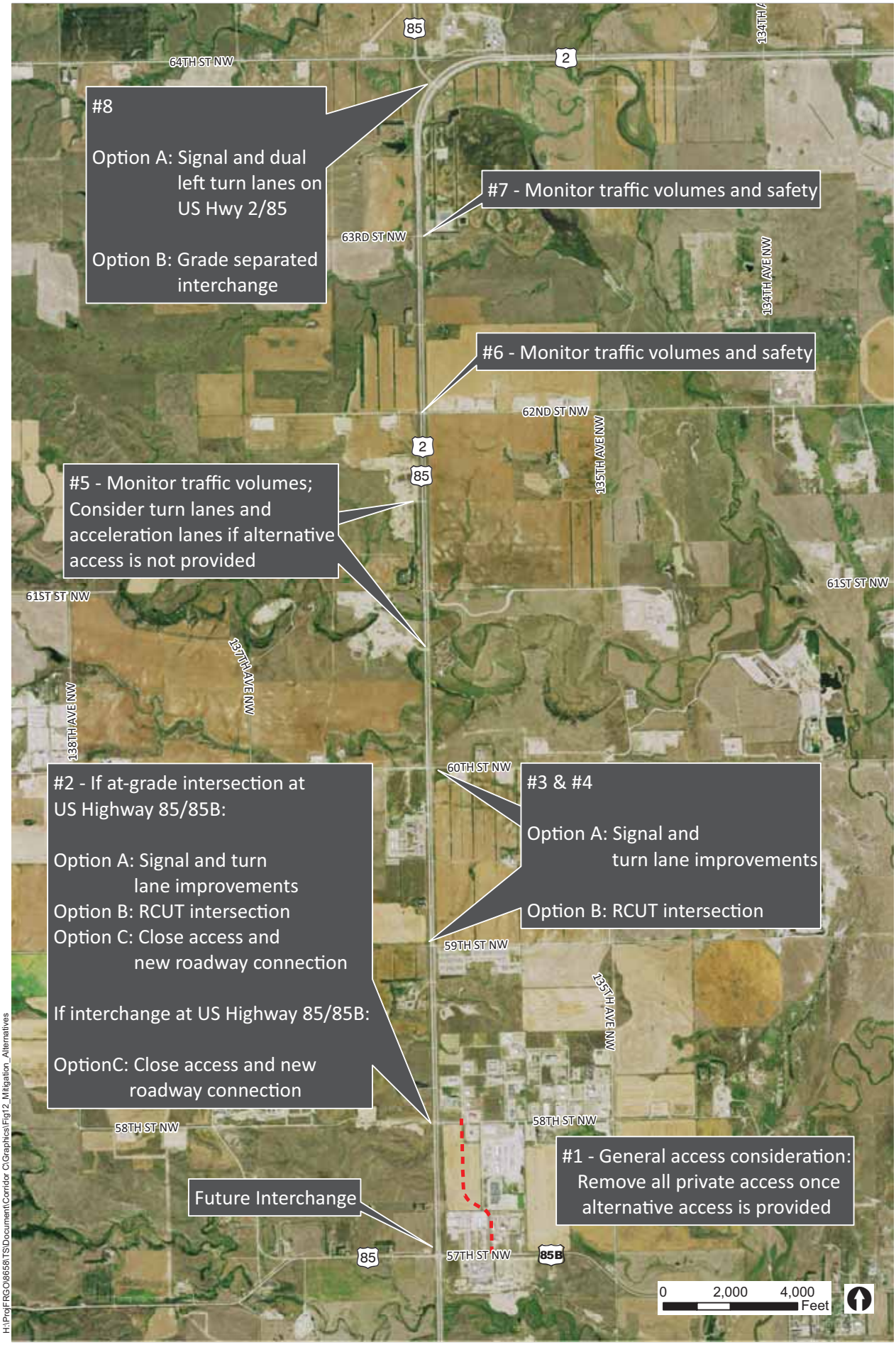
5) Quarry Accesses (2/3 mile north of 60th Street NW and 1/2 mile south of 62nd Street NW)
    a. Issue(s): Public concerns with truck access (turning and merging)
    b. Mitigation: Monitor traffic volumes; consider a northbound left-turn lane and southbound acceleration lane if alternative access is not provided.

6) 62nd Street NW
    a. Issue(s): Difficult side-street access.
    b. Mitigation: Monitor traffic volumes and safety; consider access changes or alternative traffic controls (signal or RCUT).

7) 63rd Street NW
    a. Issue(s): Difficult side-street access.
    b. Mitigation: Monitor traffic volumes and safety; consider access changes or alternative traffic controls (signal or RCUT).

8) US Highway 85 (at 13-Mile Corner)
    a. Issue(s): Intersection capacity issues under year 2040 a.m. and p.m. peak hour conditions (due to difficult side-street access and mainline left-turning conflicts).
    b. Mitigation:
        - Option A: Install a traffic signal and dual left-turn lanes along US Highway 2/85.
        - Option B: Construct a grade-separated interchange.

    Note that an RCUT intersection was considered in this location, although the left-turn maneuvers would likely need to be signalized, which makes the RCUT a less attractive option compared to Option A.



Mitigation Alternatives — **Figure 12**

Williston Area Transportation Plan Corridor Study (Corridor C)

City of Williston, Williams County, and NDDOT

0158658
July 2016

5.2 Mitigation Considerations

As noted earlier, there are a couple mitigation options, other than signalization, that could provide benefit to the study corridor. One of the primary purposes of these mitigation options is to maintain mobility along US Highway 2/85. Although installing traffic signals along the corridor would provide improved access, particularly from the cross-streets, it would also have a negative impact for the through movements along US Highway 2/85. The addition of a traffic signal along this section of US Highway 2/85 would be expected to increase travel time along US Highway 2/85 by approximately 15 to 30 seconds per traffic signal. Therefore, a combination of RCUT intersections and interchange options were developed to maintain mobility and improve cross-street access.

The following information provides a brief overview of each of these mitigation alternatives for consideration:

1) RCUT Intersections
    a. Example RCUT configurations are shown in Figures 13A and 13B.
    b. RCUT intersections reroute minor street left-turn and through movements to a median U-turn crossover and thereby provide major advantages, including reduced delay and congestion for through traffic on the major road and reduced opportunities for crashes compared to conventional designs.
    c. The U-turn maneuver occurs at a one-way median opening 400 to 1,000 feet after the intersection.
    d. There are typically no median openings at the intersection or only a one-way median opening for the exclusive use of left-turning traffic from the mainline.
    e. Typically reduces network intersection travel time (as compared to a conventional signalized intersection).
    f. Offers a substantial safety advantage over stop- or yield-control at minor road intersections along rural, high-speed, four-lane divided highways.

Figure 13A – RCUT Conceptual Illustration

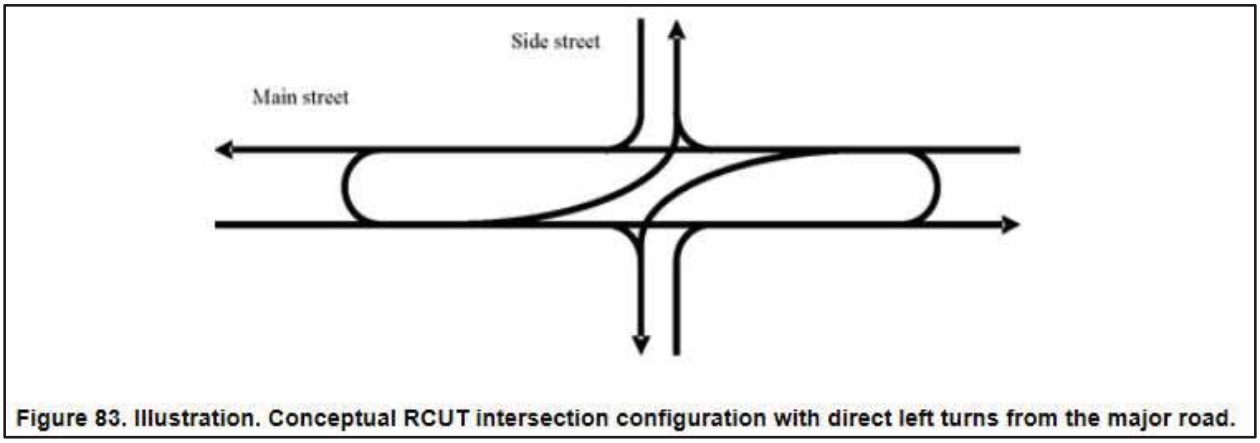


Figure 83. Illustration. Conceptual RCUT intersection configuration with direct left turns from the major road.

Figure 13B – RCUT Example (Cologne, MN)

2) Grade-Separated Interchange

   a. Four concept interchange configurations were developed and are shown in Figures 14A thru 14D.

   b. The goal of providing an interchange is to maintain mobility along US Highway 2/85, as well as to reduce high speed conflicts.

   c. Right-of-way impacts and access will need to be further reviewed with area stakeholders.

Figure 14A – Option A: Trumpet Interchange A (Ahead)

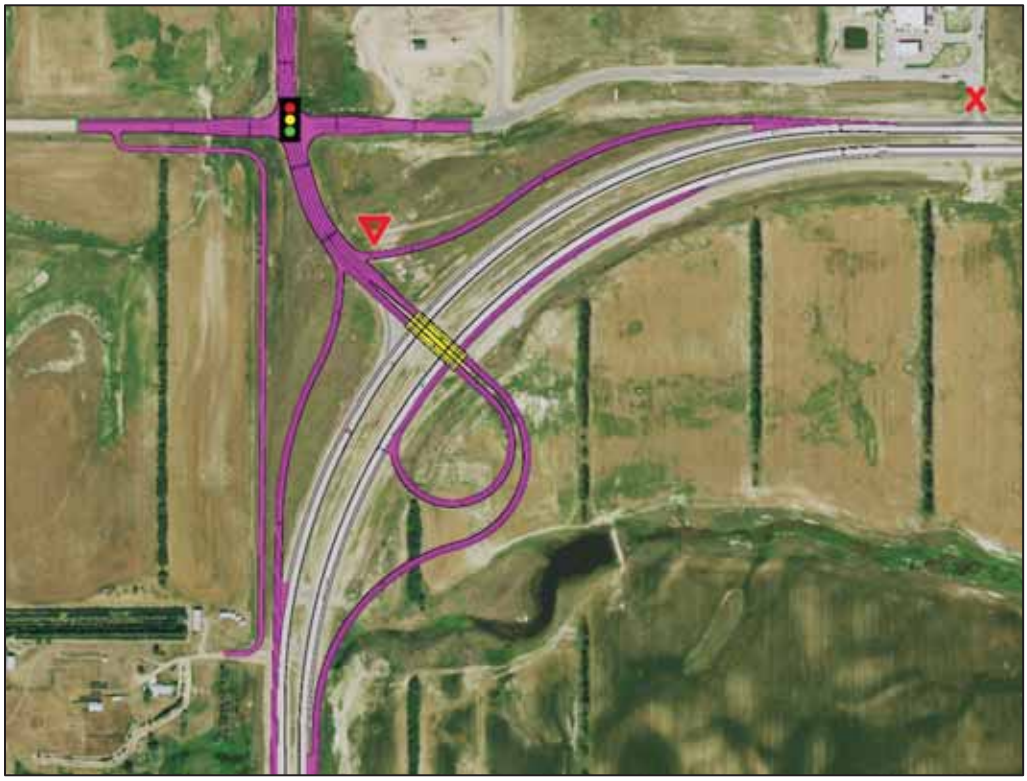


Figure 14B – Option B: Trumpet Interchange B (Behind)

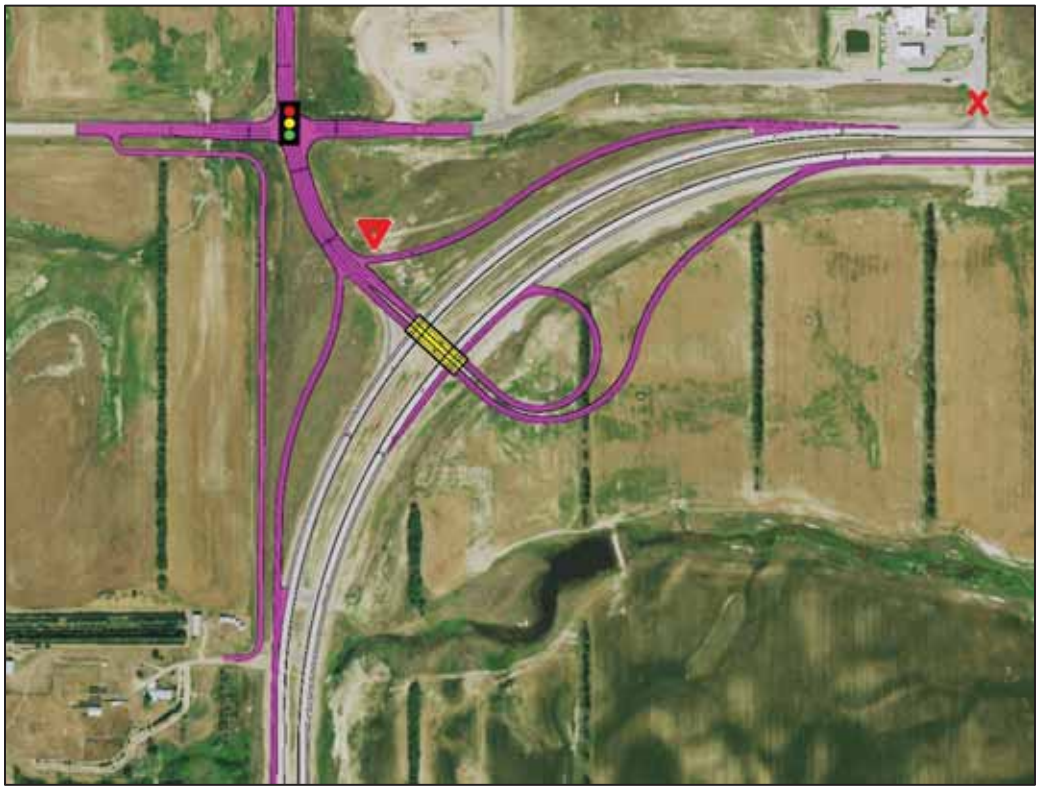
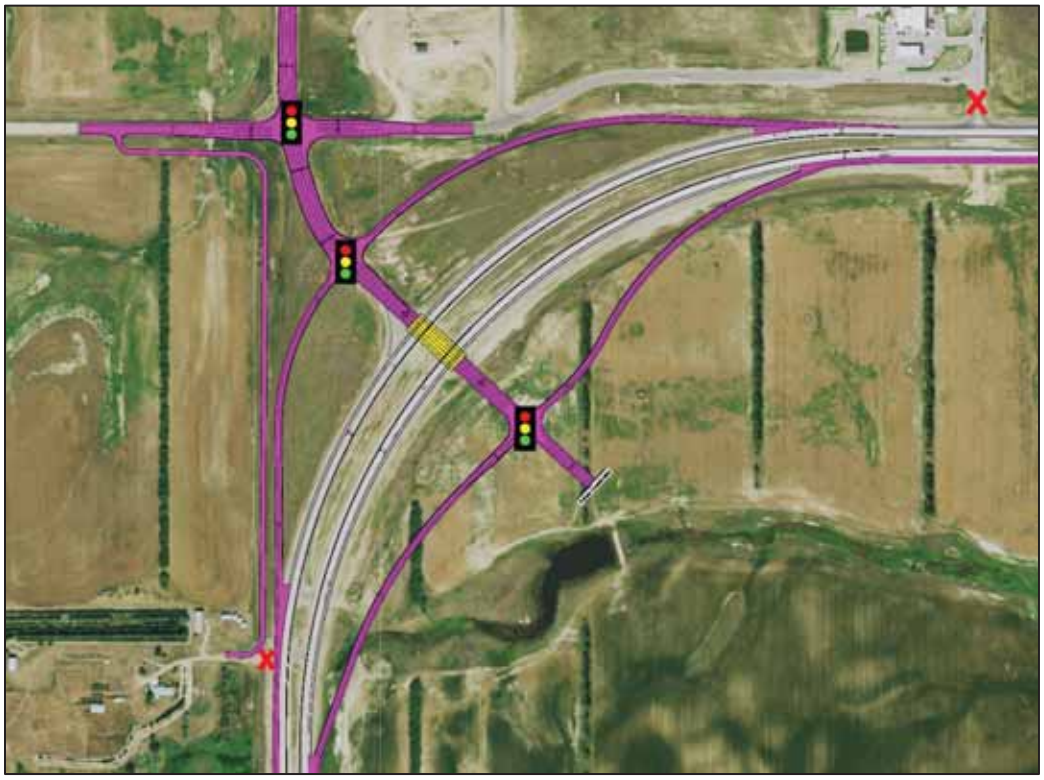


Figure 14C – Option C: Diamond Interchange with Roundabouts

Figure 14D – Option D: Diamond Interchange with Signals



6.0 Project Prioritization

6.1 Prioritization Approach

Given the mitigation necessary to ensure long-term safe and efficient operations along US Highway 2/85, there is a need to help prioritize the potential improvements. This approach focused on locations with existing issues, but also considered the approximate timeline when capacity improvements may be needed. Mitigation alternatives were prioritized into short- (existing to year 2020), medium- (year 2020 to year 2030), and long-term (year 2030 to year 2040+) improvements and are summarized as follows:

1) Short-Term Mitigation (Existing to Year 2020)
    a. General Access Considerations
    b. 59th Street NW
    c. 60th Street NW
    d. Quarry Accesses (2/3 mile north of 60th Street NW and 1/2 mile south of 62nd Street NW)
2) Mid-Term Mitigation (Year 2020 to Year 2030)
    a. 58th Street NW
    b. US Highway 85 (at 13-Mile Corner)

3) Long-Term Mitigation (Year 2030 to Year 2040+)

   a. 62nd Street NW

   b. 63rd Street NW

Although these projects were prioritized based on existing and future needs, the City, County, and NDDOT should monitor area operations and leverage opportunities when available to complete this mitigation.

6.2 Preliminary Cost Estimates

To aide in future corridor planning, preliminary concept cost estimates were developed. The intent of these cost estimates is to provide an approximate cost to allow stakeholders to adequately plan for future improvements along the study corridor. The preliminary cost estimates utilized typical planning level thresholds for various traffic controls and roadway improvements. The following information summarizes the preliminary level cost estimates, which generally follows the US Highway 2 projects as listed in the previous section, as well as the mitigation ID listed in Section 5.0. Costs shown are based on year 2016 pricing and do not include any contingency, engineering/administration, and/or right-of-way.

Table 6 - Mitigation and Preliminary Cost Estimate Summary

Mitigation ID(s)	US Highway 2 Location	Type of Improvement	Priority	Approximate Cost ($)
1	General Access Considerations	Monitor/Study	Short-Term	TBD
3	59th Street NW	Safety, Access	Short-Term	---
	Option A - Signal and Turn Lanes	---	---	$0.4M
	Option B - RCUT	---	---	$1.6M
4	60th Street NW	Safety, Access	Short-Term	---
	Option A - Signal and Turn Lanes	---	---	$0.4M
	Option B - RCUT	---	---	$1.6M
5	Quarry Access	Monitor/Study	Short-Term	TBD
2	58th Street NW	Access, Capacity	Mid-Term	---
	Option A - Signal and Turn Lanes	---	---	$0.4M
	Option B - RCUT	---	---	$1.6M
	Option C - Close and New Roadway	---	---	$2.2M
8	US Highway 85 (at 13-Mile Corner)	Capacity	Mid-Term	---
	Option A - Signal and Dual Turn Lanes	---	---	$0.6M
	Option B - Interchange	---	---	$26M to 30M*
6	62nd Street NW	Monitor/Study	Long-Term	TBD
7	63rd Street NW	Monitor/Study	Long-Term	TBD

(*) Range represents the four interchange options provided.

7.0 Summary and Conclusions

The goal of this corridor study was to identify the short- and long-term needs of US Highway 2/85 from US Highway 85/US Highway 85B (at Love's Corner) to US Highway 85 (at 13-Mile corner). The identified needs of the corridor were based on traffic operations, providing as safe and efficient operations within the study area as possible. The analysis included and focused on access, crashes, roadway and intersection capacity, and any other issues identified through stakeholder involvement. Through this analysis, several issues were identified throughout the study corridor.

To address the issues identified, multiple mitigation alternatives were developed for the corridor. The issues and corresponding mitigation alternatives are summarized in Section 5 (Issues Summary and Mitigation Alternatives). These mitigation alternatives were then prioritized based on need (safety, capacity, access) into short- (existing to year 2020), medium- (year 2020 to year 2030), and long-term (year 2030 to year 2040+) mitigation, which is summarized in Table 6. Furthermore, preliminary cost estimates were developed for the majority of the mitigation alternatives to help with capital planning and funding. This preliminary costs estimates are also summarized in Table 6. Further discussion with stakeholders should occur as planning and opportunities arise with respect to infrastructure investment.