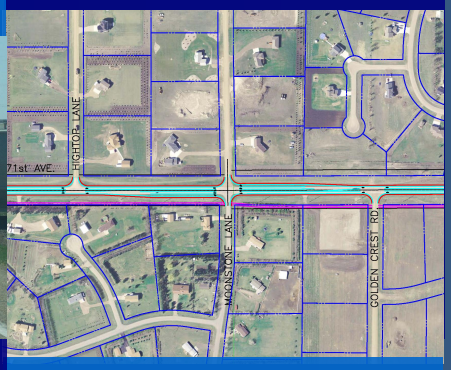
April 2008



71ST AVENUE-CENTENNIAL ROAD CORRIDOR STUDY REPORT

Bismarck-Mandan
METROPOLITAN PLANNING ORGANIZATION

URS

71ST AVENUE - CENTENNIAL ROAD CORRIDOR STUDY

FINAL REPORT

April 2008

Prepared for:

Bismarck-Mandan
METROPOLITAN PLANNING ORGANIZATION
in association with

NDDOT North Dakota Department of Transportation

Bismarck

BURLEIGH · COUNTY ·

Prepared By:

URS TRANSPORTATION

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INTRODUCTION

The primary goal of the 71st Avenue-Centennial road corridor study is to develop a short to mid-term improvement concept that can be implemented to improve safety and traffic flow within and through the corridors. The general study area is displayed in Figure 1, and includes:

- 71st Avenue from US 83 to Centennial Road
- Centennial Road from 71st Avenue to the I-94 interchange

71st Avenue and Centennial Road serve as primary travel corridors within the northern region of the Bismarck area. The high speed design of this facility coupled with relatively few traffic control devices along the five-mile long corridor make it an efficient alternative to the US 83 corridor. A number of residential developments have been constructed along this corridor over the last decade and traffic volumes have increased. This corridor is also used by a fair amount of truck traffic that is primarily accessing the business area near Centennial Road / Century Avenue or points south along Bismarck Expressway. The lack of turning lanes along the corridor combined with increasing traffic volumes has led to the perception that safety is a concern.

This study was conducted through a collaborative effort involving the following agencies/organizations:

- Bismarck-Mandan Metropolitan Planning Organization (MPO)
- City of Bismarck
- Burleigh County
- North Dakota Department of Transportation (NDDOT)

STUDY PROCESS

The study process employed took into account the identified corridor issues. The desired product was an improved roadway corridor that does not substantially impact the sustainability of current corridor activities. The balance was struck by including the public and the study team at each of the key study junctures, including:

- Identify current and emerging corridor issues.
- Evaluation of current conditions.
- Development and evaluation of alternatives to address identified corridor issues.
- Selection of a locally preferred alternatives and development of an implementation plan.

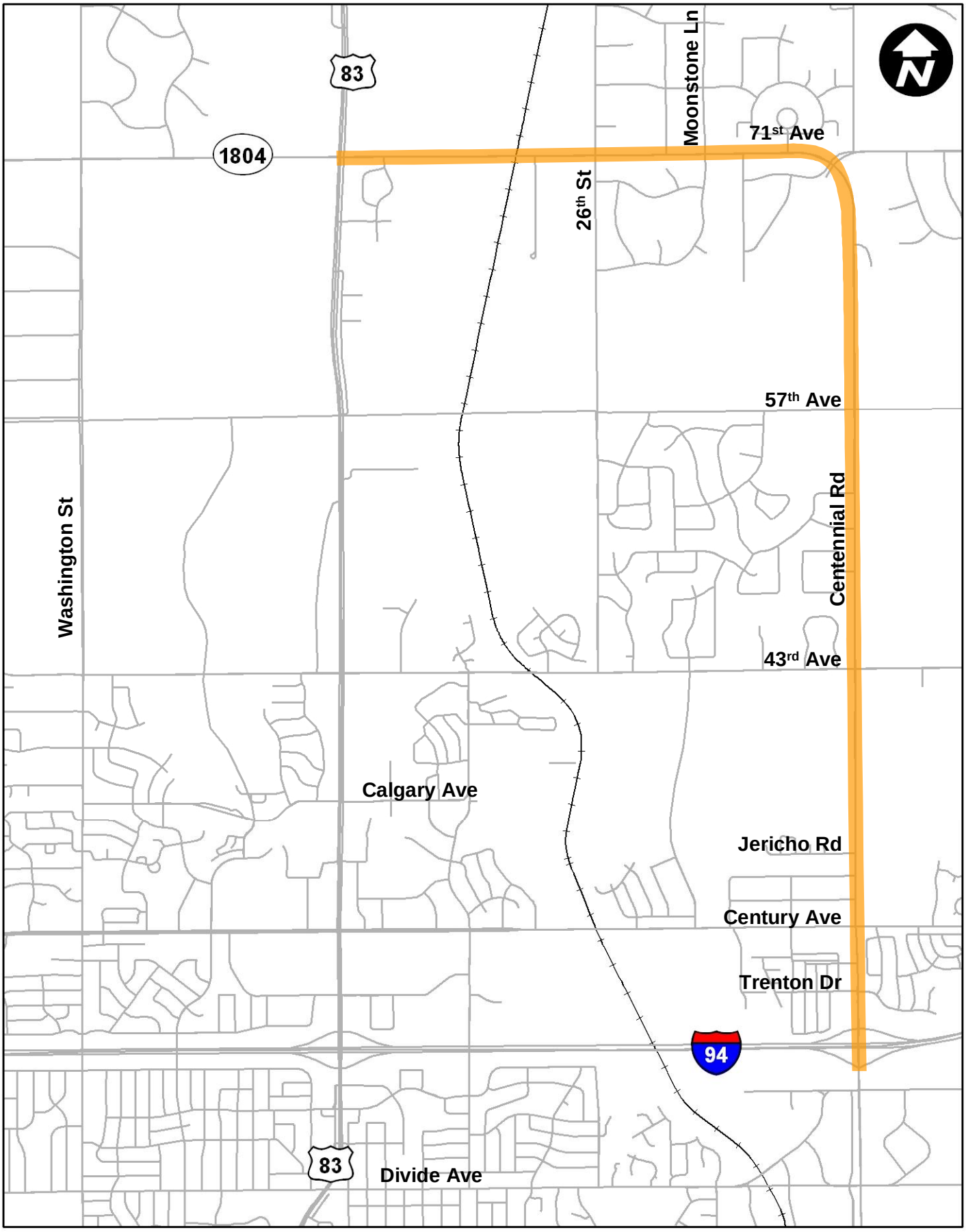


FIGURE 1: 71st Avenue – Centennial Road Corridor Study Area

PUBLIC INVOLVEMENT

For this study the consultant team strove for a meaningful public involvement process that supported sound transportation decision-making. This approach attempted to achieve three basic concepts:

- Provide access to information before decisions are final.
- Provide access to information in a number of ways.
- Allow for actual influence over the outcome of the decisions.

The public involvement effort for the Interstate and 71st Avenue / Centennial Road Corridor Study used a number of face-to-face meetings with all of the key study participants as the principal means of exchanging information throughout the study process. A number of outreach techniques were also incorporated into the public involvement effort.

The public involvement effort for this study involved the following types of meetings:

- Public meetings.
- Staff meetings and workshops involving city, state, and MPO staff.
- MPO Technical Advisory Committee (TAC) and Policy Board meeting presentations.

Property owners adjacent to the study corridor were sent a letter and invited to the public meetings.

- The first public meeting was held on November 29, 2007 in the Auditorium at Century High School. This was a joint public meeting with the North-South Regional Beltway study. The meeting format was an open house with a brief presentation. Approximately 210 people attended the meeting. The meeting had two primary purposes: 1) introduce the study and the members of the study team, and 2) obtain input from the public on corridor issues. Attendees to the public meeting were given a comment form on which they could provide their written comments. Additional public comments were also recorded by members of the MPO or the consultant team.
- A second public meeting was held February 20, 2008, and provided a summary of the study findings and recommendations. The meeting was attended by 52 people, with the vast majority of those in attendance being property owners along the corridor. The meeting was organized as a combination of an open house, a presentation outlining the process and findings, group question-answer period, and an additional open house period. Those in attendance were provided a comment form or were able to provide comments through the website (www.71st-centennial.com). Comments received were incorporated into the final report.

Throughout the course of the study, there were additional means available to the general public for providing comments / input to the study team. These additional input avenues included the project website *www.71st-Centennial.com*, a toll-free phone number for questions, and the city's website. These on-demand avenues of input have provided the public with always-available means for providing feedback to the study team. A summary of the public involvement element is provided in Appendix E, including key elements such as:

- Study Overview handout provided to the public and stakeholders
- Meeting presentations
- Invitation letters sent to adjacent land owners
- All correspondence received

Staff meetings and workshops were held on an approximately monthly basis to present information and receive feedback on significantly study milestones. Many members of the MPO TAC were involved in these meetings as well. Meetings were held at the following milestones / topics:

- Study Kick-off
- Access Management / Turn Lane Concepts
- Truck Origin-Destination Survey Results
- Initial Corridor Concept Workshop
- Preliminary Preferred Corridor Concept

Corridor Transportation Issues

At the November 29 public meeting several issues were provided by those in attendance, including:

- Scheduling of improvements. Generally, those in attendance thought that improvements to the roadways should be done as soon as possible.
- Safety. Many in attendance felt that left turns from the corridor and turns onto the corridor from cross routes were difficult.
- Traffic congestion at Centennial Road / Century Avenue.
- Short turn lanes at 71st Avenue / Centennial Road. Some in attendance thought that the recently constructed turn lanes at the intersection were too short.
- Impacts to the adjacent areas should be minimized.

In addition to the first public meeting, issues within the study corridor were identified at a workshop held with staff from the MPO, City of Bismarck, Burleigh County, and the NDDOT. The issues identified in the workshop were augmented through the technical analyses conducted as part of the corridor study work scope. In general, the issues that arose from the staff workshop and consultant analyses can be separated into the following categories:

- Development and traffic volume growth: There is a substantial amount of available land for development in the corridor adjacent to 71st Avenue and Centennial Road. What improvements are needed to accommodate future traffic volume growth?
- Truck traffic: There is a significant amount of truck traffic using this corridor. Is there anyway to mitigate this issue?
- Safety: How do the current crash rates within the corridor compare to averages for this type of facility? As traffic volumes increase will safety concerns become more prevalent? What actions can be taken to address any observed areas of concern?
- Access management: Are there locations in the corridor where access drives to the adjacent development areas negatively impacts corridor safety and / or traffic operations?

Each of the participants at the staff workshop were asked to provide a list of specific or general transportation-related issues within the corridor. The information provided by staff was combined with the issues feedback received from the public, and the summary of corridor transportation issues is shown in Figure 2.

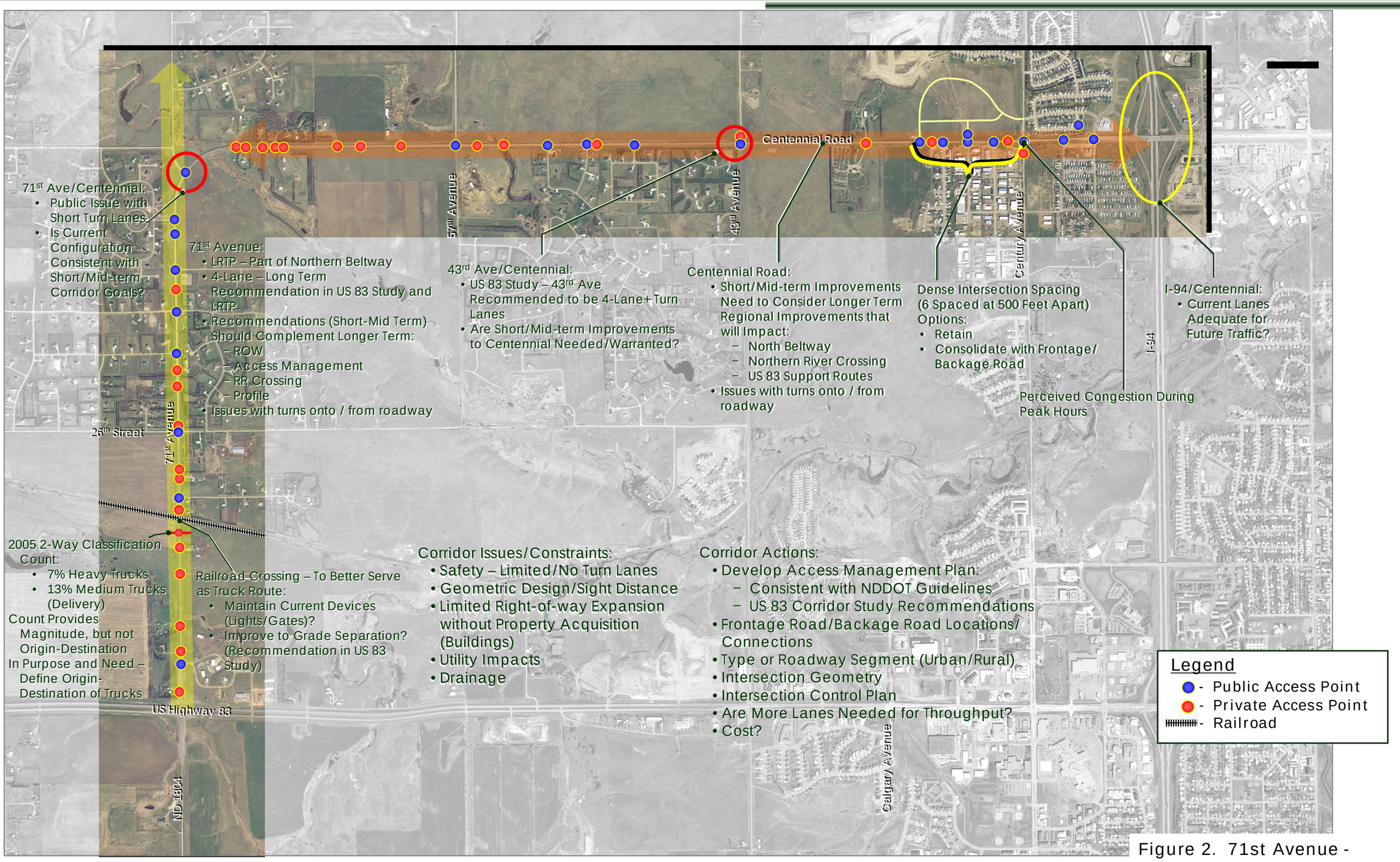


Figure 2. 71st Avenue - Centennial Road Corridor Study Issues

Existing Conditions

The purpose of the "Existing Conditions" chapter is to provide a summary of the various elements of the transportation system within the 71st Avenue and Centennial Road corridors. Gaining an understanding of the current system is important for the overall corridor improvement planning process in that the existing system forms the underlying foundation of the future system needs. Elements that were investigated / analyzed as part of this study include the following:

- Traffic volumes in the corridor.
- Truck traffic in the corridor.
- Roadway network and traffic control.
- Non-motorized facilities within the corridor.
- Crash history for the corridor.

The data used for this analysis of existing conditions were primarily provided by the City of Bismarck, Burleigh County, the North Dakota Department of Transportation (NDDOT), and the Bismarck-Mandan MPO. Field reviews to supplement the database information were conducted by consultant team personnel.

Traffic Data

Intersection hourly turning movement volumes used for this study were provided by the City of Bismarck or collected as part of this study. Average annual daily traffic (AADT) volumes were taken from the *2006 Bismarck / Burleigh County Traffic Volume Map* that is produced by the North Dakota DOT. AADT volumes are provided in Figure 3.

Intersection turn movement counts for study area intersections were obtained from a number of sources. The City of Bismarck provided counts for the Centennial Road intersections with Century Avenue (collected February 4, 2004) and Trenton Drive (March 8, 2006). These counts were conducted prior to reconstruction of East Century Avenue. As part of this study additional turn movement counts were conducted for the following intersections: 1) US 83 / 71st Avenue (July 18 and August 7, 2007); 2) Centennial Road / I-94 Westbound Ramp (August 7, 2007); and 3) Centennial Road / I-94 Eastbound Ramp (August 7, 2007). Intersection turn movement volumes for the morning and afternoon peak hours are shown in Figures 4 and 5.

In general these corridors operate at a reasonable level throughout most of the day. During peak periods the segment of Centennial Road from Trenton Drive through the Century Avenue intersection experiences the most significant congestion. Much of the congestion in that segment is related to the Century Avenue intersection where there are several high volume movements.

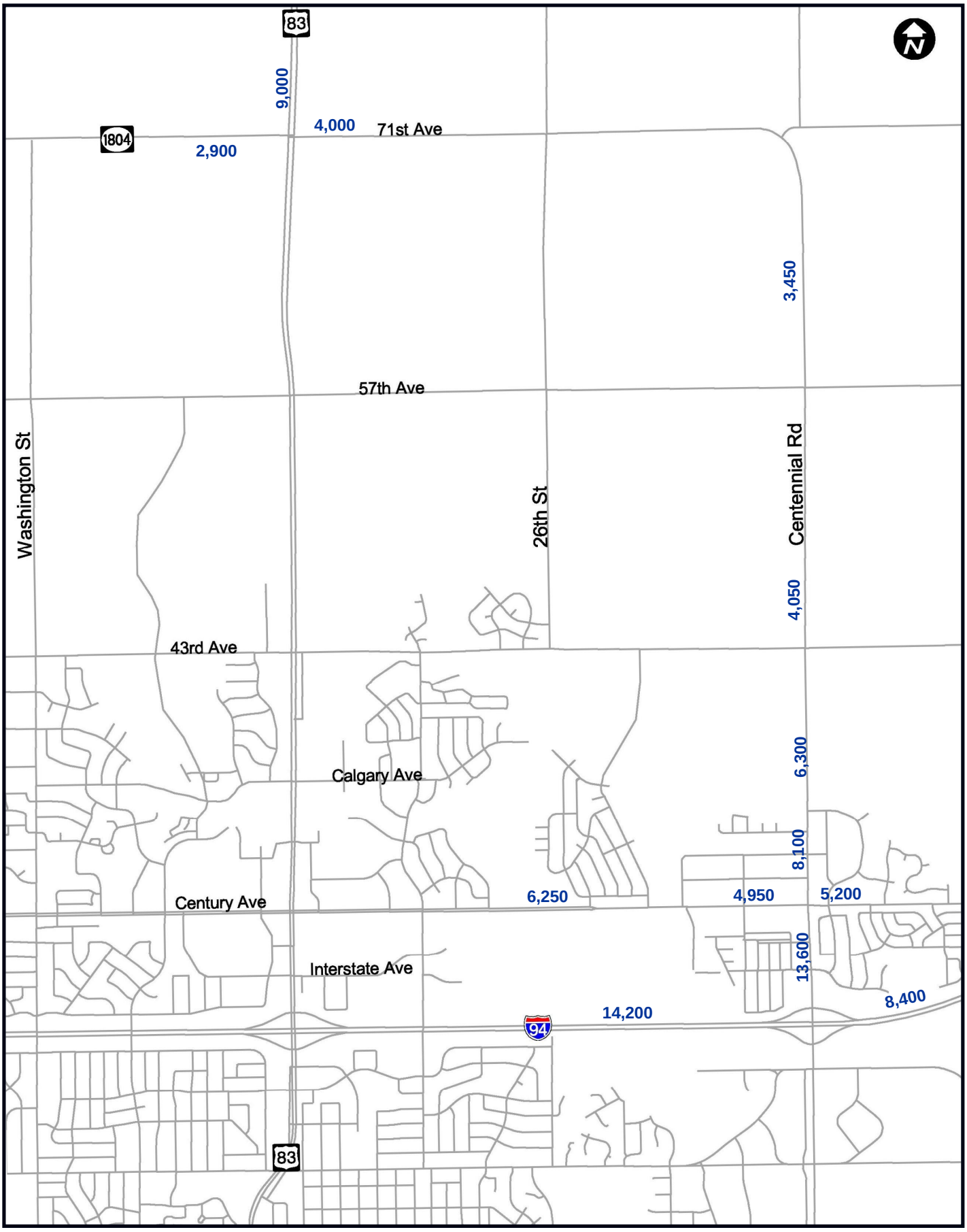


FIGURE 3: Existing (2005) Daily Traffic Volumes

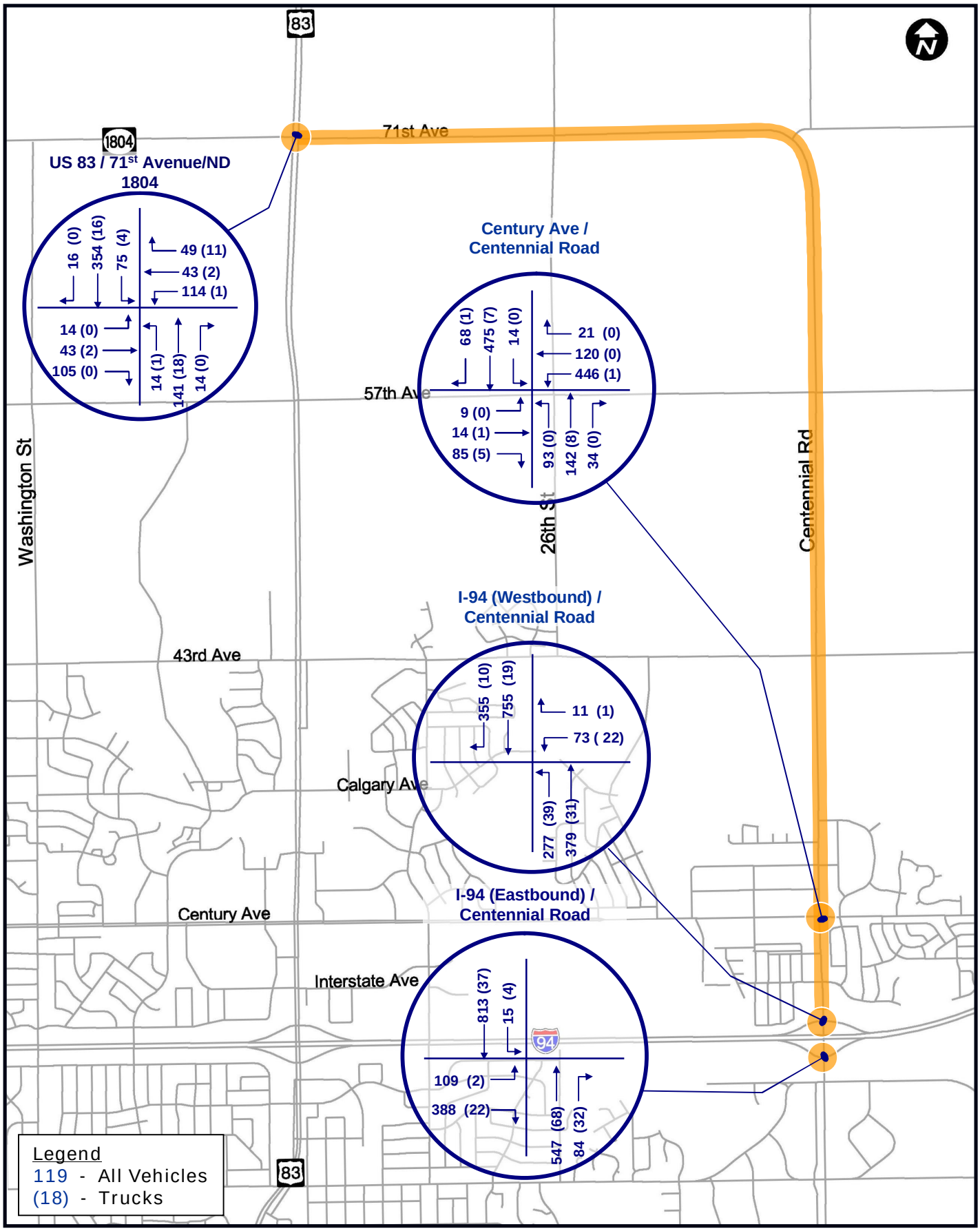


FIGURE 4: AM Peak Period Intersection Turning Movements

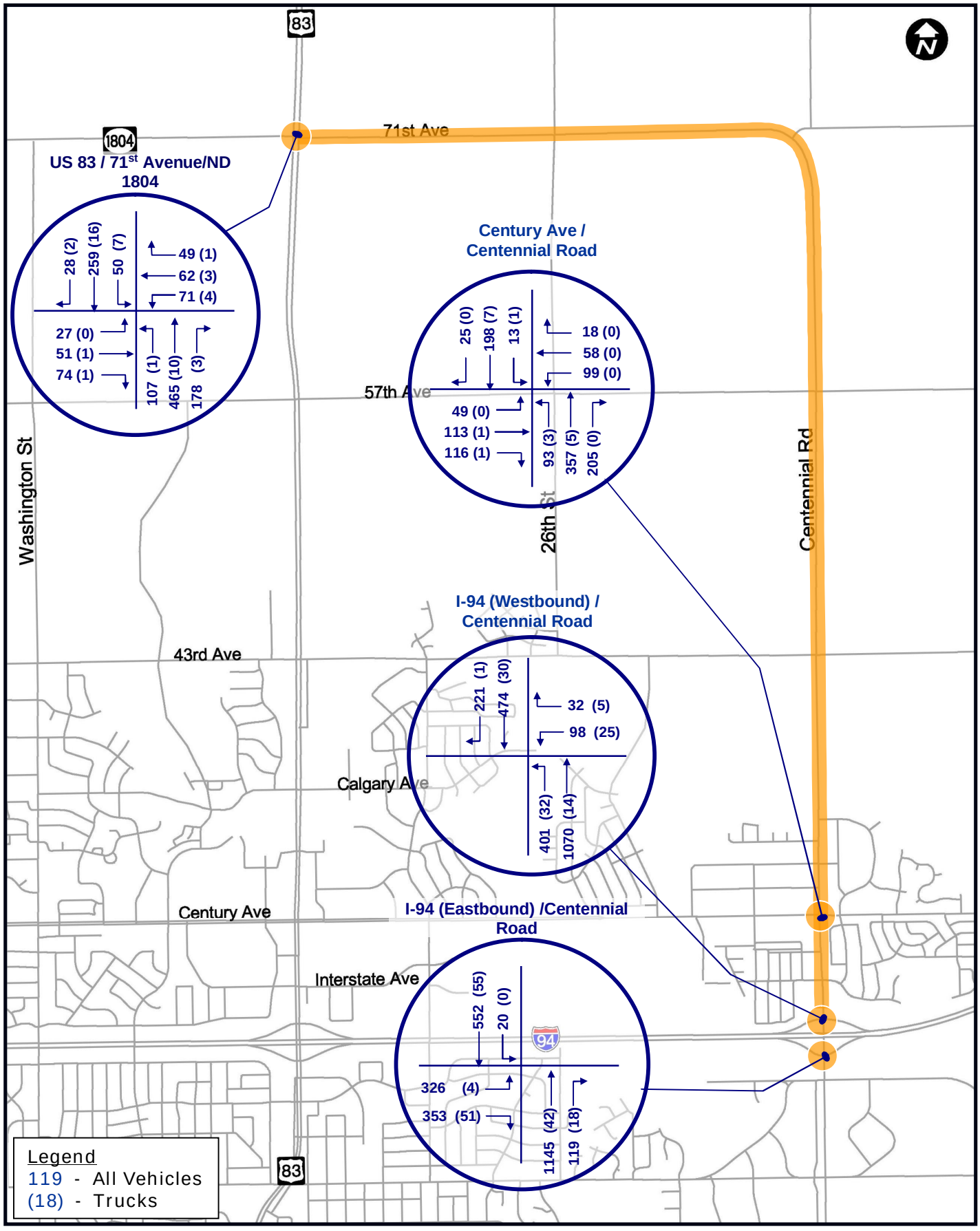


FIGURE 5: PM Peak Period Intersection Turning Movements

Truck Origin-Destination Survey

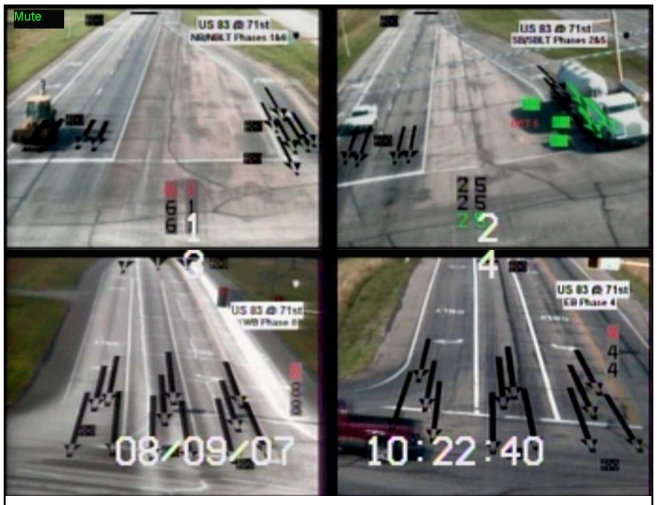
In general, the public perceives that truck traffic is high in the 71st Avenue and Centennial Road corridors. This truck traffic is viewed as a safety concern by members of the motoring public. In order to determine the level of truck traffic using these corridors a truck origin-destination (O-D) survey was completed in the summer of 2007. The purpose of the truck O-D survey included the following:

- Collect data that allows the study team to gain a better understanding of truck travel patterns in the US 83 and 71st Avenue / Centennial Road corridors.
- Use the results to determine if trucks can be diverted from the corridors.
- Determine proper short / mid-term safety improvements for the corridor.

The data were collected in a corridor-specific, time-specific manner that provided O-D information that allowed the study team to estimate:

- The number of trucks entering and leaving the corridor, compared to all traffic entering and leaving the corridor.
- The level / proportion of truck traffic passing through the corridor.
- The level / proportion of truck traffic with an origin / destination within the corridor.

To collect the O-D data, video data collection was implemented by utilizing the existing video cameras in both corridors, which are deployed for vehicle detection at traffic signals. The data collection approach involved setting up DVD recorders in the traffic control cabinets at the intersections of:



Example of Video Data

- US 83 / 71st Avenue
- US 83 / I-94 westbound ramps
- US 83 / I-94 eastbound ramps
- Centennial Road / I-94 westbound ramps
- Centennial Road / I-94 eastbound ramps

The data was recorded for all of the necessary intersection approaches over the course of four days. The data were collected between the hours of 6:00 AM and 9:00 PM. The video data included a running time and date, to provide the necessary time-based data for matching truck traffic entering and / or leaving the corridor.

This allowed the study team to assess the levels of truck traffic traveling between the surveyed intersections.

URS staff reviewed the video and reduced it into data needed to complete the analyses. This involved reviewing the collected video and looking for appropriate "matches". Matches were verified when staff observed a truck entering the corridor at one location (origin) and leaving at another location (destination) on the opposite end of the corridor. The matches were only counted as a through trip when the truck was spotted at both its origin and destination within a 15 minute interval. These through truck trip matches were then summarized by station.

Information on traffic levels, percentage trucks and through truck trip percentage **during the survey period** are presented in Table 1. The table is organized such that data are presented by the corridor (US 83 or 71st Avenue / Centennial Road) and direction (northbound or southbound) in which the vehicles traveled. The following bullets summarize the results presented in Table 1:

- Traffic volumes (both trucks and non-trucks) entering at the south end of each corridor are significantly higher than volumes entering at the north end of each corridor.
- Approximately four (4) percent of all vehicles surveyed were trucks. The percentage of trucks was higher in the 71st Avenue / Centennial Road corridor than in the US 83 corridor. On the east leg of the US 83 / 71st Avenue intersection, trucks make up approximately 10 to 11 percent of all vehicles.
- Of the trucks entering the study area, approximately 41 percent traveled through the study area, while 59 percent had a destination within the study area.
- For each corridor, the number of northbound and southbound through trucks is relatively consistent, which is expected. Observed results are documented below:
  - 71st Avenue / Centennial Road: There were 109 southbound through trucks in survey period, and 112 northbound through trucks in survey period.
  - US 83: There were 189 southbound through trucks in survey period, and 166 northbound through trucks in survey period.
- The primary destinations / origins for trucks that enter / leave the Centennial Road / 71st Avenue corridor at I-94, but do not travel all the way through the corridor to US 83 are likely the businesses located along Centennial Road from I-94 through Saratoga Avenue. Of the trucks coming through the I-94 interchange area from I-94 east or west and / or Bismarck Expressway from the south, approximately 26 percent make it to US 83. Thus, it can be concluded that 74 percent of the vehicles entering / exiting at I-94 / Bismarck Expressway have a destination in the Centennial Road corridor or use Centennial road to access nearby businesses. As there are very few truck-oriented activities north of Saratoga Avenue (or

opportunities to turn off Centennial Road to access more remote truck-oriented businesses outside the corridor), it is likely the trucks are going to the businesses along the southern part of the corridor. As the southbound total truck volume is relatively consistent with the northbound, it can be concluded that vehicles are leaving the truck-oriented businesses along Centennial Road and heading back to the south, exiting the study area to Bismarck Expressway and / or I-94.

- Very few trucks that enter / leave the 71st Avenue / Centennial Road corridor at US 83 have a destination / origin in the corridor, as almost 80 percent of the trucks observed at the north intersection are also observed at the southern study area intersections of I-94 / Centennial Road. Thus, the truck-oriented businesses in the Centennial Road corridor adjacent to I-94 do not draw much from the north, or trucks that access these businesses use US 83 to access I-94 to get to / from the southern part of the Centennial Road corridor.
- Similar patterns that were observed along the various areas of Centennial Road were also observed along US 83. Most of the trucks entering / leaving the US 83 corridor from the south on State Street or east-west on I-94 had a destination / origin in the corridor or adjacent to it and then exited back to State Street or I-94. This is demonstrated by the 72 percent of the trucks that entered from the south on State Street or I-94 did not make it to US 83 / 71st Avenue.
- Of the trucks observed entering / exiting the US 83 corridor at 71st Avenue / ND 1804, approximately 78 percent traveled all the way through the corridor to either State Street south of I-94 or I-94 east / west.
- The majority of through traffic traveling to / from areas south of I-94 uses the Centennial Road / 71st Avenue (and Bismarck Expressway) corridor. Approximately 85 percent of traffic oriented to / from areas south of I-94 uses the Centennial Road, whereas only 15 percent uses the US 83 corridor.
- The majority of through traffic traveling to / from I-94 uses the US 83 corridor. Approximately 95 percent of traffic oriented to / from I-94 uses the US 83 corridor, whereas only 5 percent uses the Centennial Road / 71st Avenue corridor.

Figures 6 and 7 provide an illustration of the general travel paths of truck traffic traveling all the way through each corridor, including the orientation of trucks when entering and exiting the corridors. The volumes presented in these figures represent daily volumes that were developed by applying expansion factors to the volumes observed during the survey period. Additional detail on the truck O-D survey can be found in Appendix A.

Table 1: Summary of Surveyed Truck Traffic

Corridor and Direction	Entering / Exiting Intersection Surveyed	Turn Movement	Total Vehicles	Total Trucks	Percentage Trucks	Trucks Traveling through Study Area	Percentage Trucks Through Study Area
US 83 Northbound Entering							
	US 83 / I-94 Westbound Ramps	WB Right-turn (1)	2,773	201	7%	66	33%
	US 83 / I-94 Eastbound Ramps	EB Left-turn (2)	3,988	221	6%	84	38%
	US 83 / I-94 Eastbound Ramps	NB Through (3)	12,082[1]	176[1]	1%	16	9%
US 83 Northbound Entering Summary			18,843	598	3%	166	28%
US 83 Southbound Entering							
	US 83 / 71st Ave	EB Right-turn (4)	671	16	2%	8	50%
	US 83 / 71st Ave	SB Through (5)	3,627	227	6%	181	80%
US 83 Southbound Entering Summary			4,298	243	6%	189	78%
US 83 Southbound Exiting							
	US 83 / I-94 Eastbound Ramps	SB Left-turn (6)	2,373	212	9%	97	46%
	US 83 / I-94 Westbound Ramps	SB Right-turn (7)	4,072	174	4%	70	40%
	US 83 / I-94 Eastbound Ramps	SB Through (8)	11,231[1]	221[1]	2%	19	9%
US 83 Southbound Exiting Summary			17,676	607	3%	186	31%
US 83 Northbound Exiting							
	US 83 / 71st Ave	NB Left-turn (9)	650	10	2%	8	80%
	US 83 / 71st Ave	NB Through (10)	3,544	226	6%	159	70%
US 83 Northbound Exiting Summary			4,194	236	6%	167	71%

Table 1: Summary of Surveyed Truck Traffic (Continued)

Corridor and Direction	Entering / Exiting Intersection Surveyed	Turn Movement	Total Vehicles	Total Trucks	Percentage Trucks	Trucks Traveling through Study Area	Percentage Trucks Through Study Area
71st Ave/ Centennial Northbound Entering							
	Centennial Rd/ I-94 Westbound Ramps	WB Right-turn (11)	295	37	13%	9	24%
	Centennial Rd/ I-94 Eastbound Ramps	EB Left-turn (12)	2,241	62	3%	0	0%
	Centennial Rd/ I-94 Eastbound Ramps	NB Through (13)	5,328[1]	324[1]	6%	103	32%
71st Ave/ Centennial Rd Northbound Entering Summary			7,864	423	5%	112	26%
71st Ave/ Centennial Rd Southbound Entering							
	US 83 / 71st Ave	EB Through (14)	458	23	5%	11	48%
	US 83 / 71st Ave	SB Left-turn (15)	583	112	19%	98	88%
71st Ave/ Centennial Rd Southbound Entering Summary			1,041	135	13%	109	81%
71st Ave/ Centennial Rd Northbound Exiting							
	Centennial Rd / I-94 Eastbound Ramps	SB Left-turn (16)	222	27	12%	2	7%
	Centennial Rd / I-94 Westbound Ramps	SB Right-turn (17)	2,705	88	3%	6	7%
	Centennial Rd / I-94 Eastbound Ramps	SB Through (18)	5,556[1]	334[1]	6%	96	29%
71st Ave/ Centennial Rd Northbound Exiting Summary			8,483	449	5%	98	22%
71st Ave/ Centennial Southbound Exiting							
	US 83 / 71st Ave	WB Through (19)	495	37	7%	15	41%
	US 83 / 71st Ave	WB Right-turn (20)	560	107	19%	92	86%
71st Ave/ Centennial Rd Southbound Exiting Summary			1,055	144	14%	107	74%
Summary of All Entering Traffic			32,046	1,399	4%	576	41%
Summary of All Exiting Traffic			31,408	1,348	5%	552	41%

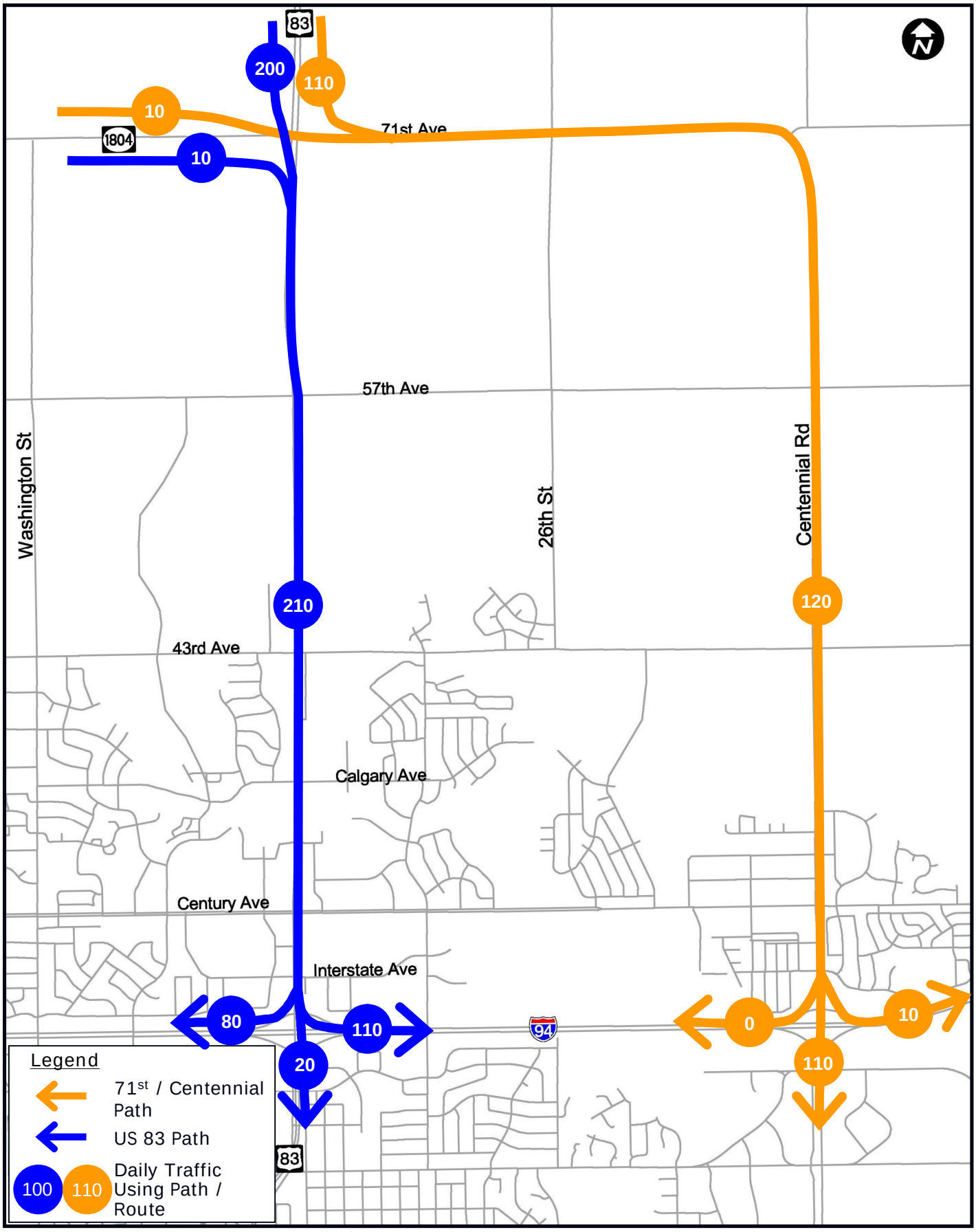


FIGURE 6: Daily Southbound Truck Estimates

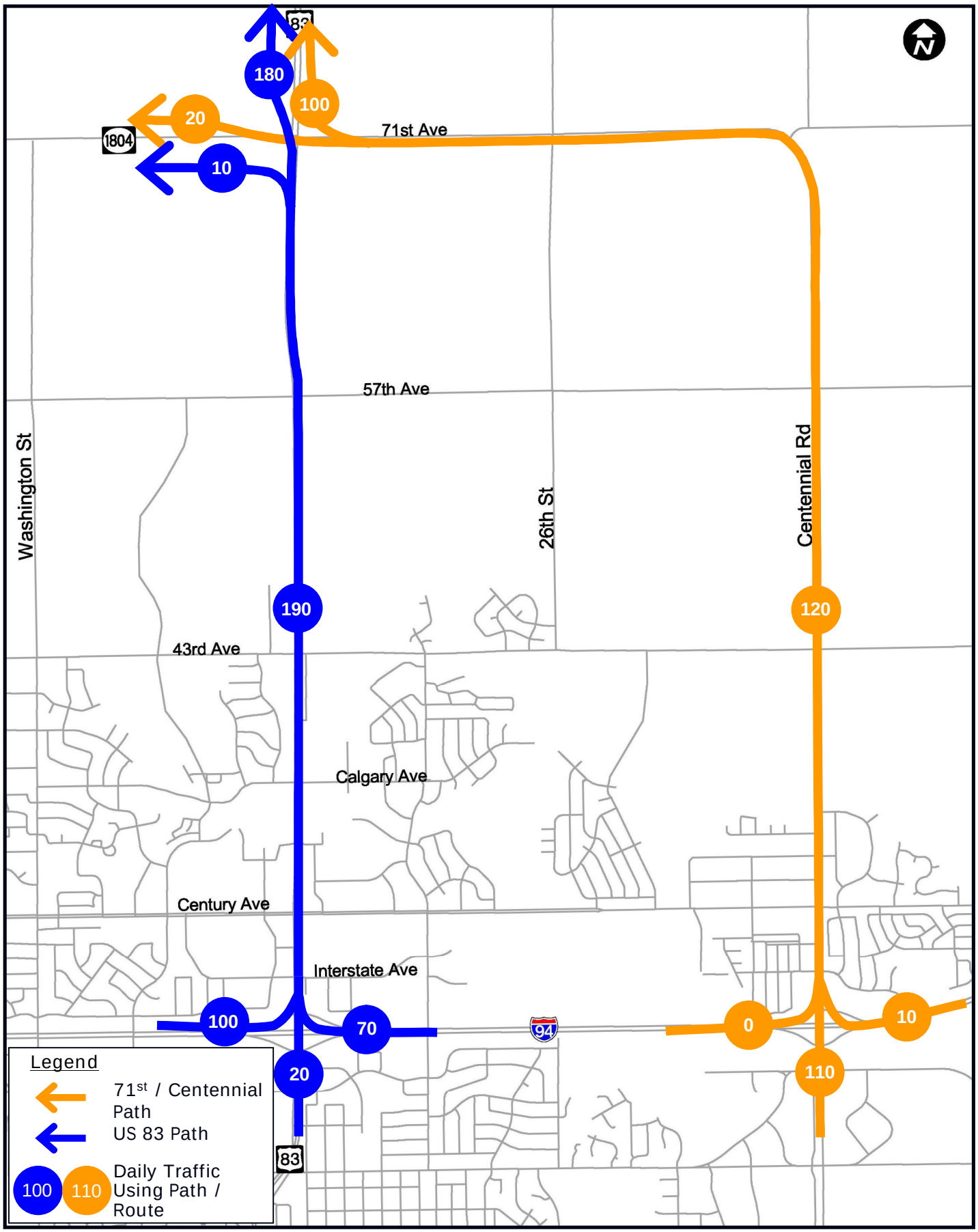


FIGURE 7: Daily Northbound Truck Estimates

The key conclusions from the truck O-D survey are summarized below:

- The 71st Avenue / Centennial Road corridor serves the majority of local / Bismarck-area truck trips traveling through the study area. The survey data analysis completed indicates that 95 percent of through trips in the 71st Avenue / Centennial Road corridor pass through the I-94 interchange to / from the Bismarck Expressway.
- The US 83 corridor serves the majority of regional through truck trips via I-94. The survey data analysis completed indicates that 85 percent of through trips in the US 83 corridor are oriented to / from the I-94 ramps at US 83.
- The majority of the truck trips entering and leaving the study area are generated within the study area, meaning they have a trip origin or destination between 71st Avenue and I-94. Specifically, 61 percent of 71st Avenue / Centennial Road corridor trips and 57 percent of US 83 corridor trips are local / non-through trips.

INVENTORY OF THE CORRIDOR

ROADWAY FACILITIES

The 71st Avenue corridor is currently being evaluated as a part of the Northern Beltway for the Bismarck region. The Centennial Road corridor serves as a key north / south roadway within the region and is the first continuous north / south roadway east of US 83 and it also provides direct access to I-94. The functional classification of study area roadways, based on the *Bismarck Mandan MPO Functional Classification Network map (2004)*, is documented in Figure 8 and summarized in the following bullets:

- 71st Avenue: Collector.
- Centennial Road, I-94 to 57th Avenue: Minor Arterial.
- Centennial Road, north of 57th Avenue: Collector.
- US 83: Principal Arterial.
- 43rd Avenue, west of Centennial Road: Minor Arterial
- 43rd Avenue, east of Centennial Road: Collector
- Century Avenue, west of Centennial Road: Minor Arterial
- Century Avenue, east of Centennial Road: Collector
- All other streets within the study area are classified as local streets.

A number of roadways within the study area are located on the fringe of urban development for the Bismarck region. Therefore, some of these roadway classifications will be upgraded (e.g., 71st Avenue as part of the Northern Beltway) or roadways will be classified (e.g., 26th Street, 57th Avenue) as the urban boundaries are updated. For the purposes of this study the Centennial Road and 71st Avenue

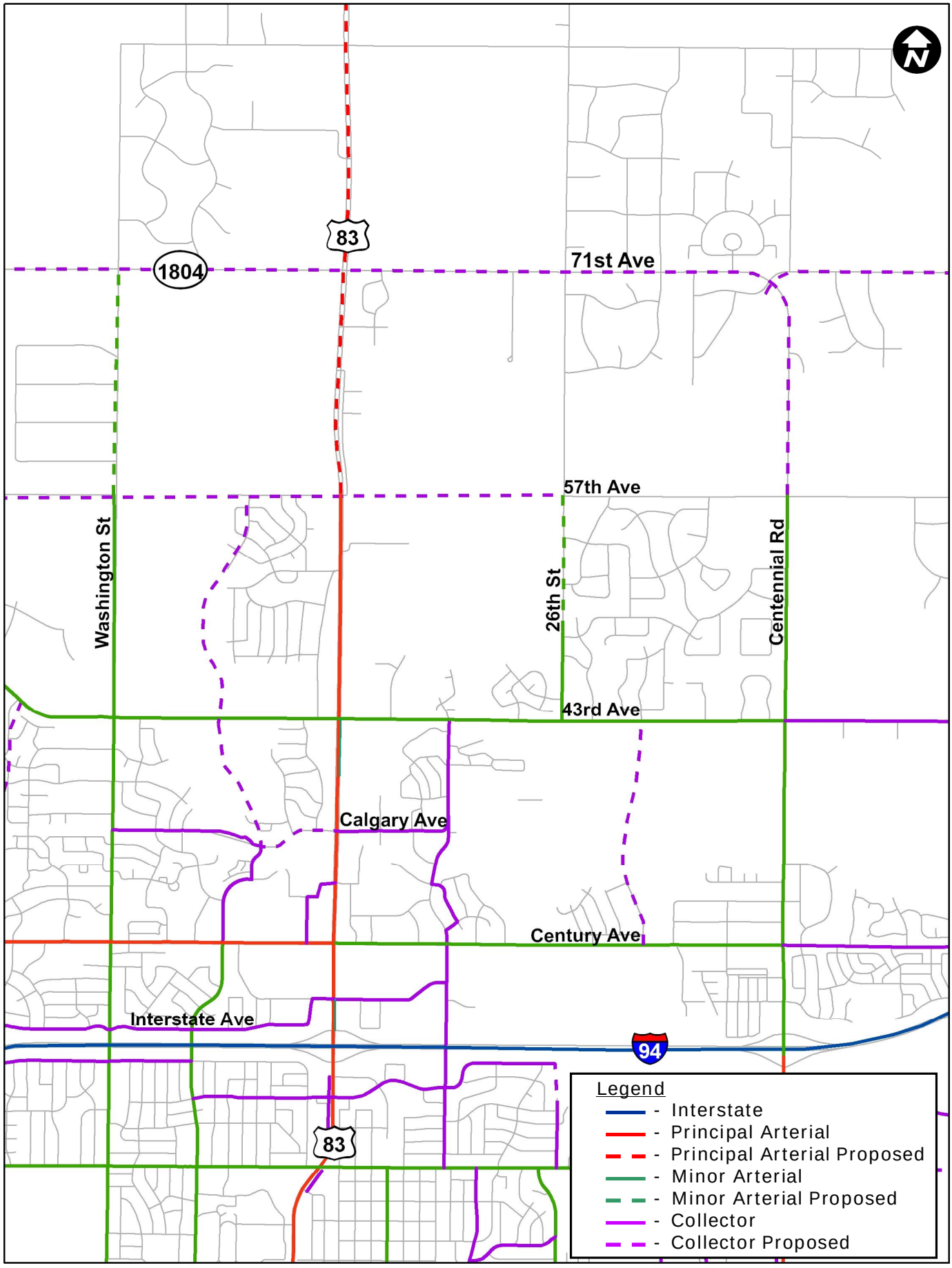


FIGURE 8: Study Area Functional Classification

corridors will be viewed as arterial roadway facilities because they service longer distance trips within the region.

The posted speed limit along 71st Avenue is 55 mph and this is also the posted speed for Centennial Road between 71st Avenue and Jericho Road. South of Jericho Road the posted speed for Centennial Road is 40 mph.

The majority of these corridors consist of a rural two-lane highway design over rolling terrain. An urban 5-lane cross section is provided along Centennial Road between the I-94 interchange and Trenton Drive. Left-turn lanes are provided on all approaches for the intersections of Centennial Road / Century Avenue and 71st Avenue / US 83. The left-turn lanes provided at the Centennial Road / Century Avenue intersection are relatively short (i.e., 75-150 feet of storage) and at times the left-turn queue spills back into the through lane. For the 71st Avenue / US 83 intersection, right-turn lanes are also provided on all intersection approaches. All other intersection approaches within the study area consist of a single lane.

TRAFFIC CONTROL

Signalized intersections within the study area are listed below:

- 71st Avenue / US 83: This intersection operates in a fully actuated mode, meaning that the signal indications respond to traffic demand on each approach. The signal has no set cycle length. The northbound and southbound approaches have protected only left-turn phasing.
- Centennial Road / Century Avenue: Like the 71st Avenue / US 83 intersection, this intersection operates in a fully actuated mode and has no set cycle length.
- Centennial Road / I-94 Westbound Ramp: This intersection is coordinated with the Centennial Road / I-94 Eastbound Ramp intersection and has a set cycle length that varies by time of day. The northbound approach provides protected / permitted left-turn phasing
- Centennial Road / I-94 Eastbound Ramp: This intersection is coordinated with the Centennial Road / I-94 Westbound Ramp and has set cycle length based on time of day.

All other intersections and access points within the study area utilize two-way stop sign control.

NON-MOTORIZED FACILITIES

Within the study area there is currently a multi-use trail located on the west side of Centennial Road between the I-94 interchange and Trenton Drive. South of the study area, this trail continues along Bismarck Expressway and currently ends at the Rosser Avenue intersection. There are currently no sidewalk facilities along or crossing the study area corridors. A multi-use trail is provided along Century Avenue to the west of Centennial Road.

CRASH DATA REVIEW

A review of the crash history for the intersections and roadway segments along the 71st Avenue and Centennial Road corridors was conducted to determine whether any high crash locations are present and to identify crash trends within the study area. Crash data for the three-year period from 2004 through 2006 were obtained from the North Dakota DOT. A summary of the crash data analysis for key intersections and roadway segments within the study area is provided in Tables 2 and 3. The key findings of the crash data review are summarized below:

- During the three years analyzed a total of 80 crashes occurred along the two corridors. The majority (85 percent) of the crashes occurred at intersections.
- The crash rate for signalized intersections ranged from 0.35 to 0.92 crashes per million entering vehicles (MEV). For unsignalized intersections the crash rates range from 0.11 to 0.98 crashes / MEV. A typical crash rate for an urban / suburban intersection typically falls in the range of 0.7 to 1.0 crashes / MEV.
- Contributing factors for these 80 crashes include alcohol (five crashes) and snow / icy roadway (11 crashes). These contributing factors are in addition to the most common factors typically associated with crashes:
  - Driver inattention: 17 crashes
  - Failure to yield: 18 crashes
  - Following too closely: five (5) crashes
  - Speeding: eight (8) crashes
- Trucks were involved in eight (8) crashes along these corridors. Of the truck crashes:
  - Seven (7) out of the eight (8) truck crashes occurred along Centennial Road from the I-94 westbound ramp to Franklin Ave (just north of Century Ave). In this segment, trucks were involved in 25 percent of all crashes. The percentage of crashes involving trucks is much higher than the truck volume (4-5 percent of all traffic volume) in this segment.
  - Only one (1) crash involving a truck occurred in the Centennial Road segment north of Franklin Ave to 71st Ave.
  - No crashes involving trucks occurred along 71st Ave during this three-year period.

  - The truck driver was cited in five (5) of the eight (8) truck-involved crashes.
  - Furthermore, two (2) of the truck-involved crashes resulted from defective equipment and / or mechanical failure.

- The predominant crash type at signalized intersections within the study area was the rear end collision (48 percent of all crashes). Rear end collisions are commonly associated with signalized intersections. These types of collisions typically result from traffic congestion and / or driver inattention. The percentage of crashes of this type within the study area is similar to those noted in a Minnesota DOT (MnDOT) study[1] on crash types. The MnDOT study was used for comparison because it is a unique resource that provides a comprehensive set of detailed summaries of crash rates and types for many different roadway settings.
- Sight distance was noted as a contributing factors for a few rear end crashes at the intersections of Centennial Road / Century Avenue (southbound approach) and US 83 / 71st Avenue (westbound approach).
- The other common crash types (i.e., left-turn and angle crashes) at signalized intersections are related to turn movements. These types of crashes account for 34 percent of all crashes and result when a driver: 1) chooses a gap that is too short to complete their turn; 2) their view of roadway is obscured; or 3) driver inattention.
- Crashes involving left-turning vehicles are common at the intersections of Centennial Road / I-94 Westbound ramps and US 83 / 71st Avenue, accounting for approximately 30 percent of all crashes at these intersections. These types of collisions occur because a left-turning vehicle attempts to use a gap in opposing traffic that is too short or a left-turning vehicle tries to make their turn toward the end of yellow phase and the opposing traffic enters the intersection during the yellow / all-red phase or later. This high percentage of left-turning crashes may be of some concern because these types of crashes generally have a higher likelihood of resulting in injuries.
- The proportion of injury crashes for signalized intersections within the study area typically fell under 30 percent of total crashes with a few exceptions. This rate is consistent with the findings of the MnDOT crash study. The intersection of US 83 / 71st Avenue had an injury rate of 45 percent.
- The traffic signal at US 83 / 71st Avenue was put into service in the fall of 2004. At least 4 crashes occurred at this intersection prior to installation of traffic signal control.
- A total of 12 unsignalized intersections within the study area recorded at least one crash over the three years. The Centennial Road intersections with 43rd Avenue and 71st Avenue had the most crashes (i.e., 4 each) over this time period.

[1] *Traffic Safety Fundamentals Handbook*, Minnesota DOT, April 2001.

- The most common type of crash at unsignalized intersections is angle collisions, accounting for 41 percent of all crashes. The second most common crash type is rear end collisions accounting for 24 percent of all crashes.
- A total of 3 sideswipe crashes occurred at unsignalized intersections and involved a trailing vehicle that tried to pass a left-turning vehicle.
- At the intersection of Centennial Road / Trenton Drive all three crashes were angle crashes involving a westbound left-turning vehicles that collided with a northbound through vehicle. Each driver claimed their view was obscured by northbound right-turning traffic.
- At the intersection of Centennial Road / Chatham Drive both crashes were rear end collisions involving a northbound to westbound left-turn vehicle that was hit while waiting to make the turn.
- The proportion of property damage only and injury crashes for unsignalized intersections are 69 and 28 percent, respectively. There was one fatal crash at the intersection of 71st Avenue / Centennial Road. The fatal crash involved a vehicle that was speeding, ran off the roadway and alcohol played a factor.
- The most common roadway segment crash type involved animals, accounting for 42% of all segment crashes. The majority of animal collisions (4 out of 5) occurred along 71st Avenue between US 83 and 26th Street. Vehicles that lost control and either overturned or hit a fixed object accounted for another 25% of segment crashes.
- There was no head-on or sideswipes (opposing direction) crashes recorded for this study area.

The crash history review did not identify any intersections or roadway segments that have higher than typical crash rates. However, there is a common perception among the public that this corridor is unsafe and there are a lot of "close calls." Several members of the public stated they watch their rear-view mirror when slowing down to make a turn off these two roadways. It is important to note that as traffic volumes increase in these corridors the likelihood for crashes involving vehicles entering / exiting the corridor will also increase if no improvements are made. Based on the crash review and projected future traffic volumes the proposed improvement alternatives for the following intersections and roadway segments will be carefully reviewed for their ability to promote corridor and intersection safety:

- Centennial Road / Century Avenue
- Centennial Road / 43rd Avenue
- Centennial Road / 71st Avenue
- Centennial Road from I-94 to the proposed Calgary Avenue
- US 83 / 71st Avenue

Table 2: Crash Data Review Summary for Intersections

Intersection	Number of Crashes	Crash Type [1]						Crash Severity [2]			3-Year Crash Rate [3]
		LT	A	RE	SS	P/B	O	PDO	I	F	
Centennial Rd / I-94 EB	8		1	7				6	2		0.35
Centennial Rd / I-94 WB	9	3		4			2	8	1		0.46
Centennial Rd / Trenton Dr [4]	3		3					1	2		0.17
Centennial Rd / Chatham Dr [4]	2			2					2		0.15
Centennial Rd / Century Ave	11	2	3	5			1	7	4		0.68
Centennial Rd / Franklin Ave [4]	2	1		1					2		0.22
Centennial Rd / Saratoga Ave [4]	1		1					1			0.11
Centennial Rd / Jericho Rd [4]	1		1					1			0.13
Centennial Rd / 43rd Ave [4]	4		1	1	1		1	3	1		0.59
Centennial Rd / Wild Rose Crest [4]	1				1			1			0.20
Centennial Rd / Heartland Dr [4]	1			1				1			0.21
Centennial Rd / 57th Ave [4]	3						3	3			0.66
Centennial Rd / 71st Ave [4]	4		1	1	1		1	3		1	0.98
71st Ave / 26th St [4]	2		1				1	2			0.34
71st Ave / North Star Acres [4]	1			1				1			0.18
71st Ave / US 83 [5]	15	3	5	4			3	9	6		0.92

(1) LT = Left-Turn; A = Angle; RE = Rear end; SS = Sideswipe; P/B = Pedestrian / Bicycle; O = Other (e.g., fixed object, run-off road, improper backing)
(2) PDO = Property Damage Only; I = Injury; F= Fatality
(3) Crashes per million entering vehicles
(4) Unsignalized intersection
(5) Traffic signal control was installed in November 2004 at this intersection. 4 out of the 15 crashes at this intersection occurred before traffic signal control was installed.

Table 3: Crash Data Review Summary for Segments

Segment	Number of Crashes	Crash Type (1)						Crash Severity (2)		
		An	SS	FO	RO	RE	O	PDO	I	F
Centennial Rd: Divide Ave to I-94 EB	2					2		1	1	
Centennial Rd: Century Ave to 43rd Ave	2	1					1	2		
Centennial Rd: 43rd Ave to 57th Ave	2			2				2		
Centennial Rd: 57th Ave to 71st Ave	2				1		1		2	
71st Ave: US 83 to 26th St	4	4						4		

(1) An = Animal; SS = Sideswipe; FO = Fixed object; RO = Run-off road; RE = Rear end; O = Other
(2) PDO = Property Damage Only; I = Injury; F= Fatality

2030 Traffic Forecasts

Daily Traffic Forecasts

As the project is addressing existing and short to mid-term (the next 5 to 10 years) needs in the corridor, the typical cross section for the corridor improvement concept will be determined based primarily on current traffic volumes / vehicle mix and traffic projections through the next 10 to 15 year period. Forecasted corridor volumes were developed based on traffic forecasts from the *US 83 Corridor Study* report that was completed in February 2006, which included the 71st Avenue and Centennial Road corridors covered in this study. The traffic forecasts used for this study assumed that:

- Projected levels of land development consistent with the *US 83 Corridor Study* are in place by 2030. The new jobs and housing associated with this development concept would lead to higher traffic levels in the study area by 2030.
- The supporting roadway network documented in the *Fringe Area Master Plan* was completed and in place.
- The Northern Beltway is not in place by 2030 (consistent with the current *Bismarck – Mandan Long Range Transportation Plan*).
- This study had access to more up-to-date traffic counts in the study area, and thus traffic volume information was updated for existing conditions.

Forecasted ADT for the 2030 period are displayed in Figure 8. Through review of the information in the figure, the following can be observed:

- 2030 daily traffic volumes in the Centennial Road corridor range from approximately 5,400 vehicles per day at the 71st Avenue curve to 26,000 vehicles per day between Century Avenue and I-94.
- 2030 daily traffic volumes in the 71st Avenue corridor range from 5,500 vehicles per day west of Centennial Road to 7,200 vehicles per day east of US 83.

As the focus of this corridor study is the short and mid-term periods, an interim forecast of a horizon year of at most 15 years into the future is needed as input data to the cross section needs determination. The interim period forecast was derived through interpolating between the current counts and future forecasts to get to a 2020 forecast year, selected because it represented a rounded decade in the future. Forecasted ADT in the corridor assumed to be representative of 2020 are displayed in Figure 9.

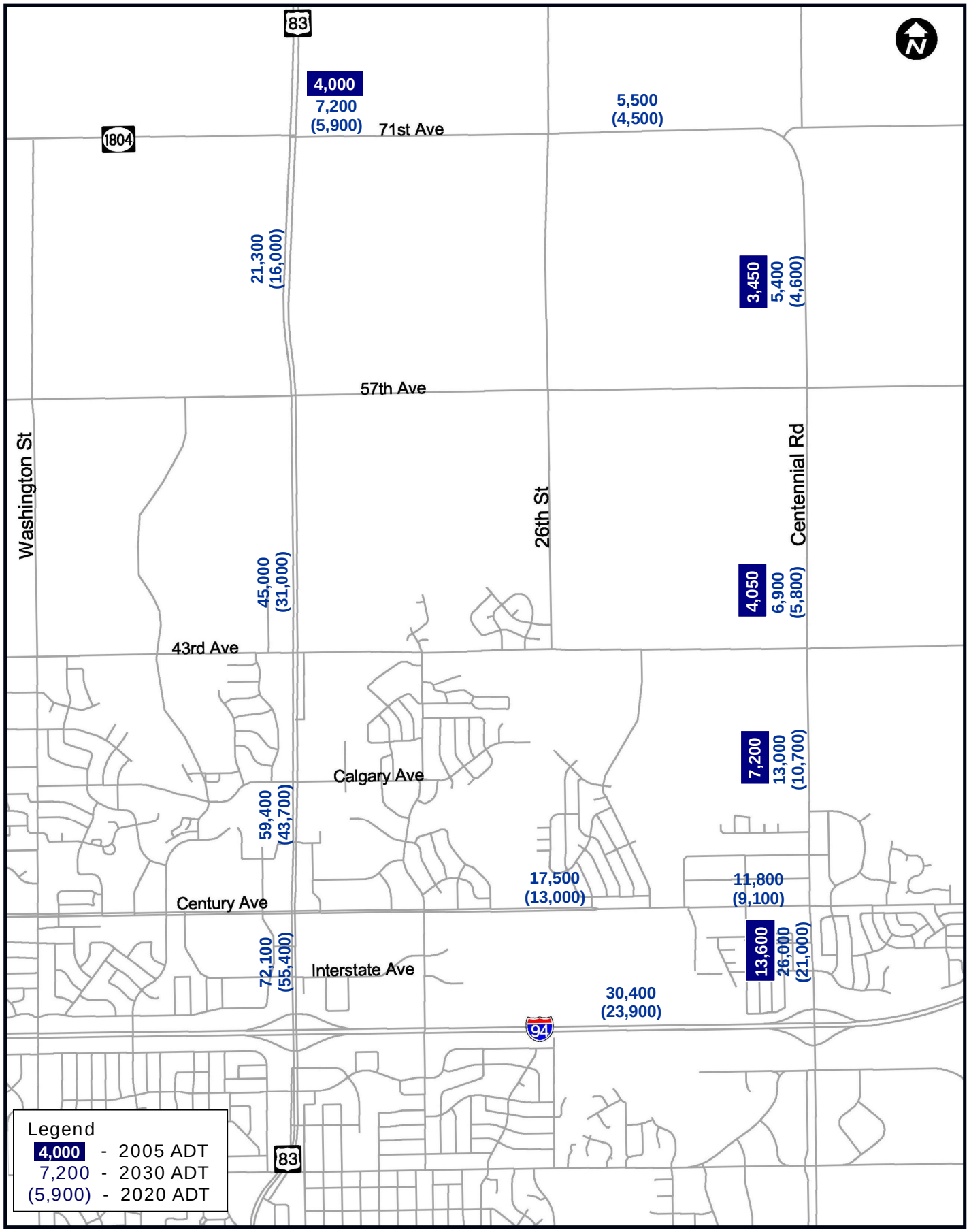


FIGURE 9: Future Year Average Daily Traffic (ADT) Volumes

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URS Transportation

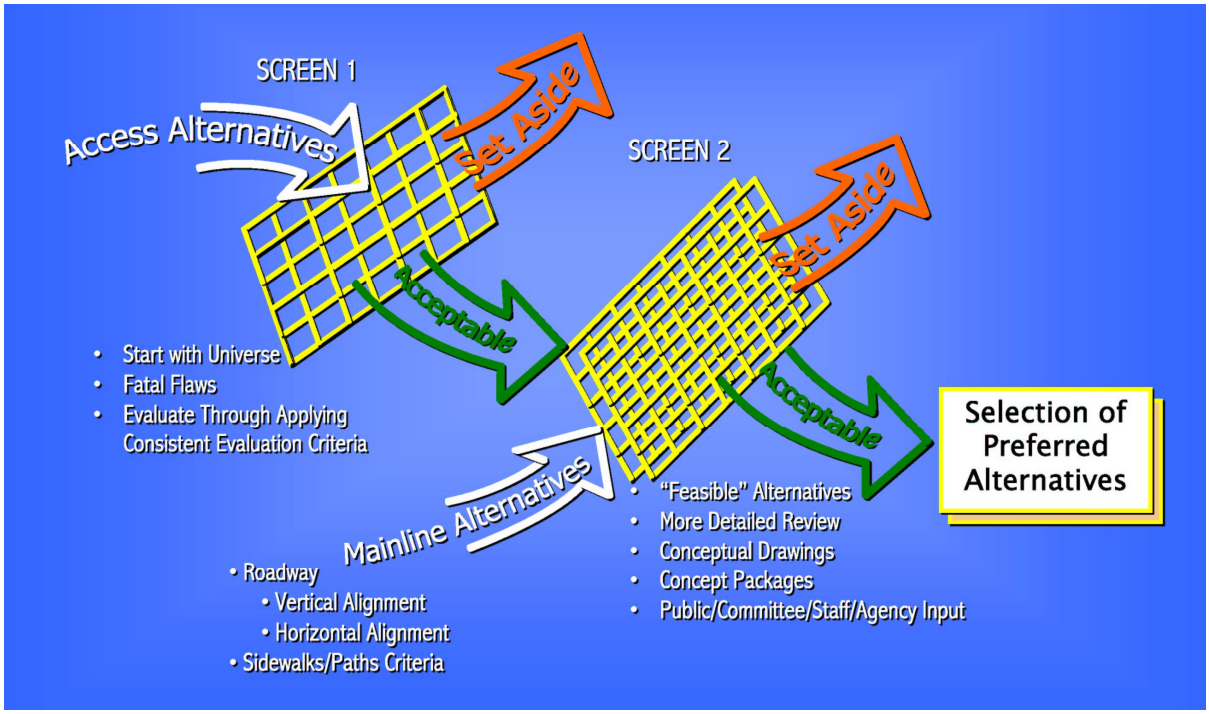
Alternatives Analysis

The purpose of this chapter is to present the alternatives that were developed to address identified issues and corridor deficiencies. These alternatives were developed based on the input received through meetings with and input received from the public, and through meetings and workshops with MPO, city, county, and NDDOT staff. Concepts that were developed as part of this study include the following:

- Access Management Plan: This plan evaluated the current access points throughout the corridor to determine if modification would be feasible. The plan also establishes policy for future access points along these corridors.
- Transportation System Management (TSM) Alternatives: These concepts are relatively small-scale, lower-cost improvements that improve intersection capacity and / or corridor safety. These alternatives include intersection improvements such as additional turn lanes and traffic signal improvements.
- Transportation System Expansion: These concepts are larger-scale improvements that increase corridor capacity and / or address safety concerns, and unlike the smaller-scale TSM project, these projects have the potential to divert traffic to the "expansion" corridor. These alternatives include reconstruction of existing facilities to add new lanes.
- Non-Motorized Facilities: These alternatives include new or improved pedestrian and bicycle facilities within and crossing the study corridor.

Screening Process

The alternative analysis phase of this study was completed using a two-step screening of a range of alternatives for corridor improvements. The overall flow of the alternatives screening process is displayed in the chart shown on the next page.



During the initial (first-level) screening a wide range of alternatives for improving operations and safety within the corridor were evaluated with an end product that placed an alternative into one of three categories:

1. Maintain the alternative for the second-level screening process.
2. Eliminate the alternative from further consideration due to an identified fatal flaw that could not be avoided without substantially reducing the concept's utility.
3. Modify the concept initially presented prior to deciding to maintain the alternative into the second-level screening.

The result of the first-level of the screening process was a determination of the general type of improvements that would be required in the study area. This initial screening refined the alternatives to a level that determined the general type and intensity of recommended improvements that would be required.

Based on a review of the forecasted 2020, and to a certain extent the 2030 traffic volumes, the following general conclusions were drawn in the first level screening:

- Forecasted traffic volumes on Centennial Road south of Century Avenue reflect the need for a four-lane corridor, with turn lanes at the key access locations.
- Forecasted traffic volumes along Centennial Road between Century Avenue and Calgary Drive reflect the need for a four-lane corridor, with left-turn lanes at key access locations.

- Forecasted traffic volumes along Centennial Road north of Calgary Drive reflect the need for a two-lane corridor, which could reasonably accommodate the traffic as long as there are left turn lanes at key arterial crossings.
- Forecasted traffic volumes throughout the 71st Avenue corridor reflect levels that would warrant one through lane in each direction and left turn lanes at the arterial cross routes.
- An access management plan should be implemented in the corridor to promote safety and traffic flow. This plan would include recommendations for access consolidations, closures and locations for new access points.

During the second phase of the screening process the alternatives retained were evaluated in greater detail, to develop a more specific set of recommended improvements. Based on the technical reviews of the data and input from all parties involved the preferred alternatives were selected, and are described in the "Recommendations" chapter.

Evaluation Criteria

The screening of the alternatives applied a set of evaluation criteria that would allow review of the concepts from the following perspectives:

- Social:
  - Economics.
  - Public support.
  - Consistency with other plans.
- Engineering feasibility.
- Environmental impacts / impacts to surroundings.

Access Management Evaluation

The 71st Avenue and Centennial Road corridors are key transportation links within the City of Bismarck / Burleigh County region. As with most arterial corridors in the Bismarck region, the 71st Avenue and Centennial Road corridors serve a wide range of functions from carrying regional through traffic to providing direct land access to adjacent developments. Many of the functions the corridors perform result in conflicts that impact the vehicle capacity and safety of the corridor. The range of functions the corridors serve and desirability to maintain the various functions will be a key element of this study. The functions of these two roadways include:

- These two roadways are primary corridors that facilitate the movement of people and goods in the northern portions of the Bismarck region.
- These roadways are high speed facilities with limited interruption from traffic control devices and together they function like a bypass of the US 83 corridor.

- The northern portion of the Bismarck metropolitan area is anticipated to be a primary growth area in the community as both a commercial center and for residential uses. These two corridors bisect / traverse the growth area and serve as a principal land access route and a truck route to carry the area-generated traffic to other regional facilities such as US 83, I-94 and Bismarck Expressway.
- Currently, individual residential and commercial parcels have direct access to these two roadways. Thus, for some area residents these roadways are their "local" street.

The purpose of this section is to provide information related to the access management evaluation and ultimate access management plan for the 71st Avenue / Centennial Road Corridor Study. The scope of the access management plan ranges from action plans for specific access points to the broader scope of access management policy. The list of issues that are discussed in the access management plan includes:

- Existing conditions for access points along these two roadway corridors.
- Future conditions for the corridor roadway network.
- Access management policies related to access spacing.
- Summary of access management evaluation.

Access Management Policy and Evaluation Criteria

For the purposes of this study, the following guidelines are recommended for access spacing.

- Maximum of 5 access points per mile per side.
- Minimum spacing of 1000 feet between adjacent access points.
- Minimum corner clearance of 500 feet.
- Do not allow access points to be offset from one another.
- Encourage consolidation of access points for adjacent parcels.

The above guidelines were developed based on a review of access management policies from the NDDOT (Section III-16 of the *NDDOT Design Manual*), the *Access Management Policy* for the City of Bismarck, the US 83 Corridor Study, and access management policies from several other DOTs. Additional information on this review process can be found in a May 21, 2007 technical memorandum that is provided in Appendix B.

Specific engineering criteria were developed for evaluating the existing and known future access points along the 71st Avenue and Centennial Road corridors. The known future access points included access points associated with platted developments and additional streets identified in either the *US 83 Study* or the *Bismarck-Burleigh County Fringe Road Master Plan*. All of these access points were evaluated using the evaluation criteria (see Appendix B for descriptions of these evaluation criteria) listed below:

- Corner Clearance / Functional Area of an Intersection.
- Access Point Spacing & Maximum number of Access Points / Mile.
- Parcels with Multiple Access Points.
- Alignment of Access Points on Opposite Sides of the Street.

Many of the access points that were evaluated as part of this study were inconsistent with more than one of the evaluation criteria. Access points that appeared to be in conflict with corner clearance / functional area of intersections and access alignment were considered more critical than access points that conflicted with the other evaluation criteria.

For existing and known future access points that did not meet one or more of the evaluation criteria, the review tried to identify alternative(s) for that particular access point. As previously described, possible modification actions for access points in these corridors include:

- Closure of an Access Point.
- Consolidation of Adjacent Access Points.
- Access Moved to Side Street.
- Frontage Roads / Backage Roads.

Any recommended actions on access points would likely not be implemented until either the affected property is redeveloped or when the adjacent roadway is improved.

Existing Access Conditions

The current land uses along these two roadways includes a significant amount of residential, agricultural, some light industrial, and a limited amount of commercial. At this time the majority of the access points accessing these roadways are public streets. Most of the private access points accessing these roadways are associated with a single home, farmstead, or field access. A summary of the number of access points by key roadway segments is provided in Table 4. These access points and issues associated with them are shown graphically in Figure 10.

In general, the access point densities documented in Table 6 are relatively low. However, there is a considerable amount of undeveloped land along these corridors that will require access in the future. Two roadway segments in the study area have more private access points than others: 71st Avenue between US 83 and 26th Street and Centennial Road between 57th and 71st Avenue. Ideally, future access to the corridor will be limited to the public streets identified in the US 83 Study and the Fringe Road Study.

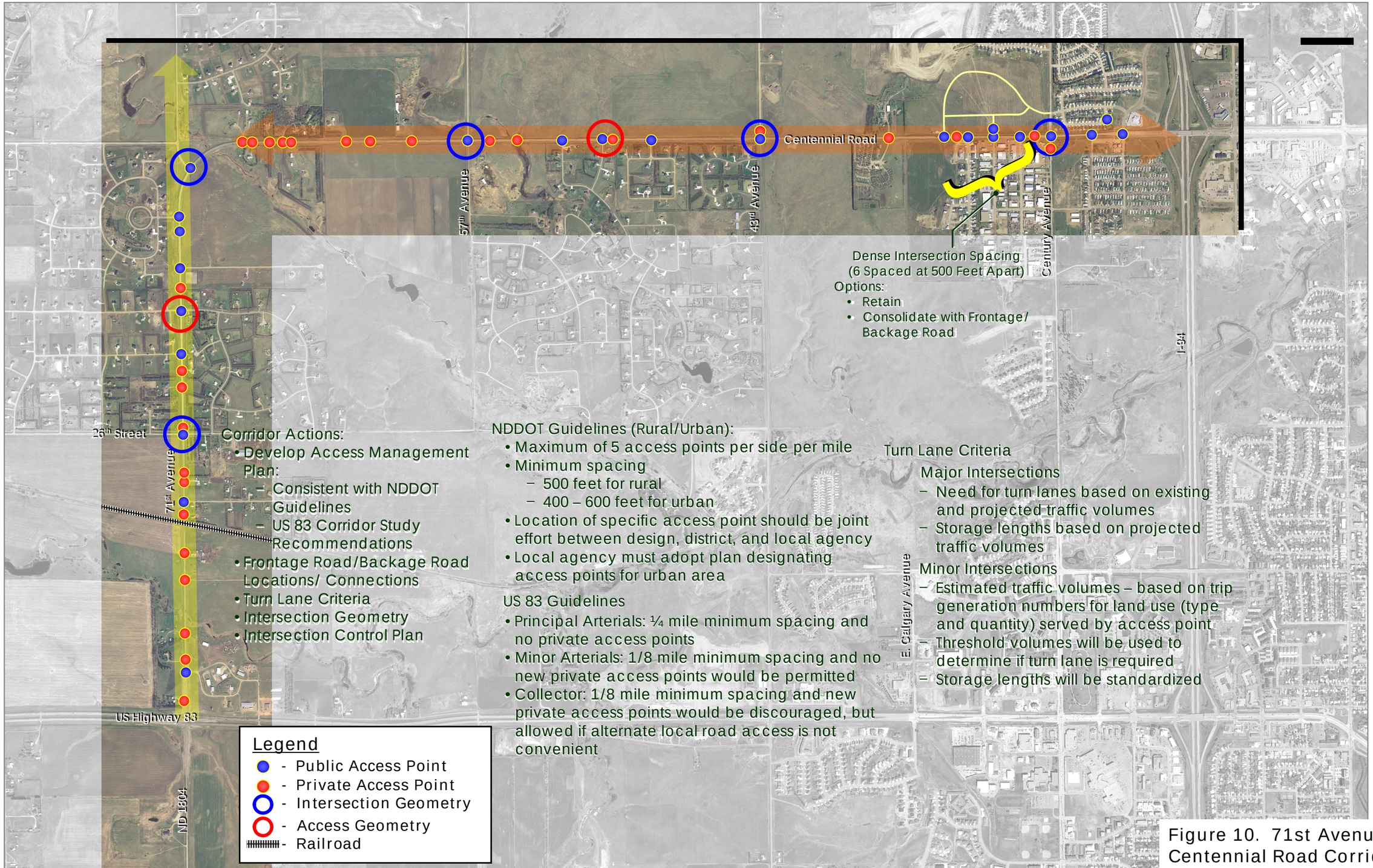


Figure 10. 71st Avenue - Centennial Road Corridor Study Access Management Issues

Table 4: Summary of Access Points (Existing Conditions)

Street / Segment	Number of Access Points		Access Points per Mile
	Public Streets	Private Driveways	
Centennial Rd – I-94 to Century Ave	5	0	13
Centennial Rd – Century Ave to 43rd Ave	5	5	10
Centennial Rd – 43rd Ave to 57th Ave	5	3	8
Centennial Rd – 57th Ave to 71st Ave	2	9	11
71st Ave – US 83 to 26th St	4	9	13
71st Ave – 26th St to Centennial Rd	7	6	13
Totals	27	34	

There are currently several public streets with intersection spacing less than 1000 feet, as listed below:

- Centennial Road: Century Avenue, Franklin Avenue, Saratoga Avenue, and Jericho Road spaced 500 feet apart.
- Centennial Road: Wildrose Crescent, Rawhide Drive, and Heartland Drive spaced approximately 800 feet apart.
- 71st Avenue: Hightop Lane, Moonstone Lane, and Golden Crest Road spaced approximately 800 feet apart.

There are also several access points to the cross streets (e.g., Century Avenue, 43rd Avenue) that are located within close proximity to the major intersections. For example, the business in the northwest corner of the Century Avenue / Centennial Road intersection has an access points just north and west of the intersection. It should be noted that the access point on the west leg was recommended for closure and incorporation into a frontage road system as part of the East Century Avenue Study.

FUTURE ROADWAY NETWORK

An improved roadway network will be required to support the anticipated development and traffic growth. Within this study area there have been two previous studies that provide a master plan for the roadway network: 1) *US 83 Corridor Study*, and 2) *Bismarck-Burleigh County Fringe Road Master Plan*. Both of these previous studies developed a system of arterial and collector routes spaced on roughly a half-mile grid. As recommendations for access points along the 71st Avenue and Centennial Road corridors are prepared, the recommendations from the US 83 and Fringe Road studies have been incorporated and / or modified as to where intersections are provided.

The Northern Beltway is a long-term roadway improvement concept in the Bismarck region. This beltway includes a new northern Missouri River crossing,

new access to I-94 at 66th Street, and includes the segment of 71st Avenue within this corridor study. This long-term transportation improvement project has the potential to change traffic volumes and travel patterns. It is desired that the recommended access actions not have their utility substantially diminished or eliminated when the regional Beltway improvements are in place. For instance, the northern beltway route along 71st Avenue will require the modification of the intersection with Centennial Road. A plat for the development in the southwest quadrant of the 71st Avenue / Centennial Road intersection includes a proposed roadway (i.e., Rooster Road) that will create a five-leg intersection or an access point in close proximity to the reconstructed 71st Avenue / Centennial Road intersection. This additional access would likely conflict with the long-term role of 71st Street within it's context in the larger the Northern Beltway corridor.

Turn Lane Evaluation

The evaluation of turn lanes within the 71st Avenue and Centennial Road corridors considered the functional classification for the roadways and the expected level of traffic per access point. The following turn lane criteria were established with respect to roadway functional classification:

- Intersections with two roadways currently or will likely be classified as minor arterial and above will have left-turn and right-turn lanes installed. Intersections included in this category are listed below:
  - Centennial Road / Century Avenue
  - Centennial Road / 43rd Avenue
  - Centennial Road / 71st Avenue
  - 71st Avenue / 26th Street
- Intersections where the minor roadway is classified as a collector the recommendation is to provide left-turn lanes. Intersections included in this category are listed below:
  - Centennial Road / Calgary Avenue
  - Centennial Road / 57th Avenue
  - Centennial Road / 64th Avenue
  - 71st Avenue / 19th Street
- For the remaining public street access points along these two corridors the need for turn lanes was based on projected traffic volumes by movement. For many of these intersections there is currently no existing turn movement count data available. The level of peak hour traffic was developed based on trip generation rates and the current / proposed land uses. A summary of the resulting projected traffic volumes for each access point is provided in Table 5. The recommended turn movement volume thresholds for providing a left-turn or right-turn lane are the following:
  - Minimum left-turn lane volume threshold of 11 vph
  - Minimum right-turn lane volume threshold of 21 vph

Table 5: Trip Generation by Access Point and Estimated Turn Movement Volumes

Access Point	Land Use (1,2)			Trip Generation (3)									Alt Route	Intersection Split (4)							
					Daily			AM Peak			PM Peak				Inbound				Outbound			
															Right Turn		Left Turn		Right Turn		Left Turn	
	Single Family (D.U.)	Indust Park (1000's SF)	Gas Station (Pumps)	Total	In	Out	Total	In	Out	Total	In	Out		AM	PM	AM	PM	AM	PM	AM	PM
Trenton Dr (W)	174.5		3	2153	1077	1077	164	49	115	217	131	86	33%	13	9	20	79	69	46	8	12
Trenton Dr (E)	68		8	1966	983	983	139	57	82	178	98	80	10%	15	79	36	9	15	58	59	14
Chatham (W)	88.5		3	1336	668	668	100	33	67	130	77	53	33%	13	5	9	47	40	28	5	8
Franklin (W)		282		1974	987	987	248	211	37	259	42	217	33%	42	6	99	22	20	102	5	43
Saratoga (W)		422		2954	1477	1477	371	316	55	388	62	326	33%	64	8	148	34	29	153	8	65
Saratoga (E)		192		1344	672	672	169	144	25	177	28	149	33%	68	13	28	6	3	30	14	70
Jericho (W)	73			694	347	347	55	14	41	74	46	28	0%	1	9	13	37	37	22	4	6
Yorktown (E)		192		1344	672	672	169	144	25	177	28	149	33%	68	13	28	6	3	30	14	70
Wildrose (W)	15			143	72	72	11	3	8	15	10	5	0%	0	1	3	9	7	4	1	1
Rawhide (W)	26			247	124	124	20	5	15	26	17	9	0%	1	2	4	15	14	8	1	1
Heartland (W)	7			67	34	34	5	1	4	7	4	3	0%	0	0	1	4	4	2	0	1
Rooster (S)	19.5			185	93	93	15	4	11	20	12	8	0%	2	6	2	6	6	4	5	4
Golden Crest (S)	19.5			185	93	93	15	4	11	20	12	8	0%	2	7	2	5	4	3	7	5
41st St (N)	14.5			138	69	69	11	3	8	15	9	6	0%	0	0	3	9	8	6	0	0
Foxhaven Lp (N)	25			238	119	119	19	5	14	25	16	9	0%	2	6	3	10	8	5	6	4
Moonstone (N)	66.5			632	316	316	50	12	38	67	42	25	0%	4	13	8	29	27	18	11	7
Moonstone (S)	27			257	129	129	20	5	15	27	17	10	0%	4	12	1	5	5	3	10	7
26th St (S)	30			285	143	143	23	6	17	30	19	11	0%	5	15	1	4	3	2	14	9
Hightop (N)	27			257	129	129	20	5	15	27	17	10	0%	1	3	4	14	12	8	3	2
26th St (N)	54			513	257	257	41	10	31	55	34	21	0%	2	7	8	27	25	17	6	4
North Star Acres (S)	20			190	95	95	15	4	11	20	13	7	0%	4	12	0	1	1	1	10	6
Aurora (S)		122		854	427	427	107	91	16	112	18	94	50%	27	5	19	4	7	45	1	2

Notes:
(1) Trip Generation, 7th Edition, Institute of Transportation Engineers
(2) Unit is the independent variable used to determine the trip generation rate. D.U. = Dwelling Unit; 1000's SF = 1000 Square Feet Gross Floor Area; Pumps = Vehicle Fueling Positions
(3) Trip generation rates determined by studies conducted throughout the United States
(4) Intersection split based on prevailing traffic flows and field observations

Turn Movement > 10
Turn Movement > 20
Turn Movement > 30
Turn Movement > 50
Turn Movement > 100

The turn lane threshold volumes were also developed based access management policies from the NDDOT, City of Bismarck, the US 83 Corridor Study, and turn lane policies from several other DOTs. Additional information on this review process can be found in Appendix B. The projected volumes for each access point are shown in Figure 11 (right-turn volumes) and Figure 12 (left-turn volumes). This data shows several additional access points that are close to the volume threshold, particularly for the left-turn movements. For this reason a continuous left-turn lane concept was added to the alternatives considered for this study.

Figure 11: Forecasted Right-turn Volumes by Intersection

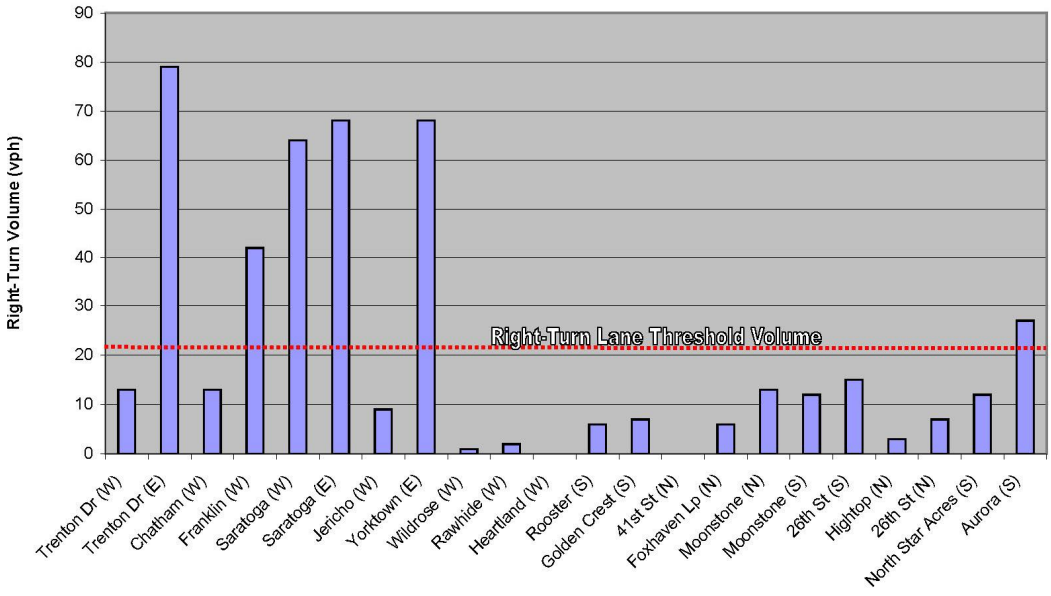
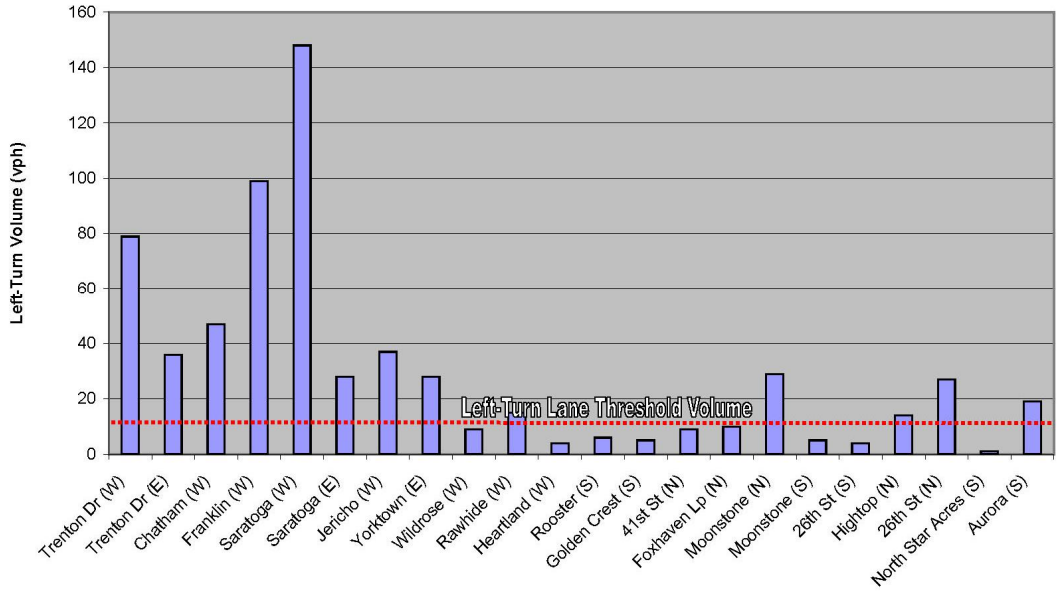


Figure 12: Forecasted Left-turn Volumes by Intersection



Based on the turn lane threshold criteria and the forecasted traffic volumes, corridor locations where turn lanes met or exceeded the criteria were identified. The locations where the turn lanes were warranted, based on this assessment of turn lane thresholds, are displayed in Figure 13.

ROADWAY IMPROVEMENT ALTERNATIVES

The alternatives analysis was completed to address the study's primary goal of the 71st Avenue-Centennial Road corridor study is to develop a short to mid-term improvement concept that better addresses the corridor combination of:

- Heavy commercial vehicle volume in the corridors.
- Safety issues associated with turning volume throughout the corridor and the potential for increases in the level of conflicts as development in the corridors continues.
- The assumption that a beltway along 71st Avenue and 66th Street will influence the corridor in the longer term period and any short to mid-term improvements should consider the longer term corridor needs and potential actions.

In the initial first-level screening, a range of alternatives was reviewed. Based on the screening conducted in this first stage of the alternatives analysis process, two corridor concepts were developed for the 71st Street and Centennial. Each of the concepts used the same assumptions with respect to design criteria and the number of through lanes and locations for turn lanes (left and right). The basic number of lanes used for both concepts is outlined below:

- Centennial Road:
  - I-94 to Century Avenue: A 4-lane divided roadway composed of two through lanes in each direction and a left turn lane at each intersection. Right turn lanes should be provided at both Century Avenue approaches and the northbound approach to Trenton Drive. This segment will be an urban roadway design to match the one south of Trenton Drive.
  - Century Avenue to Jericho Road: A 5-lane roadway composed of two through lanes in each direction and a center two-way left turn lane. This segment will also be an urban roadway design.
  - North of Calgary drive to 71st Avenue: A 3-lane roadway composed of one through lane in each direction and a center two-way left turn lane. Right turn lanes will be included at those locations described in the turn lane section of this report.
- 71st Avenue, US 83 through Centennial Road: A 3-lane roadway composed of one through lane in each direction and a center two-way left turn lane. Right turn lanes will be included at those locations described in the turn lane section of this report.

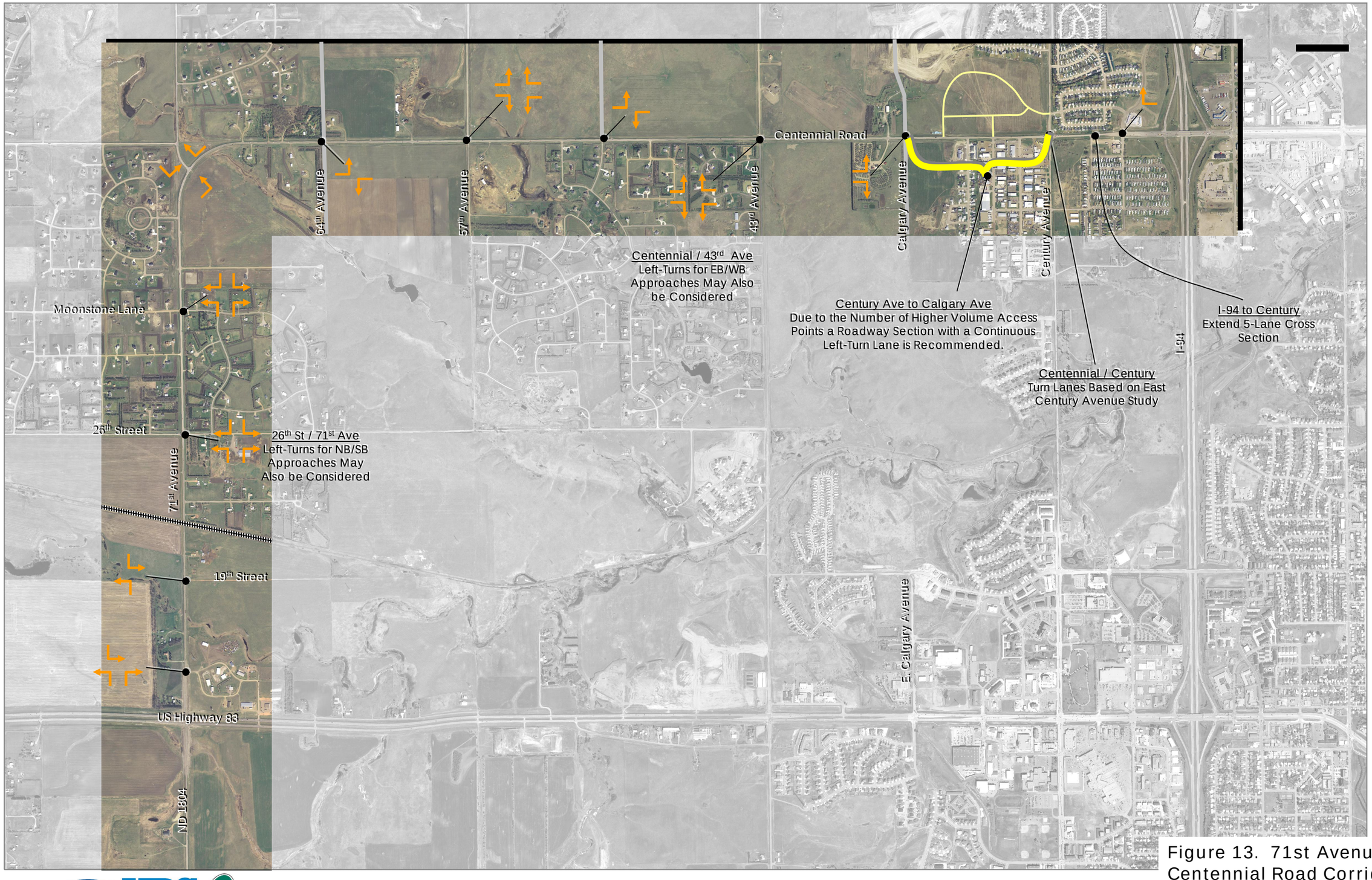


Figure 13. 71st Avenue - Centennial Road Corridor Future Warranted Turn Lanes

- Major Cross-Streets: Left turn lanes are recommended on a few cross-street approaches in the study area, as listed below:
  - 71st Avenue / 26th Street
  - Centennial Road / 43rd Avenue
- Minor Cross Streets: Right turn lanes are recommended along either 71st Avenue or Centennial Road at minor cross street locations as documented in the turn lane plan, presented in the previous section.

The initial design concept (left-turn lanes with tangent segments) is the result of applying design criteria that are outlined in an October 9, 2007 memorandum included in Appendix C. In the second level of screening, this concept was eliminated from consideration due to a combination high design speeds and the high number of "warranted" turn lanes. These two factors contributed to a longer required length for the turn lane and vehicle storage, which conflicted in several locations, resulting in the following conditions:

- Locations where the back of a westbound left turn lane overlaps with the back of an eastbound left turn lane (Example: 71st Avenue between Aurora Loop and 19th Street).
- Numerous very short tangent sections created by eastbound-west bound and / or northbound-southbound left turn lanes almost backing up into each other. An example is along Centennial Road between 57th and 64th Avenue, with a resulting tangent segment of approximately 250 feet. The result is a condition where the driver is almost continually moving into or out of a taper area, which creates a "coke bottle" type path through the corridor. These short tangent sections are shown graphically in Figure 14.

The second concept (Continuous Left-Turn Lane section) reflects a three-lane cross section through much of both corridors from north of Calgary Avenue through US 83. This concept results in:

- Removing turning vehicles from the through travel lane, which is a safety improvement relative to the current conditions.
- A through lane travel path that does not include any horizontal curvature (no moving in and out of taper areas).
- A substantial amount of earthwork, which would add to the overall project cost.

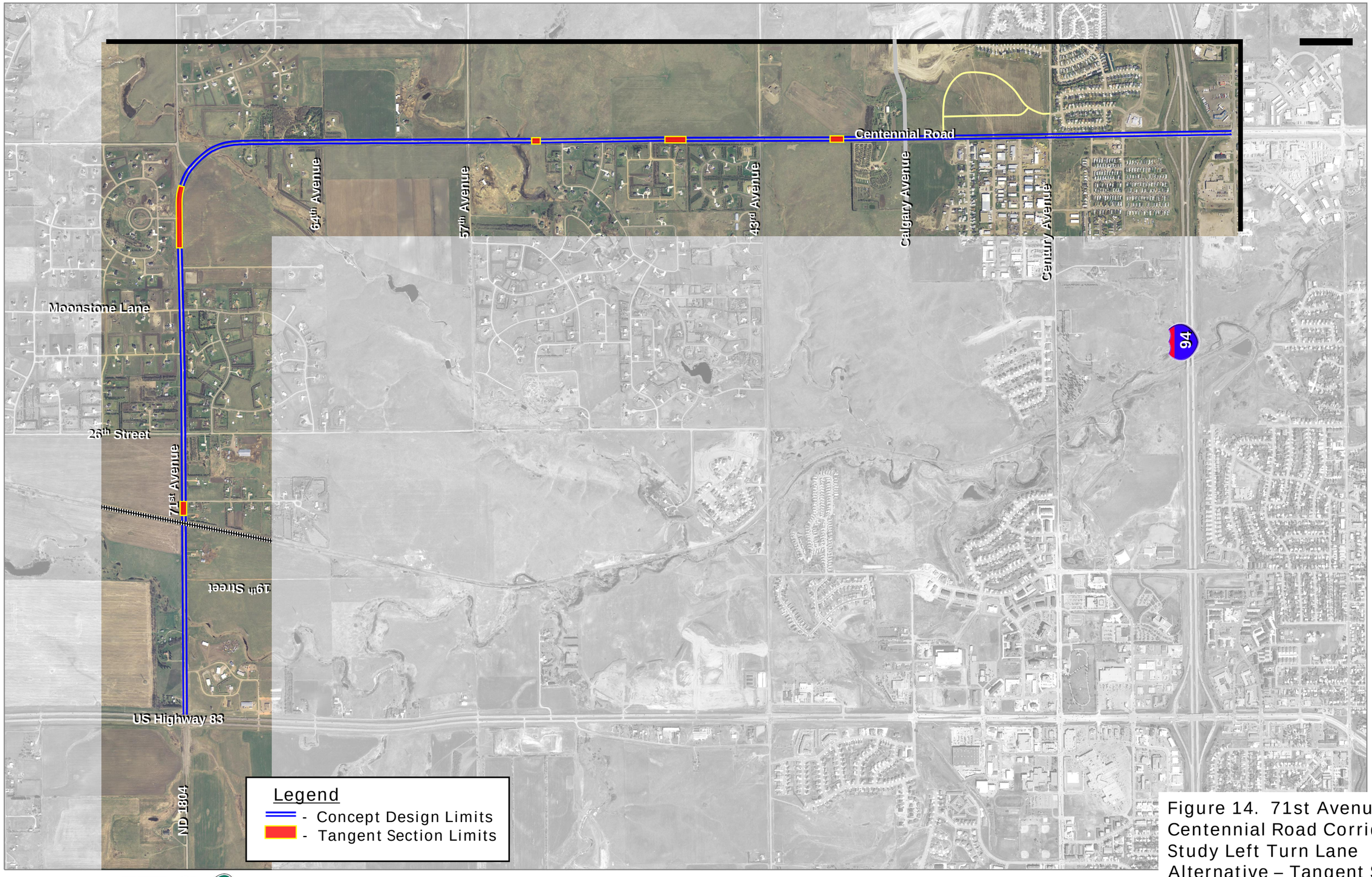


Figure 14. 71st Avenue - Centennial Road Corridor Study Left Turn Lane Alternative – Tangent Section Limits

Environmental Review

As part of the approach to project development, this study has gone beyond just looking at the project costs and benefits from solely a transportation perspective. The study has also reviewed the potential adjacent impacts that would result from a roadway improvement project in the studied corridor. This review was incorporated into the second-level screening, and evaluated the potential environmental impacts associated with the studied corridors. This environmental review includes a summary of the types of impacts considered and provides a synopsis of the potential impacts associated with the alternatives. The alternatives being evaluated were located along the existing alignment, so the environmental review focused on potential constraints and impacts located adjacent to 71st Avenue and Centennial Road and focused on several different environmental resources / elements including:

- Right-of-way / Farmland Impacts
- Traffic Noise
- Wetlands
- Threatened and Endangered Species
- Floodplains
- Historical / Cultural Resources

Right-of-Way Impacts

The study area varies from rural to suburban in nature, with residential, light industrial, commercial and agricultural uses adjacent to the corridor. The residences are predominately single-family residential, with several subdivisions and farmsteads along the corridor. There is also a mobile home park adjacent to the Centennial Road. There are several light industrial and commercial businesses located adjacent to 71st Street near US 83 and Centennial Road near Century Avenue.

The majority of the 71st Street and Centennial Road corridors currently have 150 feet of available right-of-way. Along Centennial road south of Calgary Avenue, roadway right-of-way widths range between 100 and 130 feet. The build alternatives being considered would require some widening of the roadway and the purchase of some private right-of-way. The 71st Avenue corridor is currently part of the identified future alignment for the Northern Beltway. As such, the evaluations associated with this study, and ultimately the recommendations that come out of this study, were carried out to be consistent with / avoid conflicting with the Northern Beltway concept.

Both of the roadway improvement alternatives being considered in the second-level alternatives screening had the following right-of-way footprints:

- 71st Avenue, US 83 to North Star Access Road: 200 foot-wide roadway right-of-way, to be consistent with desired cross-section documented in the Northern Beltway study.

- 71st Avenue, North Star Access Road to Moonstone Lane: 170 foot-wide roadway right-of-way.
- 71st Avenue, Moonstone Lane to Centennial Road: 200 foot-wide roadway right-of-way.
- Centennial Road: 150 foot-wide roadway right-of-way.

In general, the right-of-way impacts associated with either build alternative would be:

- 71st Avenue, US 83 to North Star Access Road: Right-of-way impacts would include acquiring strips of land approximately 25 feet wide.
- 71st Avenue, 26th Street and Moonstone Lane: The reduced right-of-way width of 170 feet is proposed, and would lead to minimal right-of-way impacts of between five and 10 feet on each side.
- Centennial Road north of Jericho Road: Limited right-of-way impacts.
- Centennial Road, Trenton Drive to Jericho Road: This segment of Centennial Road currently has roadway right-of-way widths that range between 100 and 130 feet. Thus a strip of right-of-way approximately 10 to 25 feet would be required on each side.

The right-of-way impacts associated with the alternatives would require acquisition of strips of land adjacent to the existing roadway. There are no instances where the entire property is anticipated to be acquired, or where the required right-of-way would significantly segment or affect the usage of properties in the study area.

TRAFFIC NOISE

Traffic Noise Background and Approach

A traffic noise evaluation was completed, based on guidance provided in *North Dakota Department of Transportation Noise Analysis and Abatement Guidelines* (NDDOT, 1997). The NDDOT Noise Analysis policy relied on 23 Code of Federal Regulations (CFR) Part 772, which provides procedures for noise studies, including noise abatement criteria (NAC). The NAC are based on the equivalent level (L_{eq}) noise descriptor, which summarizes a "snapshot" sound level that is equivalent (in terms of acoustic energy) to the varying noise levels experienced over the peak traffic noise hour. Table 6 documents the desired upper limits of L_{eq} by activity category, as established by the NAC. At a sensitive noise receptor, any noise levels that approach, meet or exceed these criteria would not be desirable and would be categorized a noise impact.

TABLE 6: Noise Abatement Criteria, Hourly A-Weighted Sound Level

Activity Category	Hourly Noise Levels Leq(h) dBA	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, play grounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	—	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

NDDOT defines "approaching" the NAC as being within two (2) dBA. Thus, noise levels of 65 dBA would be defined as approaching the Activity Category B NAC (i.e., a noise impact for residential uses). The evaluated sensitive receptors adjacent to the 71st Avenue and Centennial Road were all residential uses that fall under Category B exterior noise levels or commercial / industrial uses that fall under Category C exterior noise levels.

The "FHWA Highway Traffic Noise Prediction Model" was used to predict traffic noise levels through the year 2030 along the corridors. This model was developed and approved for use by the FHWA. This method was applied on this project by using the FHWA TNM software Version 2.5.

Traffic Noise Impacts

Based on the traffic forecasts and posted speed limits, traffic noise impacts were estimated in the corridor. Noise impact contours were generated for this evaluation to represent the typical distance from the roadway at which noise levels would be predicted to approach the NAC noise levels of L_{eq} 67 dBA for Category B activities, particularly residences. The Category C activity uses (commercial / light industrial) will not be affected, as noise levels approaching 72 dBA were not predicted to occur beyond the current or proposed roadway right-of-way. The noise impact contour distances for Category B activities (the 65 dBA noise contour line), by segment were:

- 71st Avenue and Centennial Road north of Jericho Road: Approximately 100 feet from the roadway centerline. There were no predicted noise impacts along this segment.
- Centennial Road, Jericho Road to Century Avenue: Approximately 75 feet from the roadway centerline. This distance falls within the proposed

roadway right-of-way, so there were no predicted noise impacts along this segment.

- Centennial Road, Century Avenue to I-94: Approximately 105 feet from the roadway centerline. As average traffic speeds decrease adjacent to the traffic signals at Century Avenue and the I-94 ramps, the resulting predicted noise levels decrease and the noise impact contour falls within the proposed roadway right-of-way. The backyards of some residences are within this predicted noise impact contour.

Based on this assessment, it is estimated that eight (8) residences north of Trenton Drive and east of Centennial will experience noise levels that approach the NAC for Category B. These residences are approximately 100 feet from the Centennial Road roadway centerline, with areas of frequent human use (backyards) that lie within the predicted 2030 noise impact contour. It is predicted that these residences will be impacted by 2030 in both improvement alternatives and in the 2030 no-build condition.

Traffic Noise Mitigation Evaluation

Potential mitigation measures were evaluated for the locations where future (2030) traffic noise levels were forecasted to approach the NAC. Mitigation measures such as alteration of the roadway alignment and management of future traffic, through restricting trucks and/or significantly lowering operational speeds are not feasible measures to consider along an existing arterial roadway that is a designated truck route.

A noise barrier was also evaluated at this location, based on the NDDOT noise abatement policies. It was determined that a noise wall could be feasibly built at this location, and could provide a substantial noise reduction. However, before a wall can be implemented, it must also be deemed reasonable. In North Dakota, the reasonableness determination relies on several factors. Two of the primary factors that were investigated for this review included:

- The amount of noise reduction provided, with a 10 dBA reduction as the target noise abatement level
- The cost of abatement, with a reasonable cost index of $20,000 per benefited residence. Benefited residences are those that receive reduction of 5 dBA or more.

It was determined that a wall approximately 13 feet tall would provide the desired 10 dBA traffic noise reduction at this location, at a cost of approximately $450,000[2]. In addition to the 8 impacted residential receivers, this wall would benefit (provide a 5 dBA noise reduction) two (2) additional residences. The estimated construction cost of $45,000 per benefited residence would significantly exceed the established NDDOT reasonable cost criterion of $20,000 or less per residence. Therefore, no noise mitigation measures were considered reasonable for the corridor.

[2] Unit construction cost of $40 / square foot assumed, based on recent wall costs for concrete residential noise walls with aesthetic treatments in the Midwest.

WETLANDS

Wetlands are a protected biological resource and one of the most productive ecosystems, providing habitat for a variety of wildlife and vegetation species. Under normal circumstances wetlands must possess three characteristics: a prevalence of hydrophytic vegetation, hydric soils and wetlands hydrology.

Executive Order (EO) 11990 (Protection of Wetlands) requires federal agencies to take action to minimize the loss of wetlands. Activities disturbing jurisdictional wetlands require a permit from the U.S. Army Corps of Engineers (USACE). Two types of authorization are available from the USACE for activities regulated under Section 404 of the Clean Water Act (Section 404). Depending on the type of project and potential impacts, either an individual 404 Permit or a Nationwide General Permit would be issued by the USACE. The USACE would determine what, if any, mitigation would be required with these permits.

Wetlands are present in the wider study area. However, the footprints of potential improvement alternatives are not likely to disturb wetlands as the alternatives being considered lie along an already-disturbed roadway corridor. The closest identified wetlands in the study area are, at a minimum, several hundred feet away from the proposed roadway corridor. The identified study area wetlands are shown in Figure 15.

THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service (USFWS) has listed four species as threatened or endangered in Burleigh County. These species include:

- Piping Plover (*Charadrius melodus*) – Threatened: These are small birds that use sand and gravel shorelines lacking vegetation along lakes and rivers including the Missouri River and prairie wetlands. The nesting and fledging periods for the piping plover are from late April to August. Piping plovers forage for invertebrates on exposed beach substrates.
- Interior Least Tern (*Sternula antillarum*) – Endangered: These birds are slightly larger than piping plovers, but occupy generally the same habitat, sparsely vegetated sandbars along the Missouri River. The nesting and fledging periods for the interior least tern are from May through August. Interior least terns feed on small fish in the river.
- Pallid Sturgeon (*Scaphirhynchus albus*) - Endangered: These are one of the largest fish found in the Missouri River, with a known habitat in the Missouri River from Montana to St. Louis. No natural Pallid Sturgeon reproduction has been documented in North Dakota in more than a decade.
- Whooping crane (*Grus Americana*) – Endangered: These are the tallest birds in North America standing 5 feet tall with a 7-foot wingspan. The historical breeding range of this bird included North Dakota. Presently, there are about 145 whooping cranes in the wild, and the migrating birds may be observed in North Dakota during the spring and fall. Whooping cranes use shallow wetlands but may also be found in upland areas, especially

during migration. They lay their eggs in bulrush and other vegetation and feed on crayfish, frogs and aquatic plants.

These species' habitats are streams, lakes and wetlands, particularly the Missouri River. As documented above in the "Wetlands" section, it is not anticipated that this project would disturb any wetlands. As a result, none of the species' habit would be disturbed due to this project.

FLOODPLAIN

Most floodplains are adjacent to streams, lakes, or oceans, although almost any area can flood under the right conditions. Beaches and small river valleys are usually easily recognizable as floodplains, but less obvious floodplains occur in dry washes and on alluvial fans, around prairie potholes, in areas subject to high groundwater levels, and in low lying areas where water may accumulate.

EO 11988 (Floodplain Management) seeks to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. EO 11988 applies to Federally-funded projects and directs agencies to consider alternatives to siting in a floodplain.

EO 11988 also requires that federal agencies proposing to site an action in a 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If no practicable alternatives exist to constructing a facility in the floodplain, the action must be designed to minimize potential harm to or within the floodplain.

The FEMA-identified floodplains are documented in Figure 15. As shown in the figure, the 100-year floodplain identified in the study area lies along Hay Creek. None of the alternatives would include improvements near the 100-year floodplain.

CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA) requires any federally funded or licensed undertaking be evaluated for the potential impact to historic and archaeological properties that are eligible for the listing on the National Register of Historic Places (NRHP). If such properties are present and would be adversely impacted either through direct effects (such as grading) or indirect effects (such as visual obstruction or alteration of setting), those impacts need to be considered for some level of mitigation. In order for a property to be eligible for NRHP listing, it must have a high degree of physical integrity (i.e. well preserved) and meet at least one of four significance criteria.

Most of the construction would occur within existing right of way and the surrounding area has been extensively developed. There are no structures that would require acquisition in the alternatives. However, as project development progresses, there should be continued consultation with the State Historic Preservation Officer (SHPO), in compliance with Section 106 requirements.

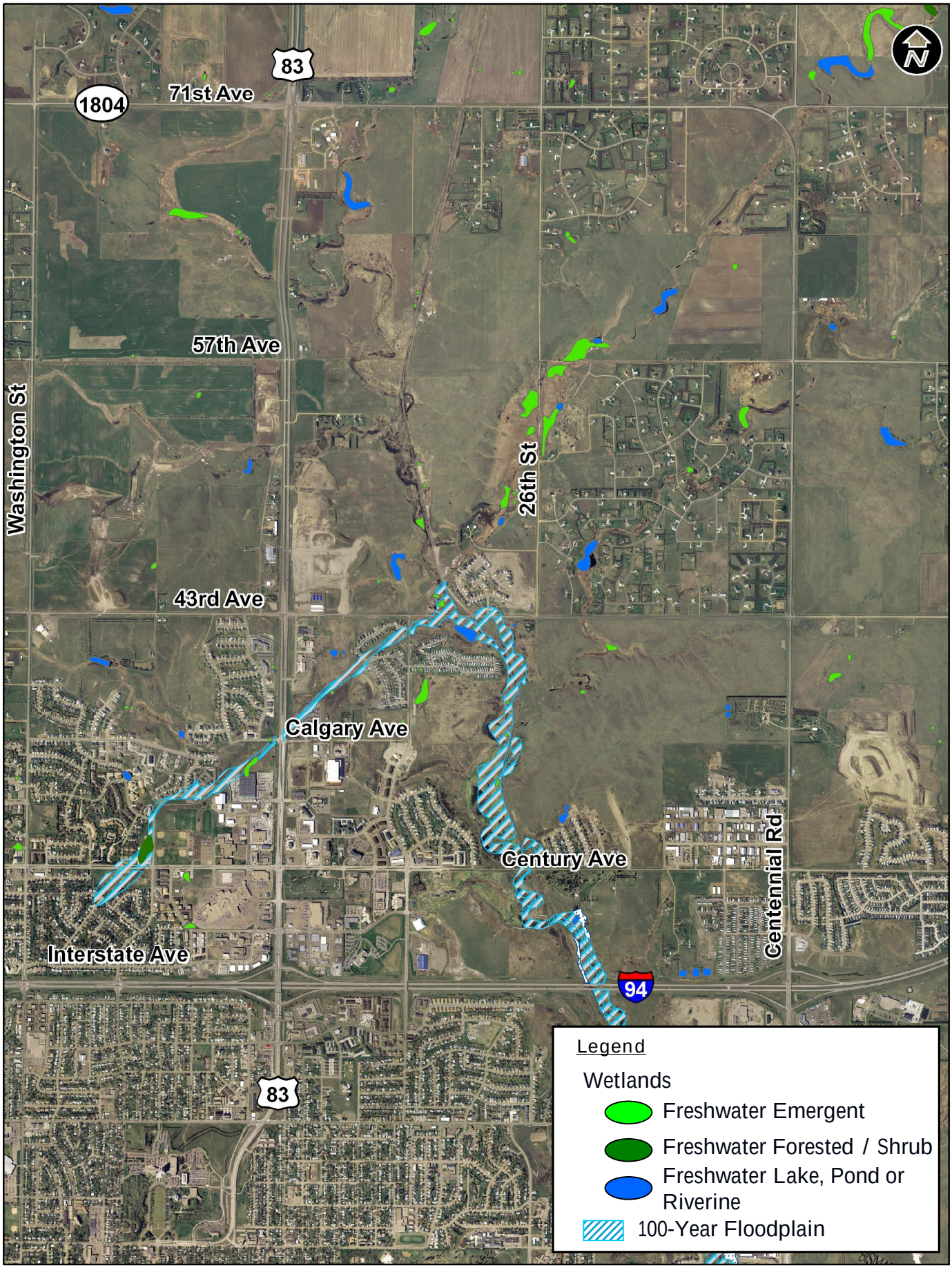


FIGURE 15: Study Area Identified Wetlands and Floodplain

RECOMMENDATIONS

The primary purpose of the 71st Avenue / Centennial Road Corridor Study was to identify improvements that can be implemented to improve safety and traffic flow within and through the corridors. This corridor improvement plan provides a multimodal program for addressing current and forecasted future transportation needs for roadways and non-motorized facilities. The study process was carried out in way that allowed the study team to identify a corridor-wide strategy for addressing identified needs that:

- Establishes plans that address future development of these corridors:
  - Develop a corridor improvement plan that looks to the future, anticipating increased traffic volume in the corridor, and provides a prioritized action plan to address current and future needs.
  - Establish a plan that addresses the multimodal transportation needs of the corridor, including autos, trucks, pedestrians and bicyclists.
  - Provide a corridor transportation plan that addresses traffic operations, safety for vehicles and non-motorized travelers and corridor efficiency through enhanced access management.
- Support the mobility desires of the city, county and region.
- Balance impacts and benefits of each concept.

RECOMMENDED CONCEPTS

The recommended concepts for the 71st Avenue / Centennial Road Corridor Study are intended to address the short-term to mid-term needs for the corridor. These proposed improvements were developed taking into account the long-term improvement concepts being considered in the corridor. This integrated approach to project development offered a more efficient use of limited transportation dollars. The recommended improvement alternatives for the 71st Avenue / Centennial Road Corridor Study roadways are outlined in the following sections.

ACCESS MANAGEMENT RECOMMENDATIONS

The intended role of these two roadways, as arterial roadways, should favor mobility over access. When implemented, this plan would help preserve the corridor's long-term viability by reducing access-related crashes, preserving corridor mobility and extending the serviceable life of infrastructure improvements. The preliminary access management recommendations for this study are listed below:

- Minimum access spacing as described in the "Alternatives Analysis" chapter.
- Remove unused access points.
- Close the field access points when those parcels are redeveloped.
- In most cases, close private access points if those parcels are redeveloped or when the expanded street network is completed.

- Do not allow any new private access points. Access to new developments or redevelopments should be provided on the minor cross streets.
- Closure is recommended for a few public streets due to alternate access availability.
- Backage roads are recommended for several undeveloped areas along these corridors.

It is assumed that where recommended, the access point closures / relocations will occur as a part of the roadway improvement projects in the 71st Avenue and Centennial Road corridors. In some cases there may be no reasonable solution for removal of a particular access point and it will simply have to remain. The access management evaluation also looked at potential opportunities for additional future access points that are consistent with the evaluation criteria. The recommended access management plan recommendations are also presented in Figures 16 through 22.

Roadway Improvement Concept Recommendation

The continuous left-turn lane section concept was selected as the preferred concept. The continuous left-turn lane section concept provided several advantages over the initial concept (left-turn lanes with tangent segments), including:

- There are no locations in the continuous left-turn lane concept where the back of a westbound left turn lane overlaps with the back of an eastbound left turn lane.
- There are no short tangent sections created in the continuous left-turn lane concept by opposing direction left turn lanes from different intersections almost backing up into each other.

The recommended continuous left-turn lane concept results in:

- Removing turning vehicles from the through travel lane, which is a safety improvement relative to the current conditions.
- A through lane travel path that does not include any horizontal curvature (no moving in and out of taper areas).
- A substantial amount of earthwork, which would add to the overall project cost.

The specific elements of the roadway improvement plan include the following elements by segment:

- Centennial Road, I-94 to Century Avenue: A 4-lane divided roadway composed of two through lanes in each direction and a left turn lane at each intersection. This segment will be an urban roadway design to match the one south of Trenton Drive.
- Centennial Road, Century Avenue to Jericho Road: A 5-lane roadway composed of two through lanes in each direction and a center two-way left turn lane. This segment will also be an urban roadway design.

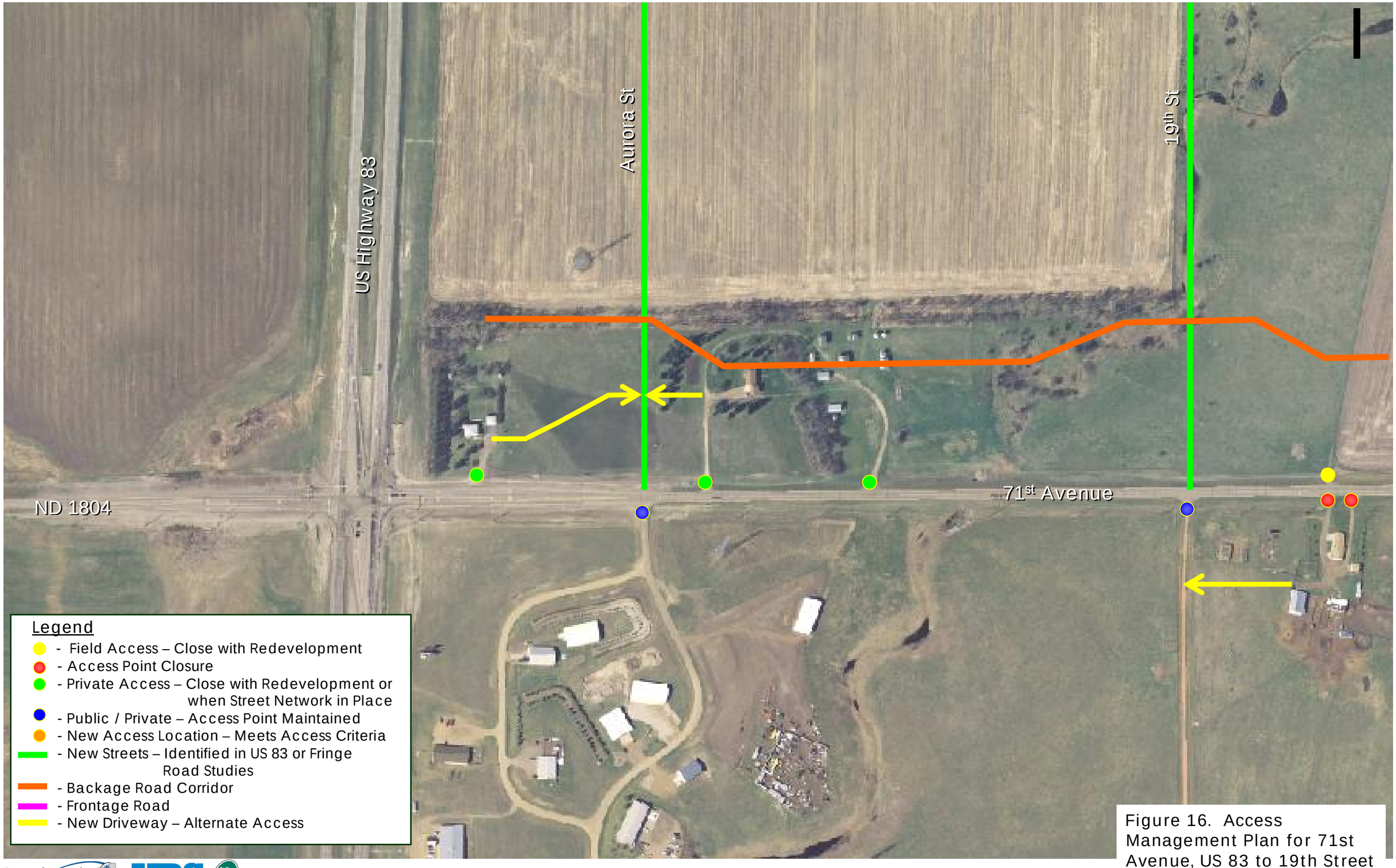


Figure 16. Access Management Plan for 71st Avenue, US 83 to 19th Street

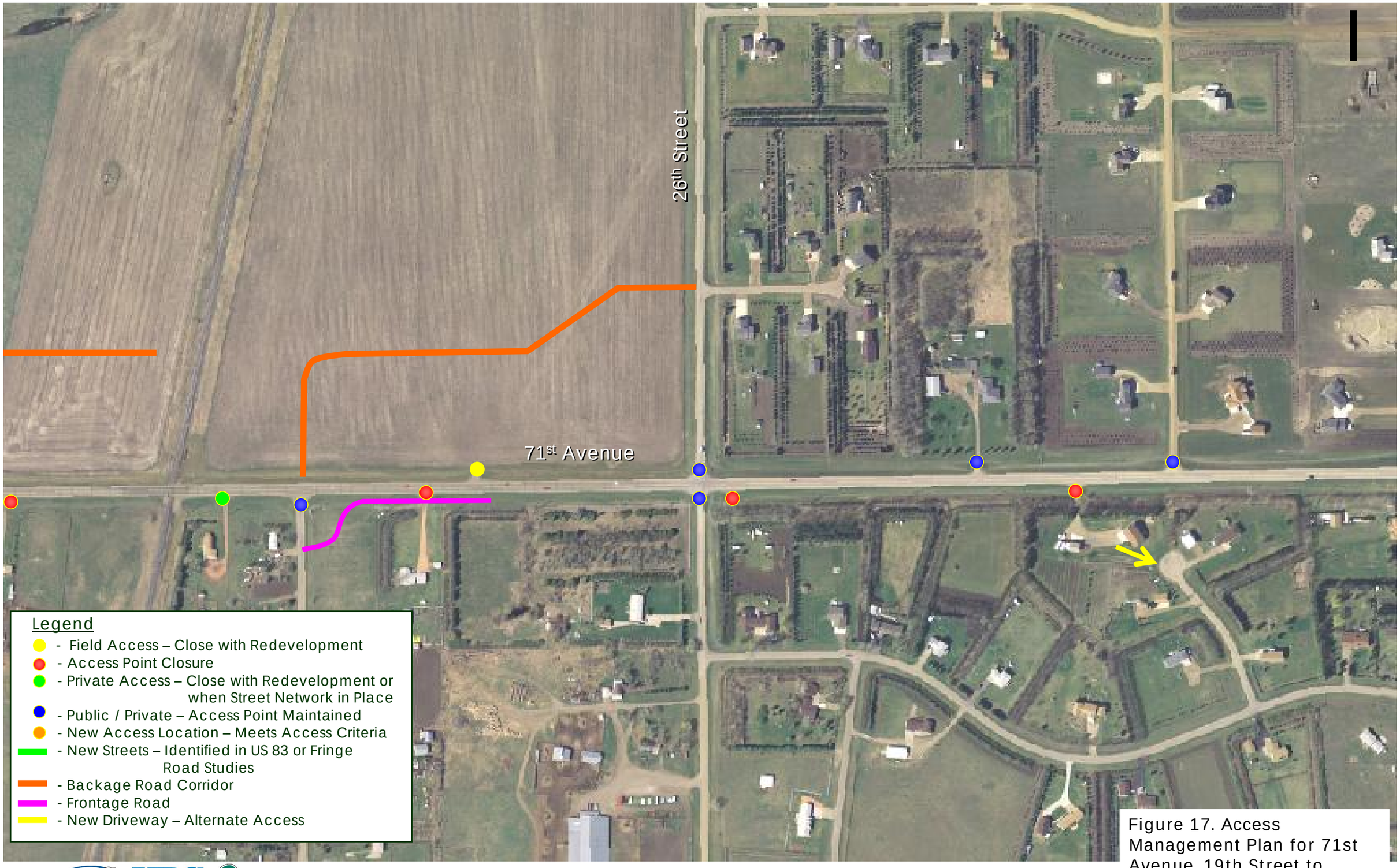


Figure 17. Access Management Plan for 71st Avenue, 19th Street to Moonstone Lane

Figure 18. Access Management Plan for 71st Avenue, Moonstone Lane to Centennial Road

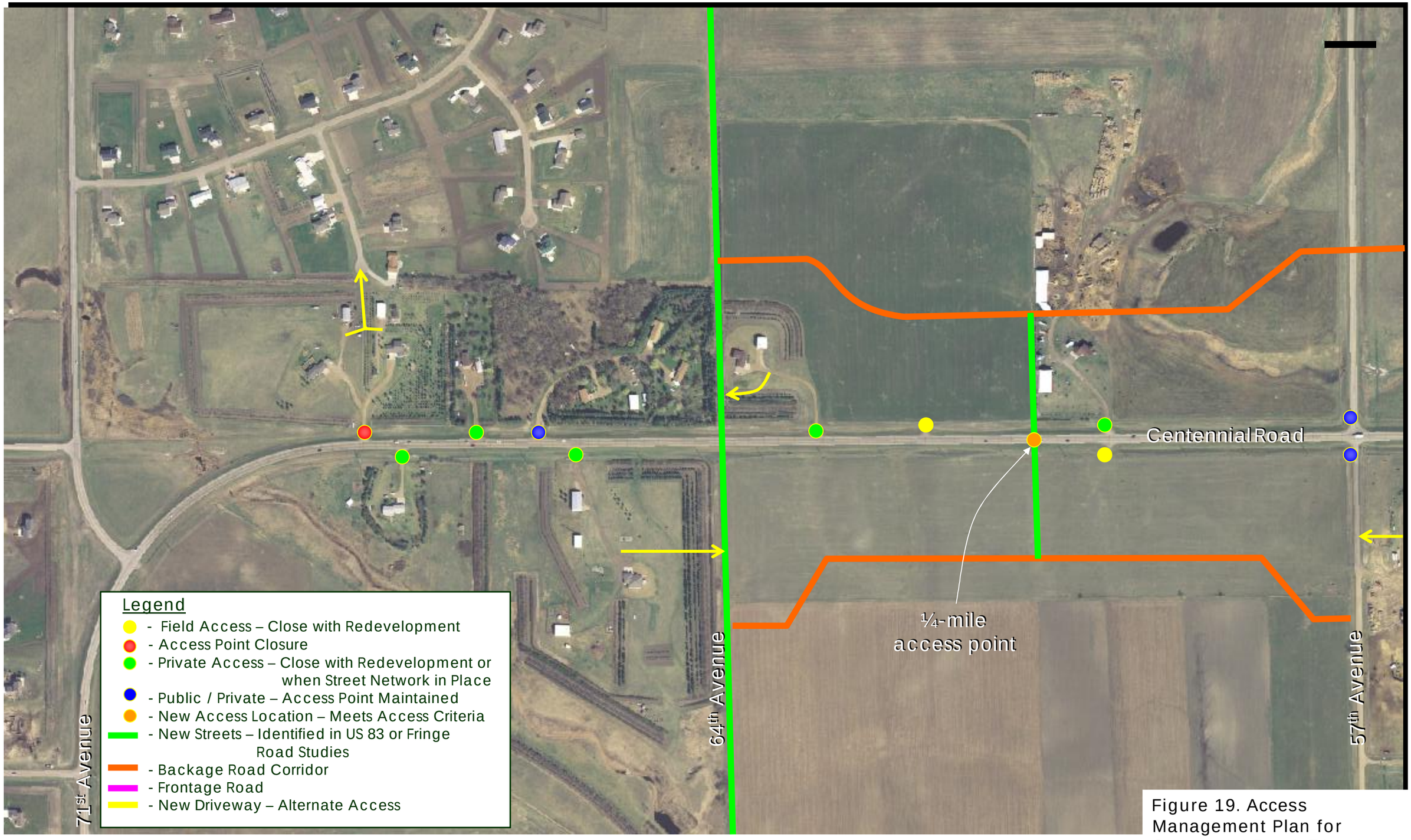


Figure 19. Access Management Plan for Centennial Road, 71st Avenue to 57th Avenue

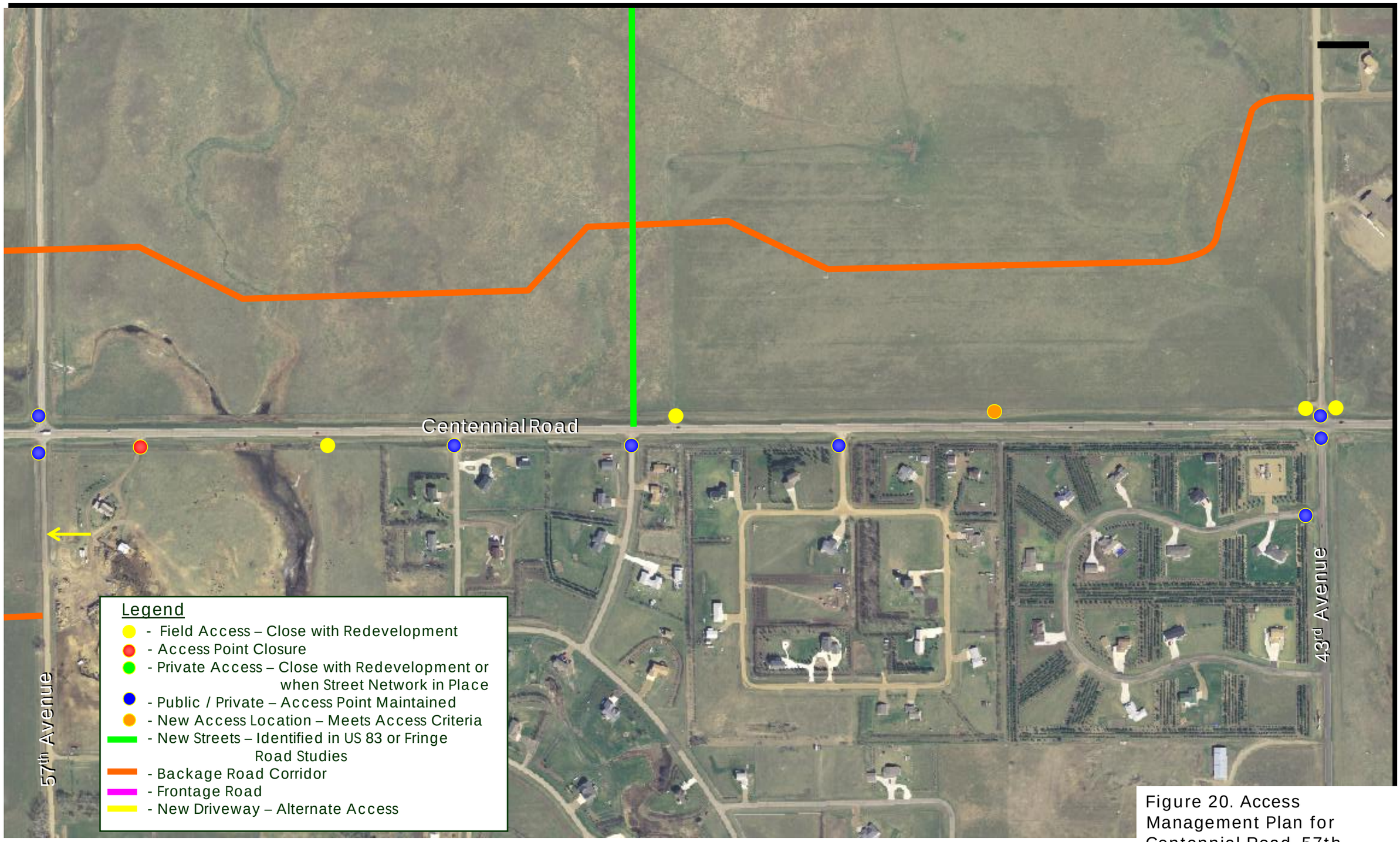


Figure 20. Access Management Plan for Centennial Road, 57th Avenue to 43rd Avenue

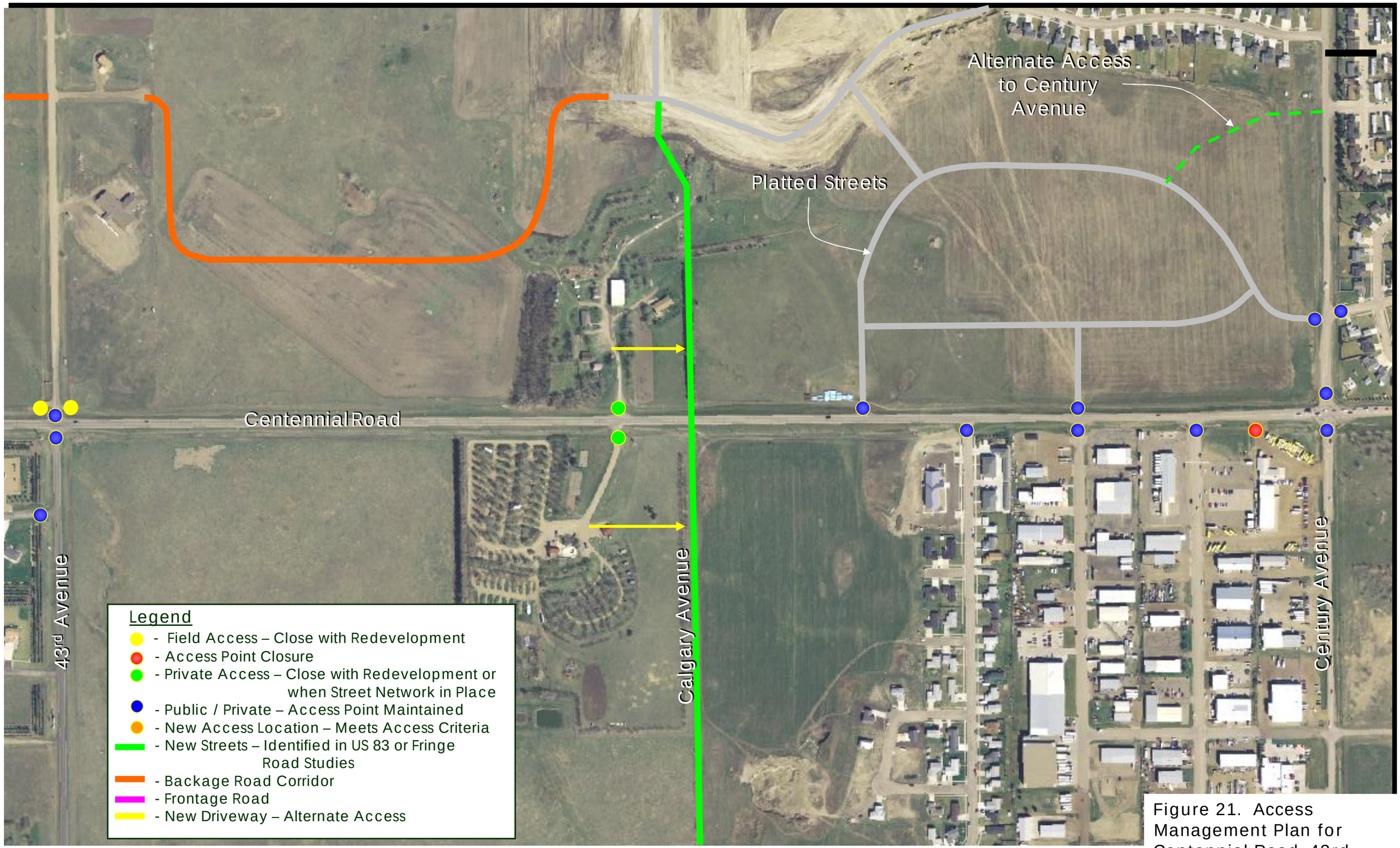


Figure 21. Access Management Plan for Centennial Road, 43rd Avenue to Century Avenue

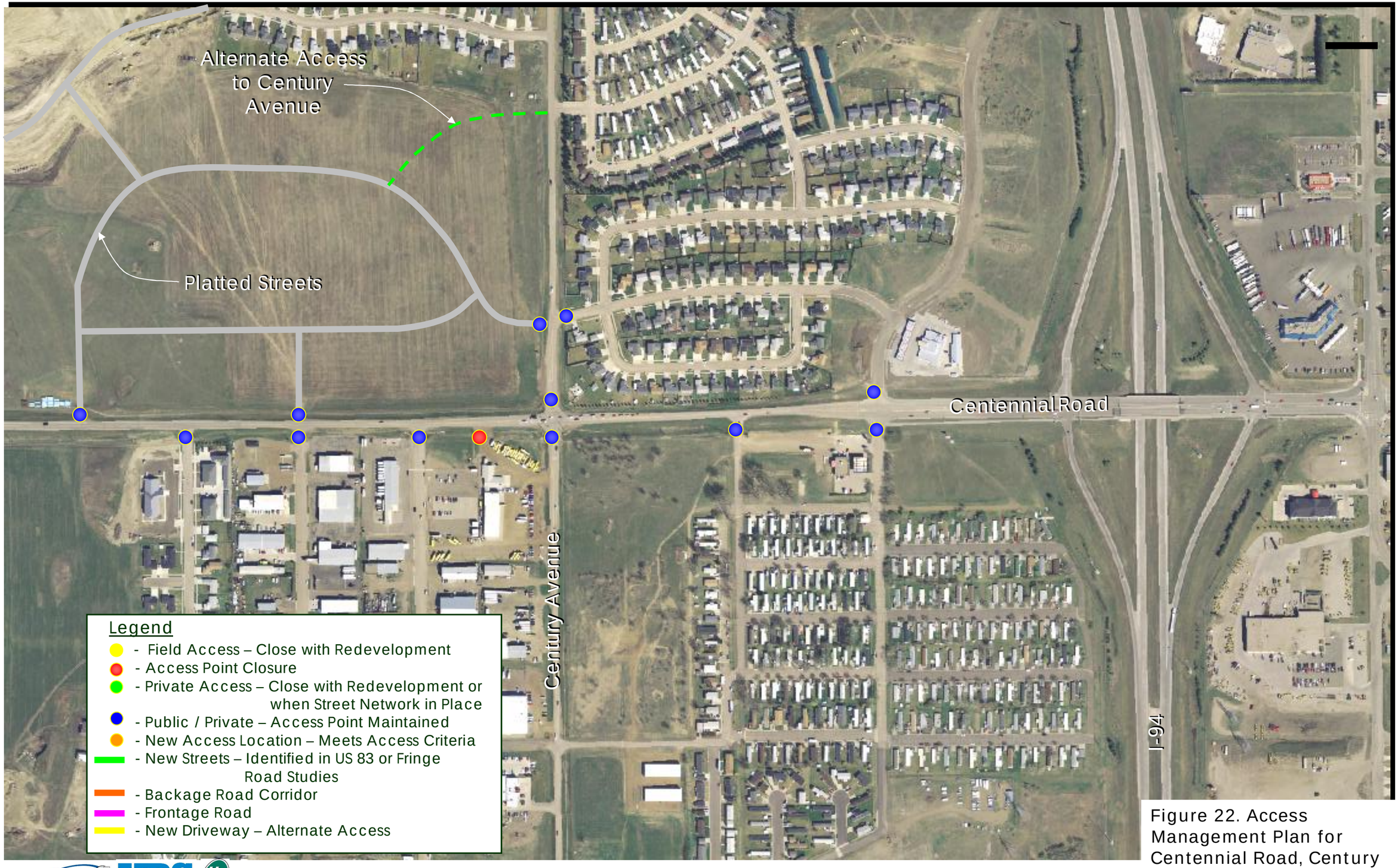


Figure 22. Access Management Plan for Centennial Road, Century Avenue to I-94

- Centennial Road, North of Jericho Road to 71st Avenue: A 3-lane roadway composed of one through lane in each direction and a center two-way left turn lane.
- 71st Avenue, US 83 through Centennial Road: A 3-lane roadway composed of one through lane in each direction and a center two-way left turn lane.
- Major Cross-Streets: Left turn lanes are recommended on a few cross-streets approaches in the study area, as listed below:
  - 71st Avenue / 26th Street
  - Centennial Road / 43rd Avenue
- Minor Cross Streets: Right turn lanes are recommended along either 71st Avenue or Centennial Road at minor cross street locations as documented in the turn lane plan, presented in the previous section.
- Provide a multi-use trail for pedestrians / bicyclists. As land development continues through this corridor, there will be new / increased demands for pedestrian and bicycle access.

The recommended roadway improvement concept is illustrated in Figures 23 through 31.

The intersection of 71st Avenue / Centennial Road is a three-legged intersection located on a horizontal curve. The current configuration does a good job of accommodating the primary traffic movements at this intersection. This past summer the intersection was reconstructed to add turn lanes to the mainline and these improvements will help operations and safety for this intersection. The long-term prospect of 71st Avenue being a part of the Northern Beltway will require the 71st Avenue / Centennial Road to be reconstructed as a more traditional four-leg configuration. With the four-leg configuration, it may be possible to have a free-right turn lane for the heavy eastbound to southbound movement; however, the heavy northbound to westbound movement would have to make a left-turn at the intersection. This study's recommended corridor improvements should not have any negative impacts on the long-term solution for this intersection.

Typical Cross Section

The preferred corridor concept was developed using typical cross section templates. For the segment of Centennial Road between Trenton Drive and Jericho Road the proposed cross section will match the existing roadway cross section south of Trenton Drive. The remaining portion of Centennial Road will utilize a rural roadway design that fits within a 150 foot right-of-way, as shown in Figure 32. North of Calgary Road, the Centennial Road corridor has 150 feet of available right-of-way. Centennial road south of Calgary Avenue has current roadway right-of-way widths that range between 100 and 130 feet.

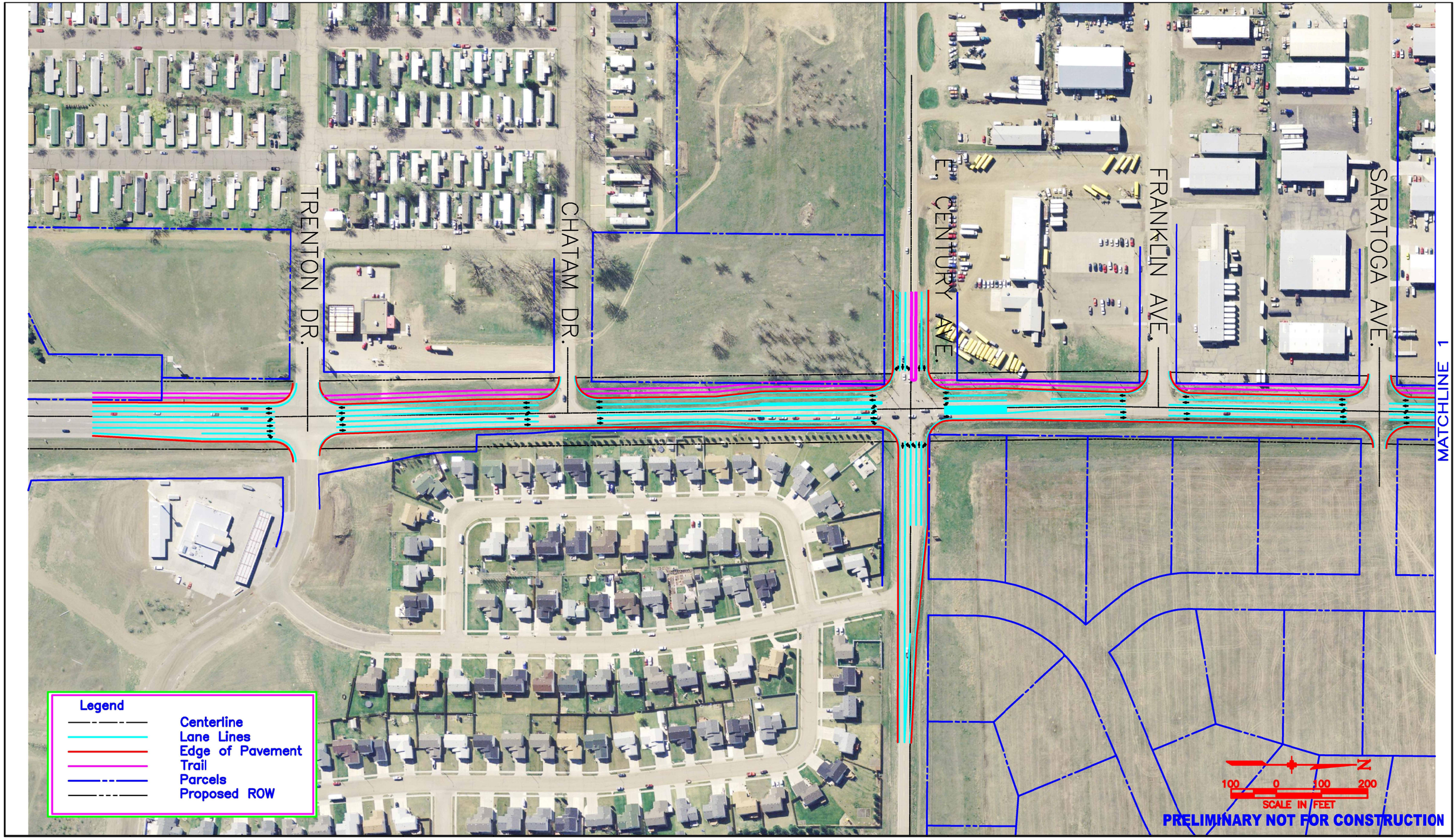


Figure 23. Centennial Rd: I-94 to Saratoga Avenue Preferred Alternative

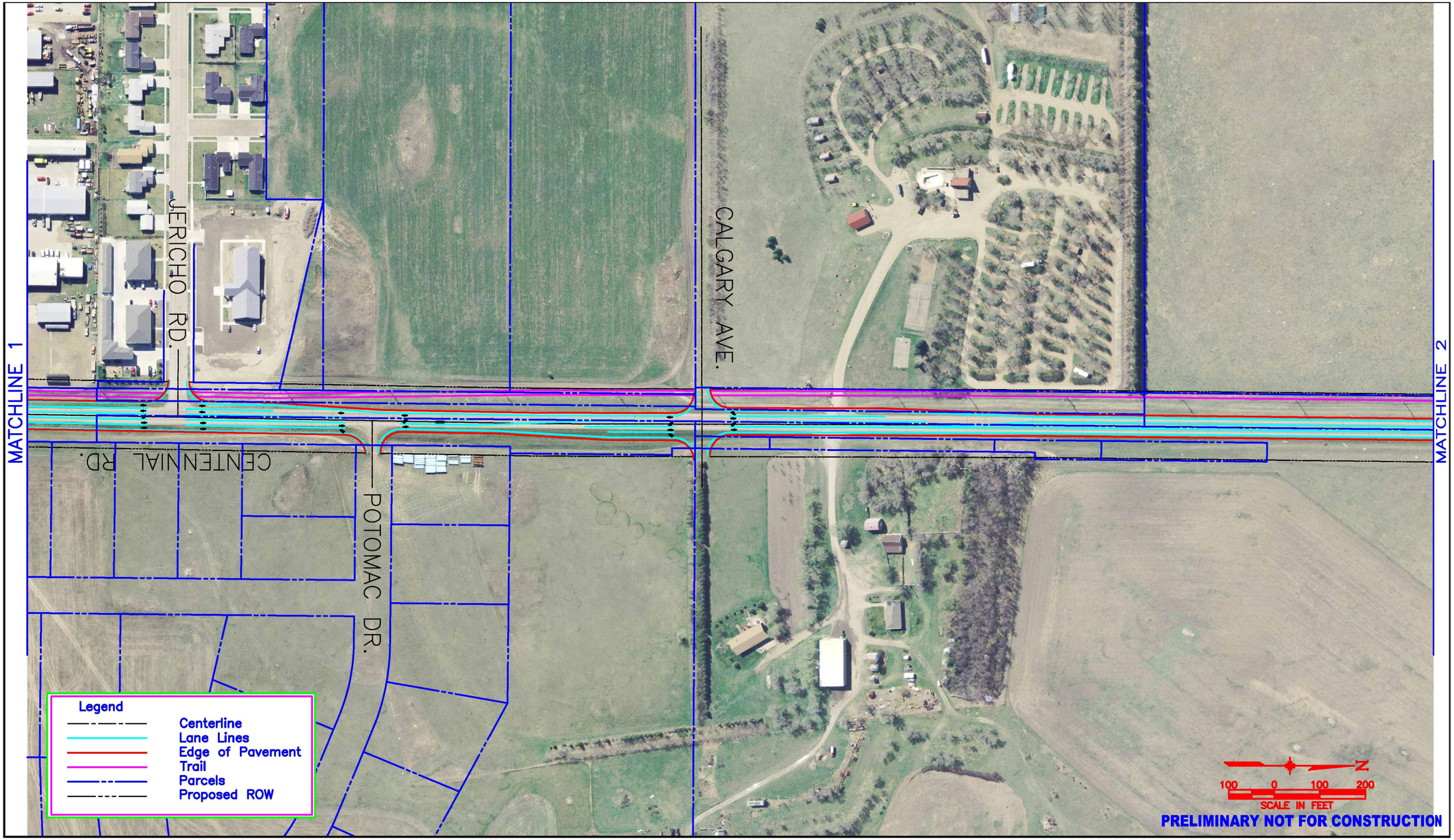


Figure 24. Centennial Road: Jericho Road to Calgary Avenue Preferred Alternative

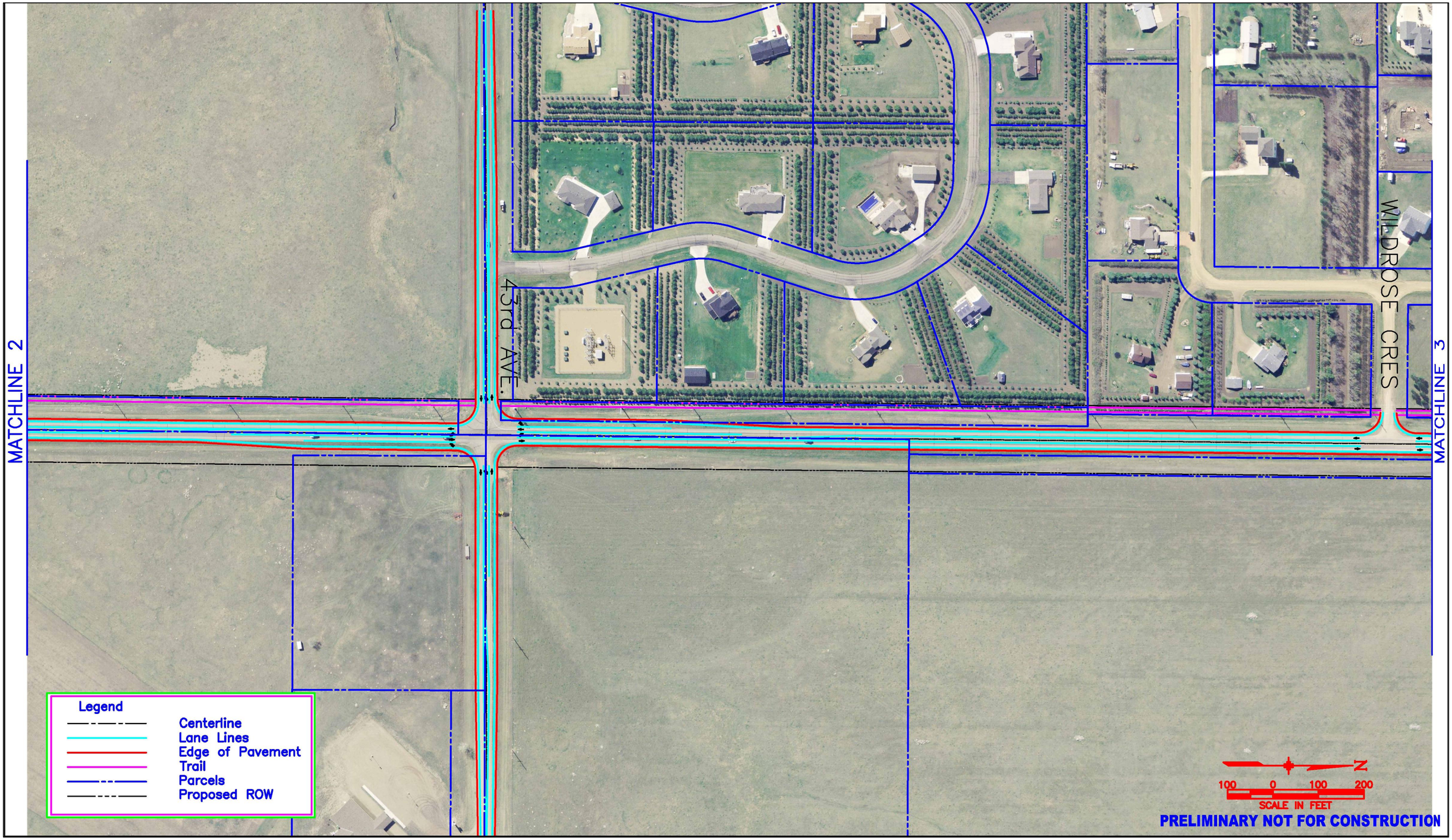


Figure 25. Centennial Road: 43rd Avenue Preferred Alternative

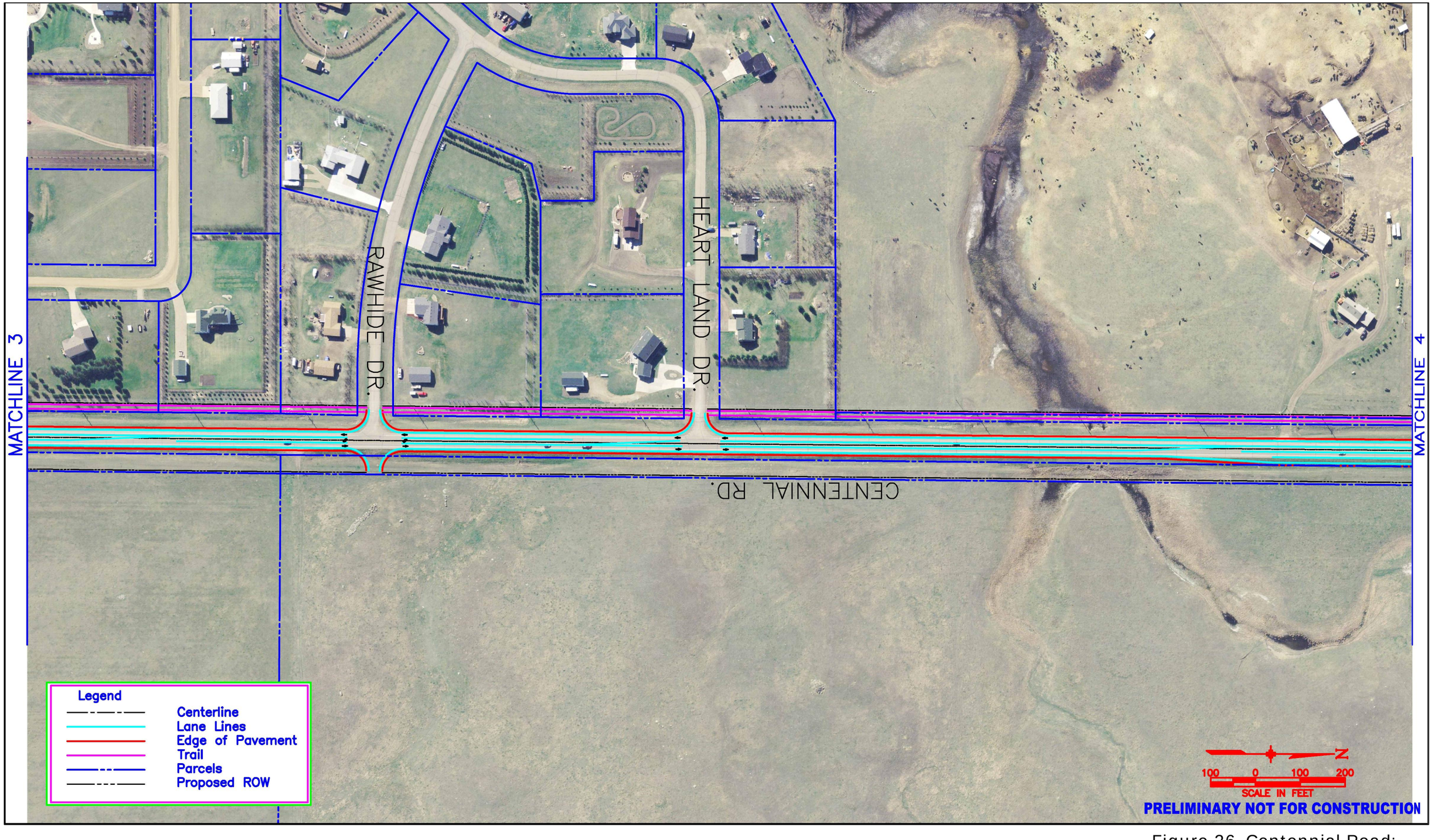


Figure 26. Centennial Road: Heartland Drive Preferred Alternative

Figure 27. Centennial Road: 57th Avenue to 64th Avenue Preferred Alternative

MATCHLINE 6

MATCHLINE 5

EVERGREEN AVE.

CENTENNIAL RD.

Legend

- Centerline
- Lane Lines
- Edge of Pavement
- Trail
- Parcels
- Proposed ROW

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

Figure 28. 71st Avenue / Centennial Road Preferred Alternative

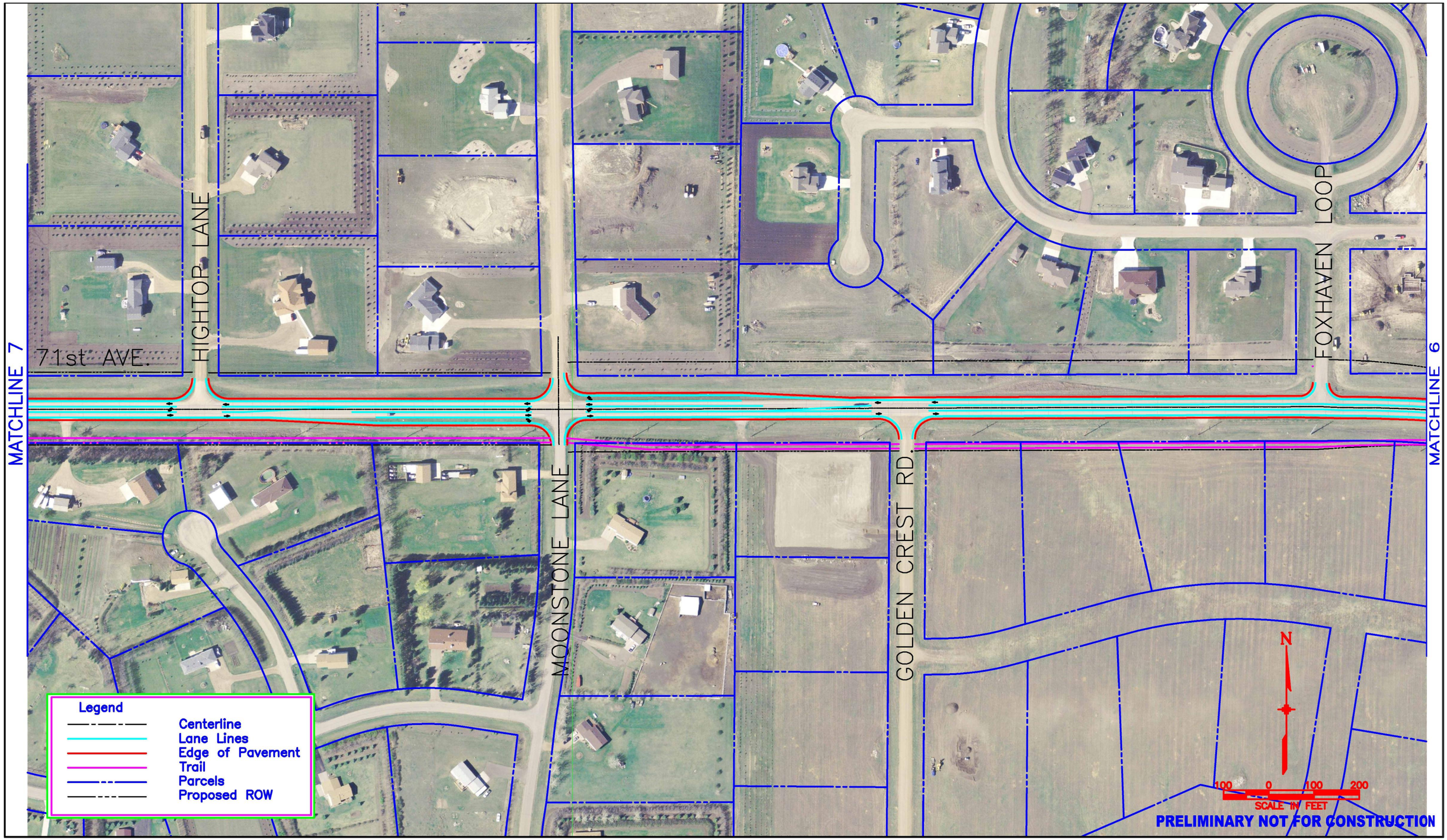


Figure 29. 71st Avenue: Moonstone Lane Preferred Alternative

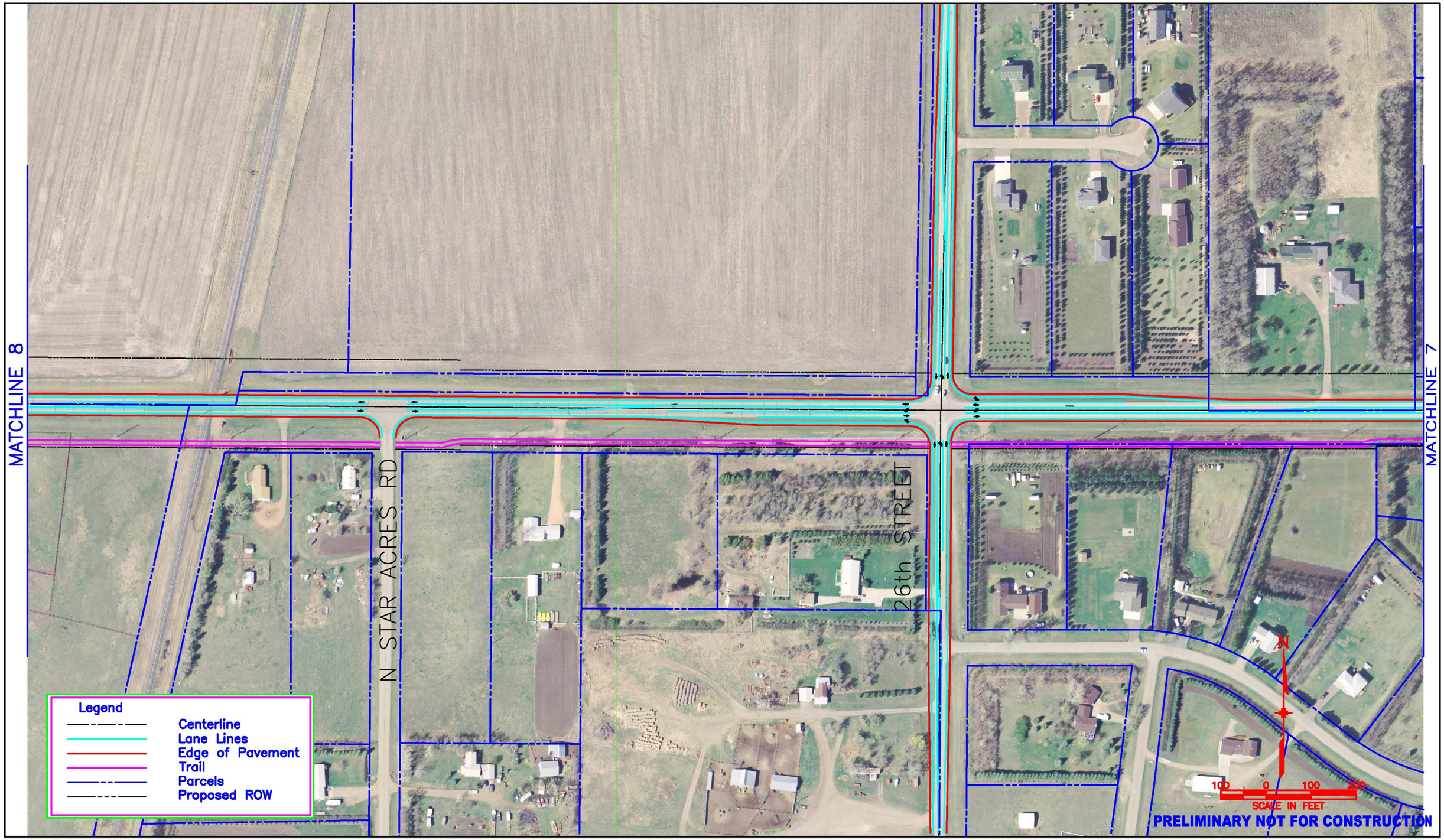


Figure 30. 71st Avenue: 26th Street Preferred Alternative

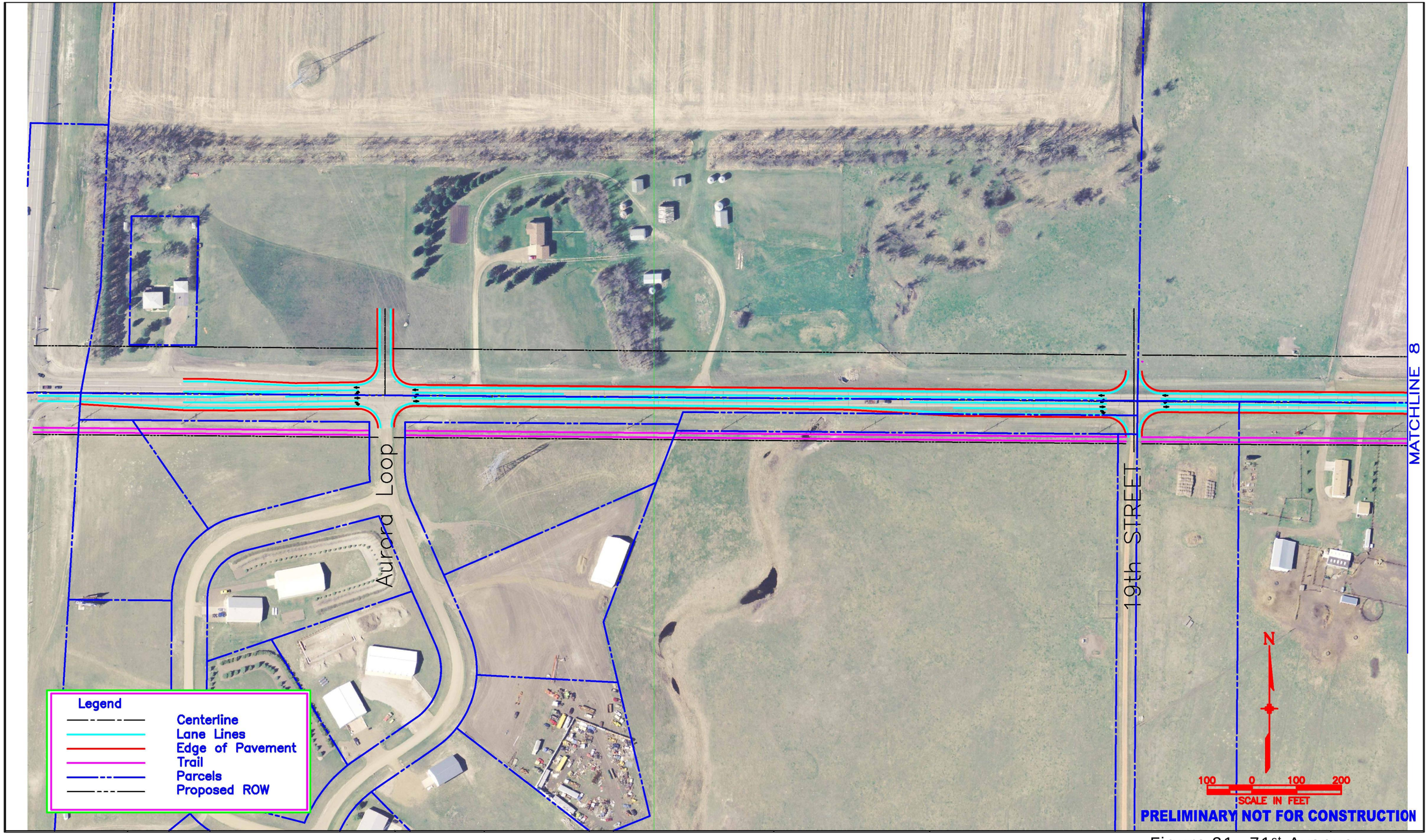
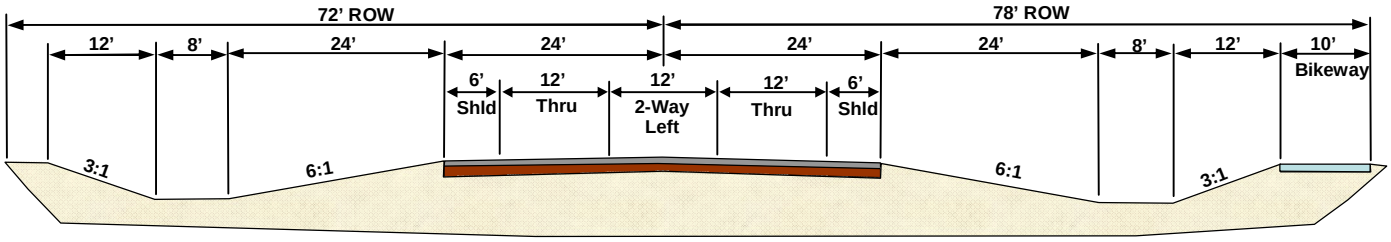


Figure 31. 71st Avenue: 19th Street to US 83 Preferred Alternative

Centennial Road Typical Cross Section – 150’ ROW



Looking South

FIGURE 32: Centennial Road Typical Cross Section – 150’ ROW

A multi-use trail is proposed for both corridors and was included in the roadway cross sections. The current long-range transportation plan recommends a trail along Centennial Road from I-94 to 43rd Avenue and for the remaining portion of Centennial Road and 71st Avenue a trail should be considered.

The 71st Avenue corridor is part of the Northern Beltway as documented in the *Northern Bridge Crossing Study*. The long-term goal for that corridor is to provide a 5-lane rural roadway design that fits within 200 feet of right-of-way, as shown in Figure 33. This cross section is used to determine the appropriate placement of the multi-use trail. The proposed cross section for 71st Avenue from this study only includes 3-lanes. The majority of the current 71st Avenue corridor also has 150 feet of available right-of-way.

The Northern Beltway study goal of 200 feet right-of-way width for 71st Avenue could result in hardships for some current property owners along that corridor. These hardships include the following:

- Proposed right-of-way line (at 200' wide) falls within 15-25 feet of existing buildings. The preferred building setback from the right-of-way line is 40 feet.
- Proposed multi-use trail would be located at the edge of the right-of-way and relatively close to these buildings.
- Placement of the trail at the edge of the right-of-way would require removal of trees that currently form windbreaks. The tree impacts are greater if the trail is located to the south of 71st Avenue.

There are many options for minimizing the impact of this project on adjacent property owners, as listed below:

- Modify design parameters (e.g., backslope, foreslope, ditch bottom width) for the roadside ditches. An example of such modifications is shown in Figure 34. This modification reduces the required roadway right-of-way width by 30 feet, 15 feet on each side.
- Move the multi-use trail to the north side of 71st Avenue. This would allow the preservation of the trees that form the windbreaks for properties on the south side of 71st Avenue.

It is anticipated that Centennial Road north of Jericho Road can be reconstructed within the existing right-of-way limits. The segment of Centennial Road between Trenton Drive and Jericho Road will require acquisition of right-of-way, which currently has the least amount of right-of-way available of all segments in the study corridor. The amount of right-of-way needed for construction of five-lane facility is reduced by constructing an urban section for this segment. Along 71st Avenue the long-term desire to have a 200 foot wide right-of-way corridor will typically require acquisition of 25 feet of additional right-of-way from each adjacent parcel. For the segment of 71st Avenue between 26th Street and Moonstone Lane a reduced right-of-way width of 170 feet is proposed to minimize impacts to adjacent properties.

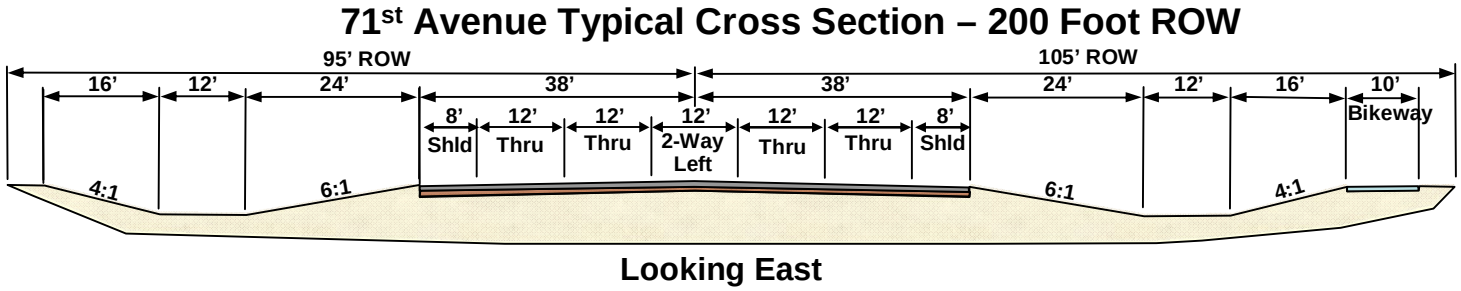
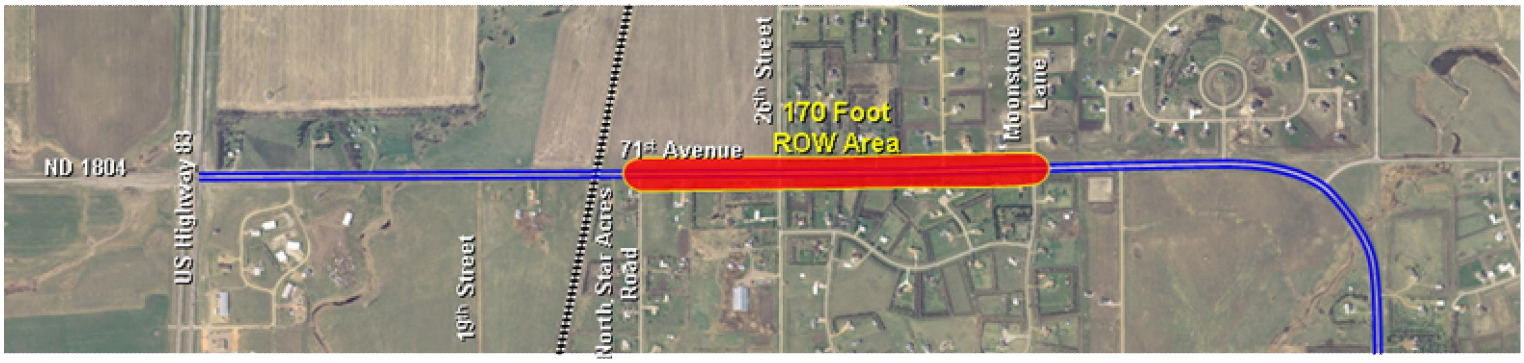
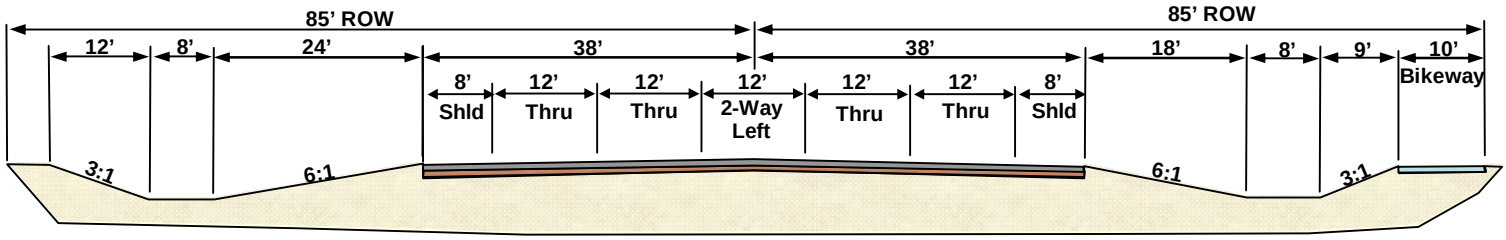


FIGURE 33: 71st Avenue Typical Cross Section (from Northern Bridge Crossing Study)



71st Avenue Typical Cross Section – 170 Foot ROW



Looking East

FIGURE 34: 71st Avenue Cross Section North Star Acres Road to Moonstone Lane

Figure 35 illustrates the study-recommended 3-lane roadway cross-section for 71st Avenue compared to and overlaid on the ultimate 5-lane cross section recommended for 71st Avenue in the Northern Bridge Crossing Study.

RIGHT-OF-WAY ESTIMATES

The recommendation from this study would be to utilize a 200 feet right-of-way along 71st Avenue except in those locations where property owners incur hardships. To address this concern, a narrower cross section that assumes 170 feet of roadway right-of-way is recommended between 26th Street and Moonstone Lane. The right-of-way impacts associated with the recommended cross-section are documented in Table 7.

As noted in the "Alternatives Assessment" chapter, the recommended alternatives would result in the need to acquire relatively narrow strips of land, and there are not any anticipated instances where properties would be acquired, or where the required right-of-way would significantly segment or affect the usage of properties in the study area

Table 7: Estimated Right-of-Way Impacts for Recommended Corridor Cross-Section

Street / Segment	Planning-Level Estimated Property Acquisition (Acres)			
	Residential	Commercial	Agricultural / Open Space	Total Acres
71st Avenue, US 83 to 26th Street	2.8	1.5	1.8	6.1
71st Avenue, 26th Street to Centennial Road	2.1	0.0	0.6	2.7
Centennial Road, 71st Avenue to 57th Avenue	0.3	0.0	0.2	0.5
Centennial Road, 57th Avenue to 43rd Avenue	1.4	0.0	0.0	1.4
Centennial Road, 43rd Avenue to Century Avenue	0.3	0.5	1.0	1.8
Centennial Road, Century Avenue to I-94	0.6	0.0	0.2	0.8
Study Area Total	7.5	2.0	3.8	13.3

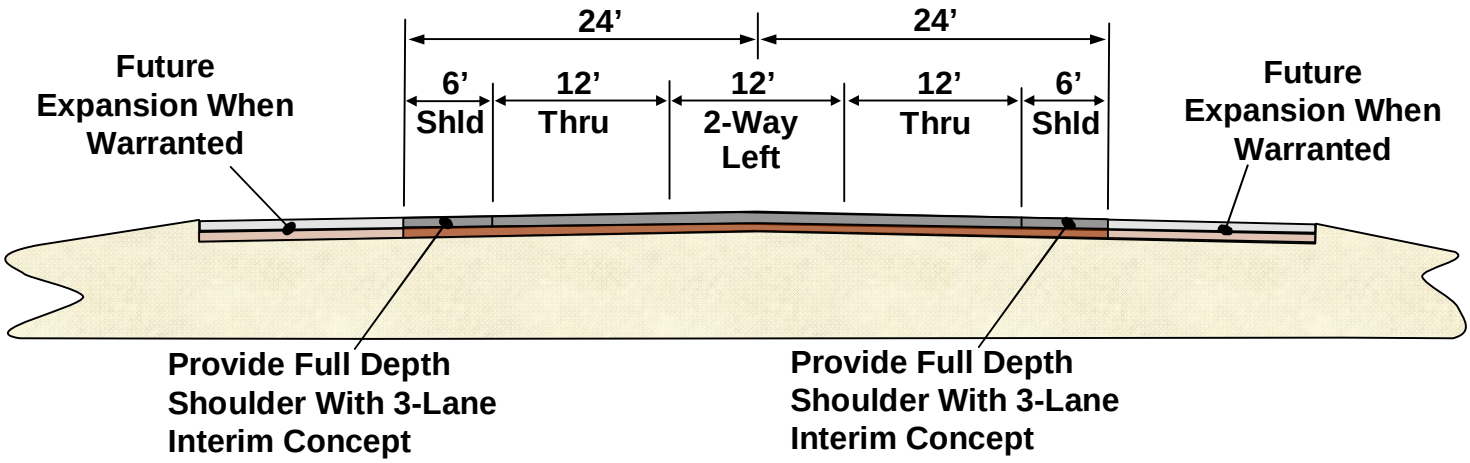


FIGURE 35: 71st Avenue Interim 3-Lane Section on Future 5-Lane Right-of-Way

Implementation Plan and Costs

Background

As documented in the "Existing Conditions" chapter, the both Centennial Road and 71st Avenue operate at an acceptable level of service and vehicle crash rates are not over the average for other similar routes in the region. The segment of Centennial Road from Trenton Drive through Century Avenue and the east approach on Century Avenue experience unacceptable congestion during the peak of the Am rush hour. In general, throughout most of the corridor pavement conditions are rated as fair to good; therefore pavement rehabilitation projects are not currently included in the current TIP. The 2008-2013 TIP include the following capacity enhancement projects that will directly address congested segments of the corridor:

- Centennial Road: Expand to a five-lane cross section from Trenton Drive to Jericho Road.
- Centennial Road: Expand to include two through lanes and turn lanes on both the east and west approaches

The projects are currently programmed for 2011.

Support for implementation of the remaining recommended improvements is tied to traffic operations and corridor safety reflective of the current (2008) and the future (2030) conditions. In the period from 2008 through 2030 traffic will increase incrementally as open space areas directly adjacent to the corridor and within the corridor travelshed occurs. The primary question to answer at this time is, "When will the expansion improvements be needed?" The remainder of this section discusses the approach to determining plan implementation and cost estimates.

Approach

There is no documented timeline when the land development that will generate the increment of corridor traffic that will result in the need for the corridor capacity improvement will happen. Thus, the study team originally approached the process determining the general timing of project implementation by:

- Identifying the locations currently in need of improvements based on current peak period traffic operations or identified safety concerns in the corridor.
- Identifying locations where developments can play a role in implementing the proposed improvements. For example, at the time the proposed connection of Calgary Avenue to Centennial Road is constructed it would be appropriate to construct the ultimate intersection configuration.
- Determining whether it is reasonable and feasible to segment the corridor-wide improvements, based on current/future needs (safety/capacity) and the description of the recommended improvements. For example, the intersection of Centennial Road/43rd Avenue may develop a safety issue. It

would then be appropriate to implement intersection improvements, but the roadway segment south of this intersection may not yet need to be widened.

ORIGINAL IMPLEMENTATION PLAN

Using the methodology listed above, an initial implementation plan for corridor improvements was developed, which reflected the following periods:

- Immediate: Within the next 3 years.
- Short-term: Within the next 3-6 years.
- Mid-term: Implemented 6 to 10 years into the future
- Long-term: Implemented 10 to 15 years into the future

Listed in the following bulletpoints is the initial implementation plan, which was not the final plan:

- Immediate:
  - Centennial Road: Trenton Drive to Jericho Road and complete reconstruction of the Century Avenue intersection.
- Short-Term:
  - Centennial Road: Jericho Road to Calgary Avenue
  - Centennial Road/43rd Avenue intersection improvements
  - Centennial Road/57th Avenue intersection improvements
  - 71st Avenue/26th Street intersection improvements
- Mid-Term
  - Centennial Road: Calgary Avenue to 43rd Avenue
  - 71st Avenue: US 83 to 26th Street
- Long-Term
  - Centennial Road: 43rd to 71st Avenue
  - 71st Avenue: 26th Street to Centennial Road

The initial implementation plan was developed with the assumption that a funding program that brought together Burleigh County, Bismarck, and the NDDOT would be developed. The collaborative funding program required to move the project ahead on the initial implementation timetable ultimately was not established due to:

- Funding constraints presently being experienced by all of the entities.
- A locally preferred improvement concept that was not consistent with a project that would address the observed issues in a manner that could be supported by the NDDOT for a larger funding commitment. The NDDOT supported funding for implementation of those improvement elements that would address safety issues through their Highway Safety Improvement Program (HSIP). This program focuses funding for roadway improvements on locations where safety issues have been identified.

Revised Implementation Plan Concept

The draft project implementation plan documented above assumed that a coordinated funding package could be identified with participation by Burleigh County, Bismarck, and the NDDOT. During the NDDOT management review meeting no commitments to funding a specific set of improvement projects along 71st Avenue and Centennial Road were provided. Staff from the NDDOT discussed issues associated with the recommendations, including:

- The three-lane cross section along the corridors does not reflect a facility that would function as a truck bypass to US 83, which the NDDOT would be looking for prior to committing to substantial funding participation.
- Incorporating a multi-use path in a corridor that would function as a truck bypass is not consistent with the NDDOT's desires.

In response to the issues raised by NDDOT management, staff from the city and county stated that:

- The goal of the project was to identify improvements that would reduce some of the conflicts that presently exist in the two-lane sections of the 71st Avenue and Centennial Road corridors by separating local access movements (left turn and selected right turn movements) from through movements. The goal of the project was not to provide a designated truck bypass/alternate for US 83 between 71st Avenue and I-94, but rather to more safely accommodate the range of functions the corridor provides.
- The detached multi-use trail reflected input from the FHWA representatives as a requirement to be able to at least consider using Federal funds in the corridor.

Implementation Schedule

The revised implementation schedule takes a more fiscally-constrained approach as to when various elements of the corridor recommendations would be implemented. Figure 36 displays the revised implementation plan for the corridor improvements. The implementation plan displayed reflects revised assumptions on the coverage of any one improvement project, outside of the five-lane expansion of Centennial Road through Jericho Road and provides for an extended overall implementation period (to 20 years rather than approximately 10 years). The initial draft implementation plan identified longer improvement segments providing a more accelerated implementation period. The revised implementation plan includes projects as limited as a single arterial intersection to projects that incorporate several private driveways. The order of selecting the various segments was a function of:

- Current traffic volumes in the corridor.
- Estimates on the timing of additional development adjacent to the corridor.
- Correction of safety issues associated with the current facilities.
- The assumed intensity of adjacent development and the resulting traffic forecasts.

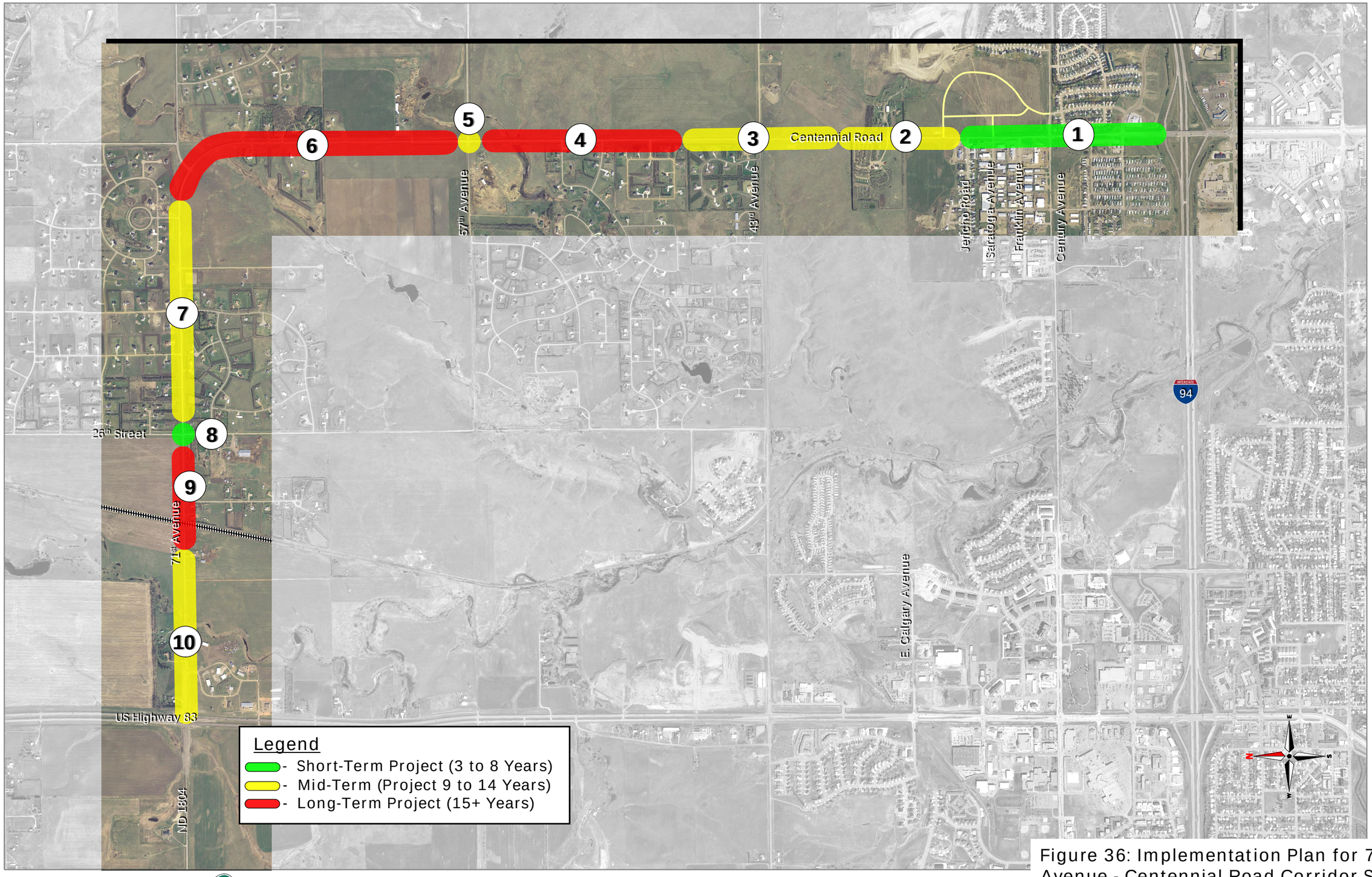


Figure 36: Implementation Plan for 71st Avenue - Centennial Road Corridor Study

The revised implementation periods are:

- Immediate: Within the next 3 years.
- Short-term: Within the next 3-8 years.
- Mid-term: Implemented 9 to 14 years into the future
- Long-term: Implemented 15 + years into the future

COST ESTIMATES

A preliminary set of cost estimates was developed for the recommended alternatives. The cost estimates were developed to an appropriate level for a planning-level corridor study, through four steps:

- Development of Unit Costs: These are the cost associated with general types of improvements (e.g., roadway surfacing) on a per-unit basis.
- Application of Unit Costs to the Various Alternatives: The quantity of the various improvement types (e.g., square feet of roadway surfacing) were calculated for each alternative and the unit costs were applied. This step establishes the cost for the big ticket items included for each alternative.
- Development of Other Project Cost Elements: Additional cost elements (e.g., drainage/utilities, signing/striping, traffic control during construction) are included in each construction project. Each of these cost elements are calculated as a percentage of the total cost for the big ticket items. For example, the drainage/utilities cost element would be 3-10% of the cost for the big ticket items.
- Development of Total Project Cost Estimate: The total project cost estimate for each alternative is the cost of the big ticket items plus the various cost elements.

A primary source of data for the unit costs used in developing the preliminary cost estimates was the construction unit costs (i.e., bid tabs) information available from the NDDOT. That information was supplemented with unit-cost data from other sources. The recommended project cost estimates reflect the following assumptions:

- Overlay of both 71st Avenue and Centennial Road north of Jericho Road and widening the roadways from a two-lane to a three-lane, rural cross section using asphalt.
- Construction of the Centennial Road 5-lane between Trenton Drive and Jericho Road using concrete.

In addition to providing base year (2007) cost estimates, an assessment of the potential year of implementation costs has been included. This year of implementation cost estimate incorporates inflation in the period between 2007 and a likely year or general period of implementation. An inflation rate of four percent per year (compounded) has been assumed and is consistent with planning methods on accepted by the NDDOT.

As shown in Table 8, real dollar costs increase significantly as projects are implemented/constructed in the later periods. It should be noted that the assumptions on inflation are generalized and over the past five years the annual rate of construction inflation have been highly volatile from quarter-to-quarter and year-to-year.

Table 8: Segment Cost Estimates and Year of Construction Costs

Segment	Implementation Period		2007 Dollars	Construction Year Costs	
	Initial Plan	Revised Plan		Initial Plan	Revised Plan
(1) Centennial Road: Trenton Avenue to Jericho Road	2010	2011	$4,049,000	$4,555,000	$4,737,000
(2) Centennial Road: Jericho Road to Calgary Avenue	3 to 6 Years	9 to 14 years	$698,000	$833,000	$1,096,000
(3) Centennial Road: 43rd Avenue Intersection Area	3 to 6 Years	9 to 14 years	$857,000	$1,022,000	$1,345,000
(4) Centennial Road: North of 43rd Avenue to South of 57th Avenue	10 Years +/-	15 +/- years	$1,014,000	$1,501,000	$1,826,000
(5) Centennial Road: 57th Avenue Intersection Area	3 to 6 Years	9 to 14 years	$541,000	$645,000	$849,000
(6) Centennial Road: North of 57th Avenue to 71st Avenue	10 Years +/-	15 +/- years	$1,521,000	$2,251,000	$2,739,000
(7) 71st Avenue: Fox Haven Loop to East of 26th Street	10 Years +/-	9 to 14 years	$888,000	$1,314,000	$1,394,000
(8) 71st Avenue: 26th Street Intersection Area	3 to 6 Years	3 to 8 years	$837,000	$999,000	$1,039,000
(9) 71st Avenue: West of 26th Street to West of Railroad Crossing	6 to 10 Years	15 +/- years	$319,000	$437,000	$575,000
(10) 71st Avenue: West of Railroad Crossing to US 83	6 to 10 Years	9 to 14 years	$888,000	$1,215,000	$1,394,000
Totals			$11,612,000	$14,772,000	$16,994,000

Note: The estimated construction year costs reflect the mid-point of the estimated implementation period.

The above cost estimates do not include right-of-way costs or side street improvements. The cost estimates assume complete reconstruction of Centennial Road between Trenton Drive and Jericho Road. Additional detail for the above cost estimates is provided in Appendix D.

APPENDIX A

Truck O-D Survey Information

MEMORANDUM

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(402) 334-1984 (Fax)

To: **Steve Saunders**

Date: October 5, 2007

Subject: **71st Avenue / Centennial Road Corridor Study: Truck O-D Survey Memo**

Survey Overview

The truck origin-destination (O-D) survey was completed to support the 71st Avenue / Centennial Road Corridor Study. The purpose of the corridor study is to:

- Collect data that allows the study team to gain a better understanding of truck travel patterns in the US 83 and 71st Avenue / Centennial Road corridors.
- Use the results to determine if trucks can be diverted from the corridors.
- Determine proper short/mid-term safety improvements for the corridor.

The data were collected in a corridor-specific, time-specific manner that provided O-D information that allowed the study team to estimate:

- The number of trucks entering and leaving the corridor, compared to all traffic entering and leaving the corridor.
- The level / proportion of truck traffic passing through the corridor.
- The level / proportion of truck traffic with an origin / destination within the corridor.

The study area corridors, the surveyed intersections and the specific intersection movements for which data were collected are illustrated in Figure 1. Each of the numbered movements corresponds with a movement documented in the tables that follow.

Approach

To collect the O-D data, video data collection was implemented in both corridors by utilizing the existing video cameras in the corridor, which are deployed for vehicle detection at traffic signals. The data collection approach involved setting up DVD recorders in the traffic control cabinets at the intersections of:

- US 83 / 71st Avenue
- US 83 / I-94 westbound ramps

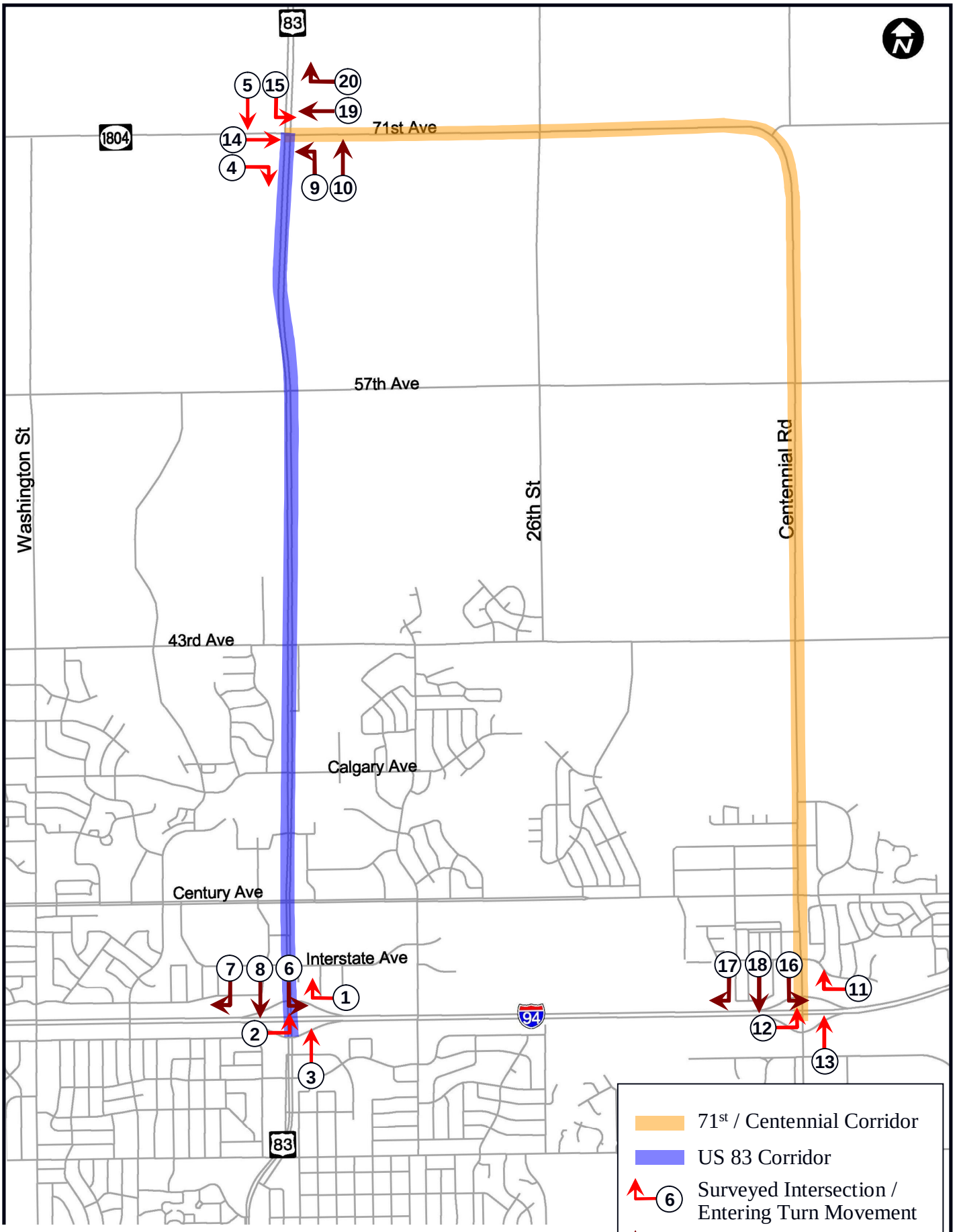
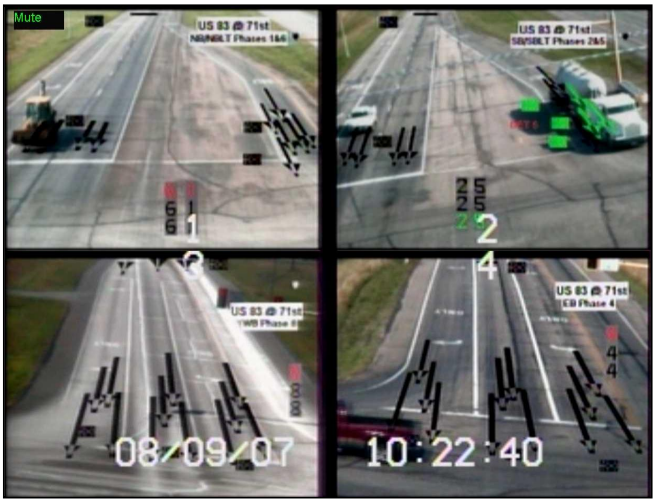


FIGURE 1. Study Area Corridors and Surveyed Intersections / Turn Movements

- US 83 / I-94 eastbound ramps
- Centennial Road / I-94 westbound ramps
- Centennial Road / I-94 eastbound ramps



The data was recorded for all of the necessary intersection approaches over the course of four days. The video data included a running time and date, to provide the necessary time-based data for matching truck traffic entering and / or leaving the corridor. This allowed the study team to assess the levels of truck traffic traveling between the surveyed intersections.

The video traffic data was recorded on four different days, and at each location was conducted from 6:00 AM to 9:00 PM. Each day was devoted to capturing logical beginning and end points related to potential routes / travel paths through the study area. Table 1 provides information on when data were collected, by study area travel path.

TABLE 1. Data Collection Schedule

Study Area Travel Path	Direction of Travel Collected	Date Collected
I-94 / US 83 ramp traffic to 71st / US 83	Northbound	07 / 18 / 2007
I-94 / US 83 northbound traffic to 71st / US 83	Northbound	07 / 26 / 2007
71st / US 83 to I-94 / Centennial Rd interchange	Northbound and Southbound	08 / 07 / 2007
71st / US 83 to I-94 / US 83 interchange	Southbound	08 / 09 / 2007

URS staff reviewed the video and reduced it into data needed to complete the analyses. This involved reviewing the collected video and looking for appropriate "matches". Matches were verified when staff observed a truck entering the corridor at one location (origin) and leaving at another location (destination) on the opposite end of the corridor. The matches were only counted as a through trip when the truck was spotted at both its origin and destination within a 15 minute interval. These through truck trip matches were then summarized by station.

To supplement the 15-hours of video data collection, staff reviewed NDDOT-collected tube counts, which were conducted for a 48-hour time period in two study area locations. The tube counts collected traffic data classified into 15 vehicle types, which allowed the study team to determine the number of both trucks and other vehicles (cars / autos / pickups / SUVs). The classification count data were collected by direction of travel. This data provided the study team with a count of all vehicles, both trucks and autos for the entire day, including the nine (9) hours when intersection video data were not collected between 9:00 PM and 6:00 AM.

At the time of the O-D survey, there was a construction project to widen Century Avenue that

required the closure of Century Avenue east of US 83. While this likely had some effect on traffic volumes in the study area, this roadway has very little impact on the distribution of through trips in the US 83 or 71st / Centennial corridors.

Survey Period Results

Information on traffic levels, percentage trucks and through truck trip percentage **during the survey period** are presented in Table 2. The table is organized such that data are presented by the corridor (US 83 or 71st Avenue / Centennial Road) and direction (northbound or southbound) in which the vehicles traveled.

The following bullets summarize Table 2:

- Traffic volumes (both trucks and non-trucks) entering at the south end of each corridor are significantly higher than volumes entering at the north end of each corridor.
- Approximately four (4) percent of all vehicles surveyed were trucks. The percentage of trucks was higher in the 71st Avenue / Centennial Road corridor than in the US 83 corridor. On the east leg of the US 83/71st Avenue intersection, trucks make up approximately 10 to 11 percent of all vehicles (since the northbound right turning traffic was not included in the survey, the truck percentage reported here is estimated).
- Of the trucks entering the study area, approximately 41 percent traveled through the study area, while 59 percent had a destination within the study area.
- For each corridor, the number of northbound and southbound through trucks is relatively consistent, which is expected. Observed results are documented below:
  - 71st Avenue/Centennial Road: Southbound through trucks – 109 in survey period; Northbound through trucks – 112 in survey period.
  - US 83: Southbound through trucks – 189 in survey period; Northbound through trucks – 166 in survey period.
- The primary destinations/origins for trucks that enter/leave the Centennial Road/71st Avenue corridor at I-94, but do not travel all the way through the corridor to US 83 are likely the businesses located along Centennial Road from I-94 through Century Avenue. Of the trucks coming through the I-94 interchange area from I-94 east or west and/or Bismarck Expressway from the south, approximately 26 percent make it to US 83. Thus, it can be concluded that 74 percent of the vehicles entering/exiting at I-94/Bismarck Expressway have a destination in the Centennial Road corridor or use Centennial road to access nearby businesses. As there are very few truck-oriented activities north of Century Avenue (or opportunities to turn off Centennial Road to access more remote truck-oriented businesses outside the corridor), it is likely the trucks are going to the businesses along the southern part of the corridor. As the southbound total truck volume is relatively consistent with the northbound, it can be concluded that vehicles are leaving the truck-oriented businesses along Centennial Road and heading back to the south, exiting the study area to Bismarck Expressway and/or I-94.

TABLE 2. Summary of Surveyed Traffic

Corridor and Direction	Entering / Exiting Intersection Surveyed	Turn Movement	Total Vehicles	Total Trucks	Percentage Trucks	Trucks Traveling through Study Area	Percentage Trucks Through Study Area
US 83 Northbound Entering							
	US 83 / I-94 Westbound Ramps	WB Right-turn ①	2,773	201	7%	66	33%
	US 83 / I-94 Eastbound Ramps	EB Left-turn ②	3,988	221	6%	84	38%
	US 83 / I-94 Eastbound Ramps	NB Through ③	12,082[1]	176[1]	1%	16	9%
US 83 Northbound Entering Summary			18,843	598	3%	166	28%
US 83 Southbound Entering							
	US 83 / 71st Ave	EB Right-turn ④	671	16	2%	8	50%
	US 83 / 71st Ave	SB Through ⑤	3,627	227	6%	181	80%
US 83 Southbound Entering Summary			4,298	243	6%	189	78%
US 83 Southbound Exiting							
	US 83 / I-94 Eastbound Ramps	SB Left-turn ⑥	2,373	212	9%	97	46%
	US 83 / I-94 Westbound Ramps	SB Right-turn ⑦	4,072	174	4%	70	40%
	US 83 / I-94 Eastbound Ramps	SB Through ⑧	11,231[1]	221[1]	2%	19	9%
US 83 Southbound Exiting Summary			17,676	607	3%	186	31%
US 83 Northbound Exiting							
	US 83 / 71st Ave	NB Left-turn ⑨	650	10	2%	8	80%
	US 83 / 71st Ave	NB Through ⑩	3,544	226	6%	159	70%
US 83 Northbound Exiting Summary			4,194	236	6%	167	71%

TABLE 2. Summary of Surveyed Traffic

Corridor and Direction	Entering / Exiting Intersection Surveyed	Turn Movement	Total Vehicles	Total Trucks	Percentage Trucks	Trucks Traveling through Study Area	Percentage Trucks Through Study Area
71st Ave/ Centennial Northbound Entering							
	Centennial Rd/ I-94 Westbound Ramps	WB Right-turn ⑪	295	37	13%	9	24%
	Centennial Rd/ I-94 Eastbound Ramps	EB Left-turn ⑫	2,241	62	3%	0	0%
	Centennial Rd/ I-94 Eastbound Ramps	NB Through ⑬	5,328[1]	324[1]	6%	103	32%
71st Ave/ Centennial Rd Northbound Entering Summary			7,864	423	5%	112	26%
71st Ave/ Centennial Rd Southbound Entering							
	US 83 / 71st Ave	EB Through ⑭	458	23	5%	11	48%
	US 83 / 71st Ave	SB Left-turn ⑮	583	112	19%	98	88%
71st Ave/ Centennial Rd Southbound Entering Summary			1,041	135	13%	109	81%
71st Ave/ Centennial Rd Northbound Exiting							
	Centennial Rd / I-94 Eastbound Ramps	SB Left-turn ⑯	222	27	12%	2	7%
	Centennial Rd / I-94 Westbound Ramps	SB Right-turn ⑰	2,705	88	3%	6	7%
	Centennial Rd / I-94 Eastbound Ramps	SB Through ⑱	5,556[1]	334[1]	6%	96	29%
71st Ave/ Centennial Rd Northbound Exiting Summary			8,483	449	5%	98	22%
71st Ave/ Centennial Southbound Exiting							
	US 83 / 71st Ave	WB Through ⑲	495	37	7%	15	41%
	US 83 / 71st Ave	WB Right-turn ⑳	560	107	19%	92	86%
71st Ave/ Centennial Rd Southbound Exiting Summary			1,055	144	14%	107	74%
Summary of All Entering Traffic			32,046	1,399	4%	576	41%
Summary of All Exiting Traffic			31,408	1,348	5%	552	41%

1 Through movements do not include traffic that exited or entered at the I-94 ramps.

- Very few trucks that enter/leave the 71st Avenue/Centennial Road corridor at US 83 have a destination/origin in the corridor, as almost 80 percent of the trucks observed at the north intersection are also observed at the southern study area intersections of I-94/Centennial Road. Thus, the truck-oriented businesses in the Centennial Road corridor adjacent to I-94 do not draw much from the north, or trucks that access these businesses use US 83 to access I-94 to get to/from the southern part of the Centennial Road corridor.
- Similar patterns that were observed along the various areas of Centennial Road were also observed along US 83. Most of the trucks entering/leaving the US 83 corridor from the south on State Street or east-west on I-94 had a destination/origin in the corridor or adjacent to it and then exited back to State Street or I-94. This is demonstrated by the 72 percent of the trucks that entered from the south on State Street or I-94 did not make it to US 83/71st Avenue.
- Of the trucks observed entering/exiting the US 83 corridor at 71st Avenue/ND 1804, approximately 78 percent traveled all the way through the corridor to either State Street south of I-94 or I-94 east/west.

Estimates of Daily Truck Traffic through the Corridors

Table 3 provides daily/24-hour estimates of truck traffic, including estimates of daily "through" truck trips. The information used to expand the 15-hour survey period truck data summary into estimates of 24-hour daily traffic is also provided. Based on the tube count traffic data collected over two straight days, it was estimated that approximately 88 percent of daily traffic (for all vehicles) and 91 percent of daily truck traffic passed the survey stations during the survey period. The "expansion factors" shown in Table 3 are based on the proportion of daily truck traffic observed during the survey period.

The major findings documented in Table 3 are:

- Of the estimated 1,540 trucks daily that enter the study area, 900 have a destination within the study area and 640 (42 percent) are traveling through the study area without a stop.
- An estimated 400 trucks (43 percent) per day travel through the US 83 corridor between 71st Avenue and I-94, while 530 have a destination in the US 83 corridor.
- There are an estimated 240 (39 percent) trucks per day that travel through the Centennial Road / 71st Avenue corridor between the 71st Avenue/US 83 intersection and the I-94/ Centennial Road interchange, while 370 have a destination within the Centennial Road/ 71st Avenue corridor.
- Approximately 27 percent of northbound trucks and 80 percent of southbound trucks that are entering the corridors are traveling through the study area without a stop.
- The majority of through traffic traveling to / from areas south of I-94 uses the Centennial Road/71st Avenue (and Bismarck Expressway) corridor. Approximately 85 percent of traffic oriented to/from areas south of I-94 uses the Centennial Road, whereas only 15 percent uses the US 83 corridor.

TABLE 3. Summary of Estimated Daily Truck Traffic

Corridor and Direction	Entering / Exiting Intersection Surveyed	Turn Movement	Total Survey Period Trucks	Survey Period-to-Daily Expansion Factor	Daily Truck Estimate	Percentage Trucks Through Study Area	Estimate of Daily Trucks Through Study Area
US 83 Northbound Entering							
	US 83 / I-94 Westbound Ramps	WB Right-turn ①	201	1.098	220	33%	70
	US 83 / I-94 Eastbound Ramps	EB Left-turn ②	221	1.098	240	38%	100
	US 83 / I-94 Eastbound Ramps	NB Through ③	176	1.098	190	9%	20
US 83 Northbound Entering Summary			598		650	28%	190
US 83 Southbound Entering							
	US 83 / 71st Ave	EB Right-turn ④	16	1.098	20	50%	10
	US 83 / 71st Ave	SB Through ⑤	227	1.098	250	80%	200
US 83 Southbound Entering Summary			243		270	78%	210
US 83 Southbound Exiting							
	US 83 / I-94 Eastbound Ramps	SB Left-turn ⑥	212	1.098	230	46%	110
	US 83 / I-94 Westbound Ramps	SB Right-turn ⑦	174	1.098	190	40%	80
	US 83 / I-94 Eastbound Ramps	SB Through ⑧	221	1.098	240	9%	20
US 83 Southbound Exiting Summary			607		660	31%	210
US 83 Northbound Exiting							
	US 83 / 71st Ave	NB Left-turn ⑨	10	1.098	10	80%	10
	US 83 / 71st Ave	NB Through ⑩	226	1.098	250	70%	180
US 83 Northbound Exiting Summary			236		260	71%	190

TABLE 3. Summary of Estimated Daily Truck Traffic

Corridor and Direction	Entering / Exiting Intersection Surveyed	Turn Movement	Total Survey Period Trucks	Survey Period-to-Daily Expansion Factor	Daily Truck Estimate	Percentage Trucks Through Study Area	Estimate of Daily Trucks Through Study Area
71st Ave/ Centennial Rd Northbound Entering							
	Centennial Rd / I-94 Westbound Ramps	WB Right-turn (11)	37	1.098	40	24%	10
	Centennial Rd / I-94 Eastbound Ramps	EB Left-turn (12)	62	1.098	70	0%	0
	Centennial Rd / I-94 Eastbound Ramps	NB Through (13)	324	1.098	360	32%	110
71st Ave/ Centennial Rd Northbound Entering Summary			423		470	26%	120
71st Ave/ Centennial Southbound Entering							
	US 83 / 71st Ave	EB Through (14)	23	1.098	30	48%	10
	US 83 / 71st Ave	SB Left-turn (15)	112	1.098	120	88%	110
71st Ave/ Centennial Rd Southbound Entering Summary			135		150	81%	120
71st Ave/ Centennial Rd Northbound Exiting							
	Centennial Rd / I-94 Eastbound Ramps	SB Left-turn (16)	88	1.098	100	7%	10
	Centennial Rd / I-94 Westbound Ramps	SB Right-turn (17)	27	1.098	30	7%	0
	Centennial Rd / I-94 Eastbound Ramps	SB Through (18)	334	1.098	370	29%	110
71st Ave/ Centennial Rd Northbound Exiting Summary			449		500	23%	120
71st Ave/ Centennial Rd Southbound Exiting							
	US 83 / 71st Ave	WB Through (19)	37	1.098	40	41%	20
	US 83 / 71st Ave	WB Right-turn (20)	107	1.098	120	86%	100
71st Ave/ Centennial Rd Southbound Exiting Summary			144		160	74%	120
Summary of All Entering Traffic			1,399		1,540	42%	640
Summary of All Exiting Traffic			1,436		1,580	41%	640

- The majority of through traffic traveling to/from I-94 uses the US 83 corridor. Approximately 95 percent of traffic oriented to/from I-94 uses the US 83 corridor, whereas only 5 percent uses the Centennial Road / 71st Avenue corridor.

Figures 2 and 3 provide an illustration of the general travel paths of truck traffic passing through each corridor, including the orientation of trucks when entering and exiting the corridors.

Based on staff observations of the video, trucks with destinations within the study area (those not traveling through the study area) generally appeared to have the following trip purposes:

- Construction-related activity: many of these non-through trucks included dump trucks, cement trucks and building materials delivery trucks.
- Home delivery activity trucks: such as FedEx and UPS trucks.
- Business delivery activity trucks: such as food delivery trucks.

There are several truck-generating businesses within the study area, so it is not unexpected that a relatively high percentage of the trucks entering/exiting the study area have a trip origin / destination inside the study area. UPS has a facility located in the industrial park northwest of the Century Avenue/Centennial Road intersection. Other businesses that generate significant levels of truck traffic are located within this industrial park, including a construction company and a wholesale food distribution company.

Summary

Our review of the truck O-D survey indicates that:

- The 71st Avenue / Centennial Road corridor serves the majority of local / Bismarck-area trips traveling through the study area. The survey data analysis we completed indicates that 95 percent of through trips in the 71st Avenue/Centennial Road corridor pass through the I-94 interchange to/from the Bismarck Expressway.
- The US 83 corridor serves the majority of regional through trips via I-94. The survey data analysis we completed indicates that 85 percent of through trips in the US 83 corridor are oriented to/from the I-94 ramps at US 83.
- The majority of the truck trips entering and leaving the study area are generated within the study area, meaning they have a trip origin or destination between 71st Avenue and I-94. Specifically, 61 percent of 71st Avenue/Centennial Road corridor trips and 57 percent of US 83 corridor trips are local / non-through trips.

If you have any questions or comments about this memorandum, please contact Jim Kollbaum at (402) 952-2556.

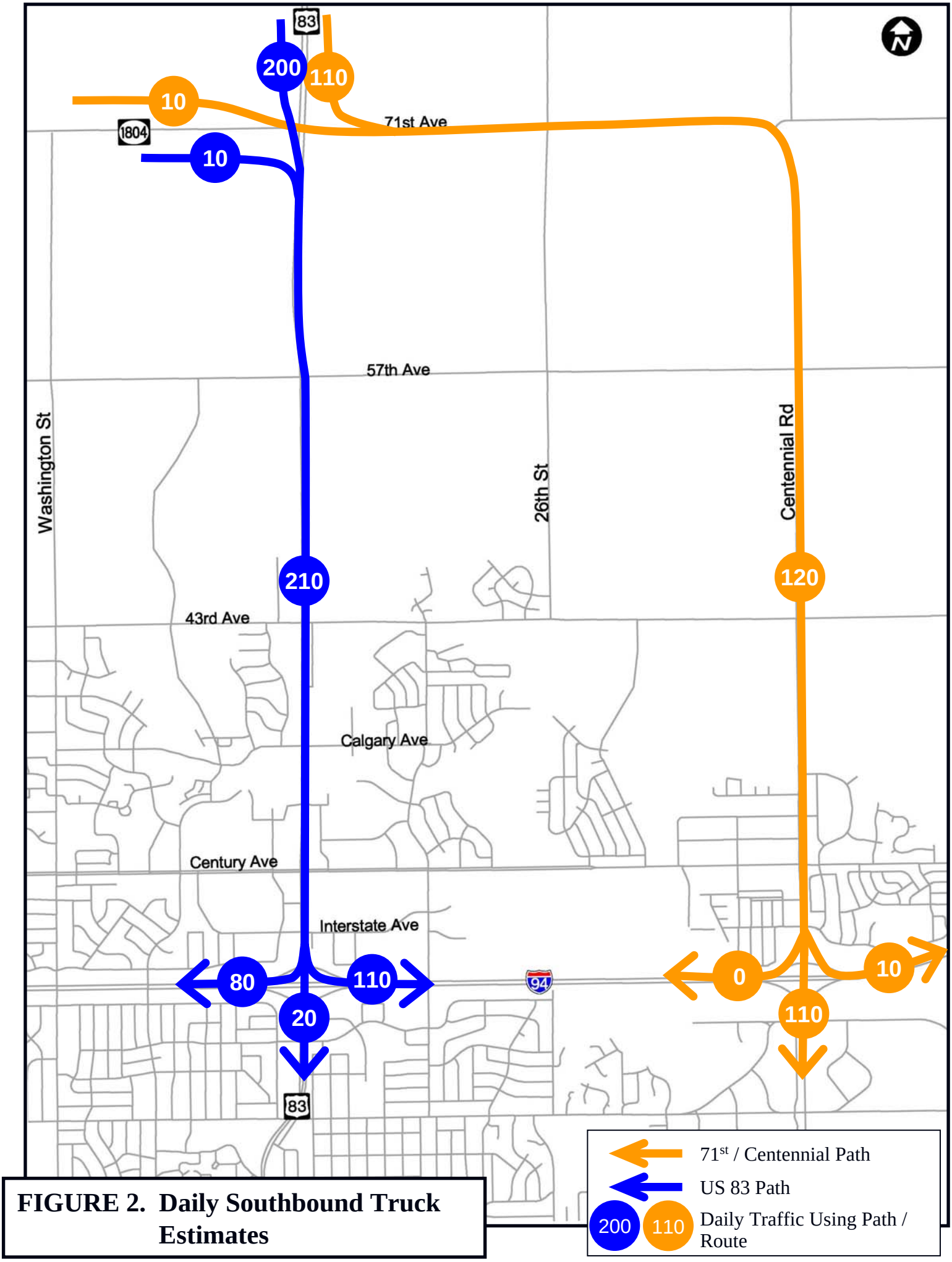


FIGURE 2. Daily Southbound Truck Estimates

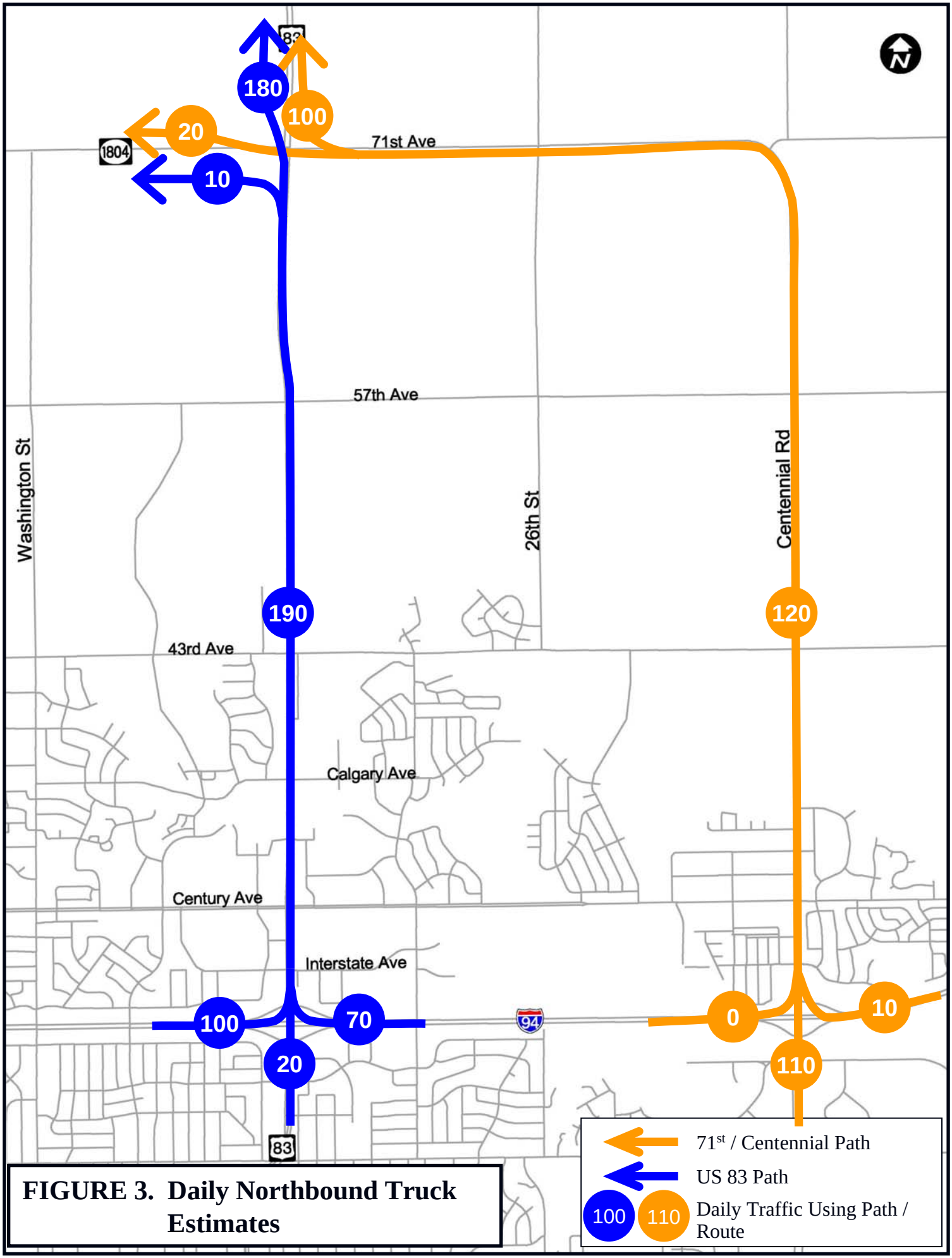


FIGURE 3. Daily Northbound Truck Estimates

APPENDIX B

Access Management Information

MEMORANDUM

Jim Kollbaum, PE
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To: **71st Avenue / Centennial Road Corridor Study Team Members**

Date: May 21, 2007

Subject: **Preliminary Recommendations for Access Management Plan**

BACKGROUND AND PURPOSE

The 71st Avenue and Centennial Road corridors are key transportation links within the City of Bismarck / Burleigh County region. As with most arterial corridors in the Bismarck region, the 71st Avenue and Centennial Road corridors serve a wide range of functions from carrying regional through traffic to providing direct land access to adjacent developments. Many of the functions the corridors perform result in conflicts that impact the vehicle capacity and safety of the corridor. The range of functions and desirability to maintain the various functions will be a key element of this study. The functions of these two roadways include:

- These two roadways are primary corridors that facilitate the movement of people and goods in the northern portions of the Bismarck region.
- These roadways are high speed facilities with limited interruption from traffic control devices and together they serve as a bypass of the US 83 corridor.
- The northern portion of the Bismarck metropolitan area is anticipated to be a primary growth area in the community as both a commercial center and as residential uses. These two corridors bisect/traverse the growth area and serve as a principal land access route and a truck route to carry the area-generated traffic to other regional facilities such as I-94 and Bismarck Expressway.
- Currently, individual residential and commercial parcels have direct access to these two roadways. Thus, for some area residents these roadways are their "local" street.

The purpose of this memorandum is to provide information related to the access management plan for the 71st Avenue / Centennial Road Corridor Study. The scope of this memorandum ranges from action plans for specific access points to the broader scope of access management policy. A list of issues that will be discussed in more detail in this document is provided below:

- Existing conditions for access points and turn lanes within these two roadway corridors.
- Future conditions for the corridor roadway network.

- Access management policies related to access spacing and turn lane guidelines.
- Access management concepts and evaluation criteria.
- Summary of access management evaluation.
- Summary of turn lane evaluation.

EXISTING CONDITIONS

According to the *MPO Functional Classification Network* map published by Bismarck-Mandan Metropolitan Planning Organization (MPO), all of 71st Avenue and Centennial Road between 71st Avenue and 57th Avenue are designated as a proposed collector. These two roadway segments are currently outside the current urbanized area of the Bismarck region. The segment of Centennial Road south of 57th Avenue down to I-94 is classified as a minor arterial. The *Design Manual* (Section I-04: State Highway System) published by the North Dakota Department of Transportation (NDDOT) also classifies Centennial Road between I-94 and Calgary Avenue as a minor arterial, but does not provide a designation for remaining roadway segments in the study area. In the hierarchy of a roadway network a minor arterial is intended to favor mobility over access. The Centennial Road and 71st Avenue do function like an arterial roadway facility by servicing longer distance trips within the region. The Northern Beltway corridor includes the segment of 71st Avenue included with this study. Centennial Road is one of only a select few continuous north-south roadways that serves the northern Bismarck region and it also provides direct access to I-94.

The current land uses along these two roadways includes a significant amount of residential, some light industrial, and a limited amount of commercial. At this time the majority of the access points accessing these roadways are public streets. Most of the private access points accessing these roadways are associated with a single home, farmstead, or field access. A summary of the number of access points by key roadway segments is provided in Table 1. These access points and issues associated with them are shown graphically in Figure 1.

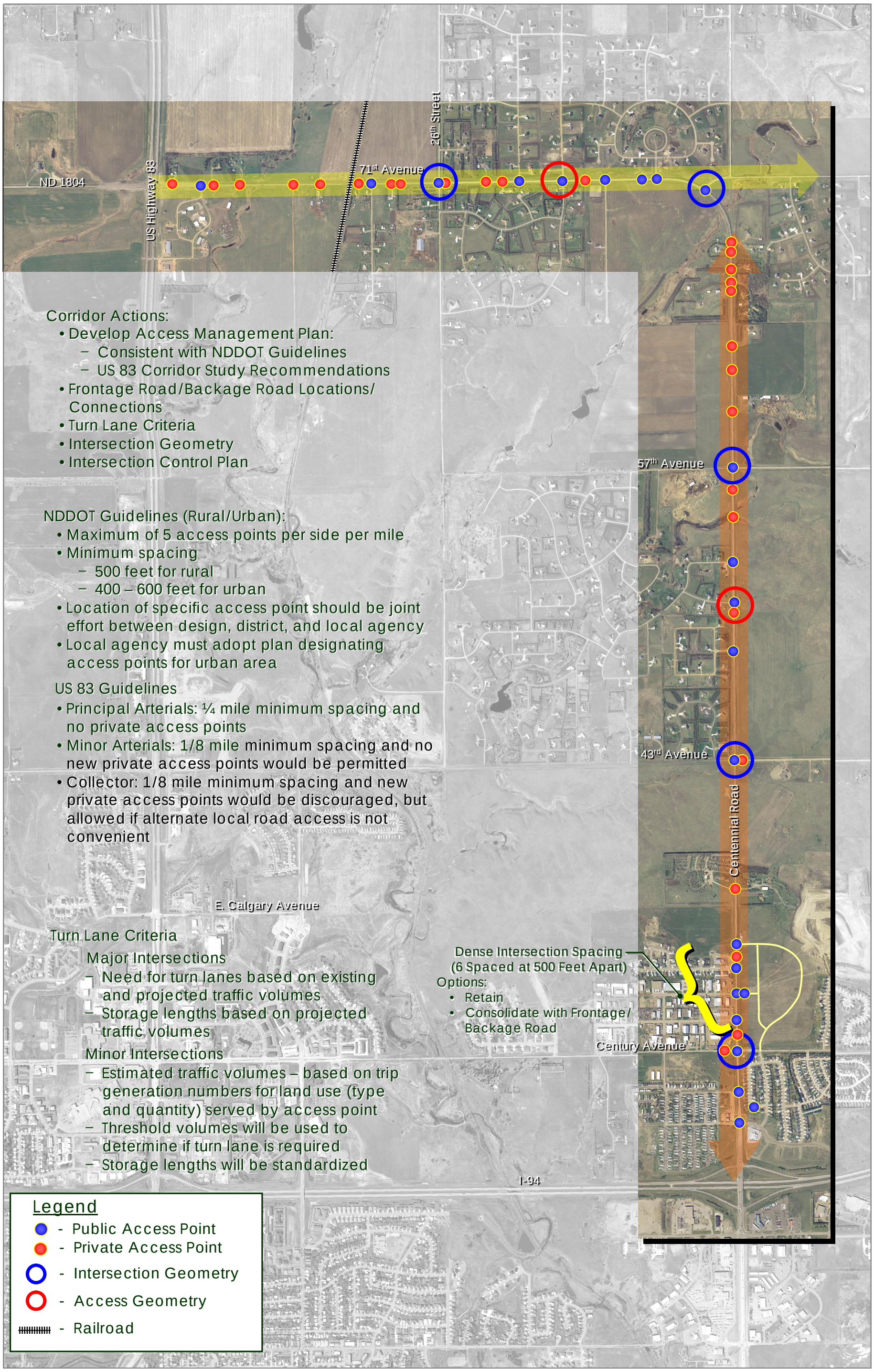


Figure 1
71st Avenue/Centennial Road Corridor Study
Access Management Issues

TABLE 1: SUMMARY OF ACCESS POINTS (EXISTING CONDITIONS)

Street / Segment	Number of Access Points		Access Points per Mile
	Public Streets	Private Driveways	
Centennial Rd – I-94 to Century Ave	5	0	13
Centennial Rd – Century Ave to 43rd Ave	5	5	10
Centennial Rd – 43rd Ave to 57th Ave	5	3	8
Centennial Rd – 57th Ave to 71st Ave	2	9	11
71st Ave – US 83 to 26th St	4	9	13
71st Ave – 26th St to Centennial Rd	7	6	13
Totals	**27**	**34**	

In general, the number of access points per mile shown in the table above are relatively low; however, there is a considerable amount of undeveloped land along these corridors that will require access in the future. There are two roadway segments where private access points are more prevalent. Those segments include 71st Avenue between US 83 and 26th Street and Centennial Road between 57th and 71st Avenue. Ideally, future access to the corridor will be limited to public streets identified in the US 83 Study and the Fringe Road Study. There are currently several public streets with intersection spacing less than 1000', as listed below:

- Centennial Road – Century Avenue, Franklin Avenue, Saratoga Avenue, and Jericho Road spaced 500' apart.
- Centennial Road – Wildrose Crescent, Rawhide Drive, and Heartland Drive spaced approximately 800' apart.
- 71st Avenue – Hightop Lane, Moonstone Lane, and Golden Crest Road spaced approximately 800' apart.

There are also several access points to the cross streets (e.g., Century Avenue, 43rd Avenue) that are located within close proximity to the major intersections. For example, the business in the northwest corner of the Century Avenue/Centennial Road intersection has an access points just north and west of the intersection (note: the access point on the west leg was recommended for closure and incorporation into a frontage road system as part of the Century Avenue Study).

The current roadway design for 71st Avenue and most of Centennial Road is a two-lane rural highway on a rolling terrain. The segment of Centennial Road south of Trenton Drive has four-lanes and left-turn lanes at each intersection. Left-turn lanes are also provided on all approaches to the intersections of Century Avenue/Centennial Road and US 83/71st Avenue. No other intersections in these two corridors have turn lanes. This lack of turning lanes leads to potential

safety concerns and inefficiency in traffic operations.

A final issue identified for access points along these two corridors is the sight distance available for vehicles on cross streets accessing the primary roadway. Intersections with potential sight distance are shown in Figure 2. This issue will be investigated further as part of the geometric evaluation for this study.

FUTURE CONDITIONS

A large percentage of the area immediately adjacent to these two corridors is currently in agricultural use or is open space. Anticipated land uses in the corridor range from lower-density residential uses throughout the corridor to some commercial/light industrial activity at US 83 and near Century Avenue. With all of the undeveloped area available, there is potential for significant traffic growth in these two corridors.

To support the anticipated growth in development and traffic will be an improved roadway network. Within this study area there has been two previous studies: 1) US 83 Corridor Study, and 2) Bismarck-Burleigh County Fringe Road Master Plan that provide a master plan for the roadway network. Both of these previous studies developed a system of arterial and collector routes spaced on roughly a half-mile grid. As recommendations for access points along the 71st Avenue and Centennial Road corridors are prepared, the recommendations from the US 83 and Fringe Road studies need to be incorporated and/or modified as to where intersections are provided.

For the Bismarck region there is a long-term roadway improvement plan called the Northern Beltway. This beltway includes a new northern Missouri River crossing, new access to I-94 at 66th Street, and includes the segment of 71st Avenue within this corridor study. This long-term transportation improvement project has the potential to change traffic volumes and travel patterns. The northern beltway route along 71st Avenue will require the modification of the intersection with Centennial Road. A plat for the development in the southwest quadrant of the 71st Avenue / Centennial Road intersection includes a proposed roadway (i.e., Rooster Road) that will create a five-leg intersection or an access point in close proximity to the reconstructed 71st Avenue / Centennial Road intersection. The recommended actions must not be rendered useless, or their utility substantially diminished, when the regional improvements are in place

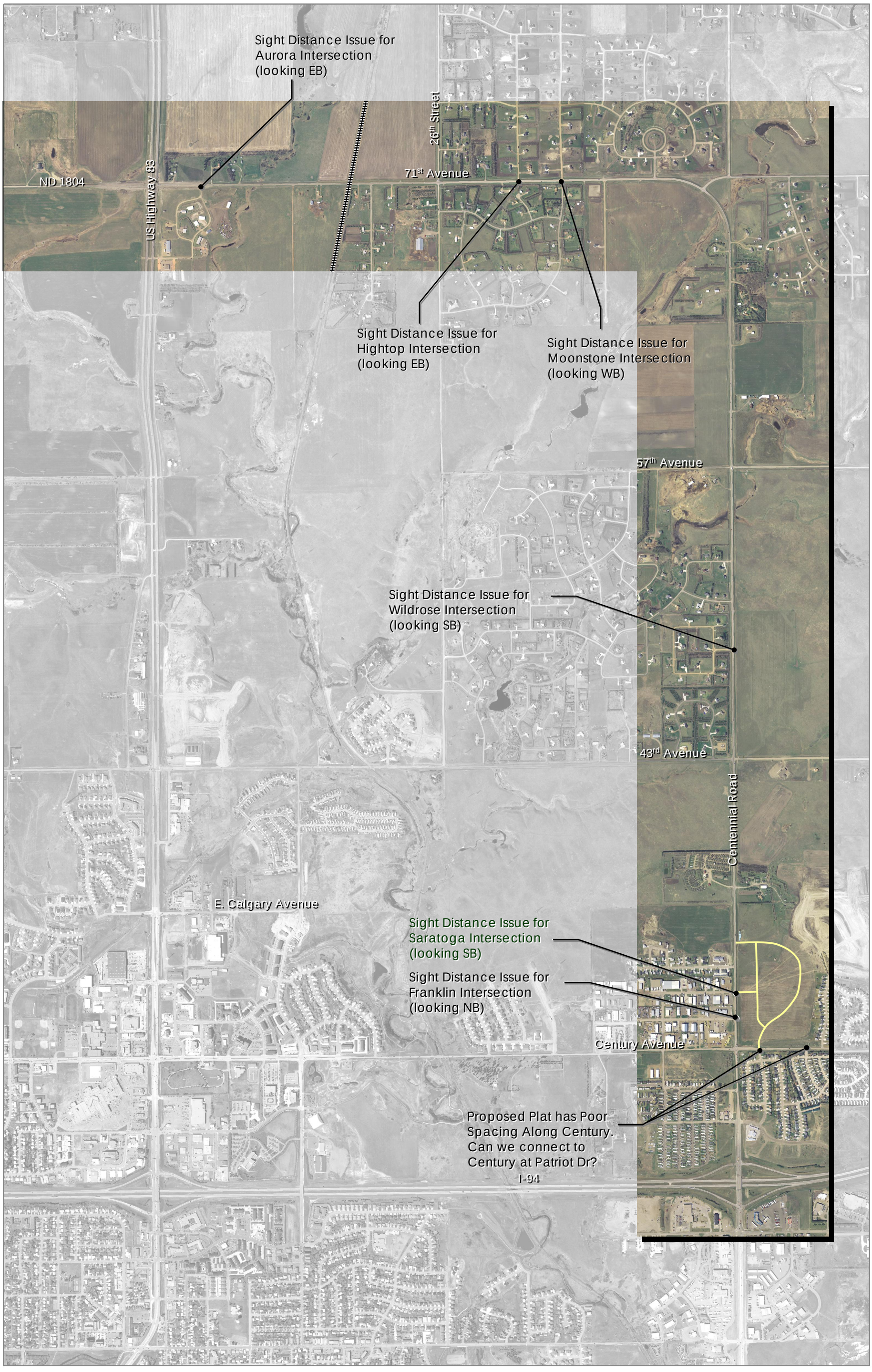


Figure 2
71st Avenue/Centennial Road Corridor Study
Sight Distance Issues

ACCESS MANAGEMENT POLICIES

A critical element of this corridor study is the establishment of an access management plan. A principal source of information on access management in North Dakota is Section III-16 of the NDDOT *Design Manual*. The information from that document is summarized below:

- Maximum of 5 access points per side per mile (rural)
- Minimum spacing of 500' (rural) or 400-600' (urban) is desirable
- Location of access point is a joint effort between the NDDOT and the local agency
- Local agency must adopt a plan designating the points of access
- No volume warrants for turn lanes

A second source regarding access management is the *Access Management Policy* for the City of Bismarck. The principles of access control according to this document include:

- Provide a specialized roadway system,
- Limit direct access to major roadways,
- Promote an intersection hierarchy,
- Locate traffic signals to favor through movements,
- Preserve the functional area of intersections,
- Limit the number of conflict points,
- Separate the conflict points,
- Remove turning vehicles from through traffic lanes, and
- Provide a supporting street and circulation system.

This document has a range of values for intersection spacing dependent on roadway facility type. For a principal arterial roadway the desired intersection spacing is ¼-mile or 5 access points per mile per side and includes public streets.

A third local source for access management guidelines comes from the US 83 Corridor Study. That document has the following recommendations for access management based on roadway classification.

- Principal Arterials: ¼-mile minimum spacing and no private access points
- Minor Arterials: 1/8-mile minimum spacing and no new private access points would be permitted
- Collector: 1/8-mile minimum spacing and new private access points would be

discouraged, but allowed if alternate local road access is not convenient

- For existing access points that do not meet the minimum spacing requirements the desire would be to purchase the access control; however in many cases that is not possible and the access point would remain open until such time that an access review occurs due to parcel redevelopment

A review of access management policies from other states was also conducted as part of this study. These access management policies are summarized below.

South Dakota DOT (Chapter 17 of *Design Manual*)

Maximum of 5 access points per side per mile (rural or fringe urban)

Minimum spacing of 1,000' (rural or fringe urban)

Full access point at ½-mile spacing and reduced access points at ¼-mile spacing

Upstream corner clearance of 425' at intersections for 55-mph roadway

No volume warrants for turn lanes

Minnesota DOT (Access Management Guidelines)

Full access ½ mile spacing and conditional secondary access at ¼ mile spacing (urbanizing area)

No volume warrants for turn lanes

Colorado DOT (State Highway Access Code 601-1)

Full access points at ½-mile spacing

Left-turn lane volume threshold > 10 vehicles / hour (vph) (rural) / > 25 vph (urban < 41 mph)

Right-turn lane volume threshold > 25 vph (rural) / > 50 vph (urban < 41 mph)

Oregon DOT (Policy Manual)

Minimum spacing of 1000' (rural regional highways) and 700' (rural district highways)

Left-turn lane volume on a 55-mph roadway can be justified with as little as 10 vph

Right-turn lane volume on a 55-mph roadway can be justified with as little as 20 vph

The Oregon DOT volume thresholds for turn lanes considers the advancing volume for right-turns and the total volume on the roadway (i.e., advancing and opposing traffic volumes) for left-turns

New Mexico DOT (Access Management Manual)

Full access points at ½-mile spacing (rural) and ¼-mile spacing (urban)

Partial access points at 725' spacing (rural) and 600' spacing (urban)

Left-turn lane volume threshold > 11 vph (rural) / > 26 vph (urban < 45-55 mph)

Right-turn lane volume threshold > 21 vph (rural) / > 36 vph (urban < 45-55 mph)

Nebraska DOR (Access Control Policy)

Maximum of 3 access points (½ - mile spacing) per side per mile (rural) and 7 access points (1/8-mile spacing) per side per mile (urban undeveloped)

Minimum spacing of 1,000'(rural) and 600' (urban undeveloped)

No volume warrants for turn lanes

SUDAS (Iowa)

Maximum of 4 access points per side per mile (rural)

Minimum spacing of 1,000' [1,320' preferred] (rural)

Turn lanes based on traffic volume nomographs

This review of access management policies found a significant range for the maximum number of full access points per mile and for the minimum spacing. Only a handful of states have established traffic volume guidelines / warrants for turn lanes.

ACCESS POLICY RECOMMENDATIONS

For the purposes of this study the following guidelines are recommended for access spacing and turn lane criteria.

- Maximum of 5 access points per mile per side
- Minimum spacing of 1000' between adjacent access points
- Minimum corner clearance of 500'
- Do not allow access points to be offset from one another
- Minimum left-turn lane volume threshold of 11 vph
- Minimum right-turn lane volume threshold of 21 vph
- Encourage consolidation of access points for adjacent parcels

ACCESS MANAGEMENT CONCEPTS AND EVALUATION CRITERIA

With developing corridors like 71st Avenue and Centennial Road, the focus of the access

management plan is to establish a long-term plan ("blueprint") and to retrofit existing access points to the maximum extent possible. There are several access management concepts and evaluation criteria that were reviewed relative to each of the access point within the study area to determine if they were consistent / inconsistent with the access policy goals. If it was determined through application of the criteria that an access location was inconsistent with the goals, a determination of the feasibility of modifying the access point was completed. Possible modification actions for access points in these corridors include:

- Closure of an Access Point
- Consolidation of Adjacent Access Points
- Access Moved to Side Street
- Frontage Roads / Backage Roads

Factors considered when trying to determine whether closure and/or consolidation of an access point was feasible included the following:

- Availability of alternate access point(s)
- Parking lot circulation or circulation through a neighborhood
- Physical impact to a parcel
- Physical constraints (e.g., elevation differences, building locations, wall/fence)
- Cross easement probability
- Visual impact to a parcel

ACCESS CLOSURE

There are some cases where an existing access point could be closed. An example of when this would be appropriate action is for a parcel with multiple access points. Another example of when a closure is made is for an access point is no longer used. There are several farm field access points along these corridors that should be closed when the parcels redevelop.

ACCESS CONSOLIDATION

Along these two corridors there are several smaller parcels with single family homes or farmsteads. Providing access for each individual parcel results in too many access points in a short distance. A possible solution for this problem is to utilize an access point that is jointly shared by adjacent parcels. This access management technique is most likely to succeed for new access and can be difficult to achieve for retrofit projects due to terrain issues and reconstruction of the driveways.

MOVE ACCESS TO SIDE STREET

In some cases a parcel will have frontage on both the main roadway and a side street. In those cases, access should only be granted to the roadway with the lower functional class. For these corner properties it is also important to consider the corner clearance. This solution can become more feasible as more of the proposed street network is constructed.

FRONTAGE ROADS / BACKAGE ROADS

A great way to limit the number of access points on the main roadway is to provide a supporting parallel street network in the form of frontage roads or backage roads. A frontage road is typically located directly adjacent to the main roadway while a backage road is normally setback from the main roadway so that development can be located in between the roadways. The connection of the frontage road to the side street is the most important design issue associated with this concept. When that intersection is too close to the side street and main street intersection, the resulting operations for the frontage road and side street intersection suffers. A minimum separation of 300' between these two intersections is recommended according to *NCHRP Report 420*.

US 83 Frontage Road

Each of the current and proposed access points were evaluated with respect to the following access related criteria:

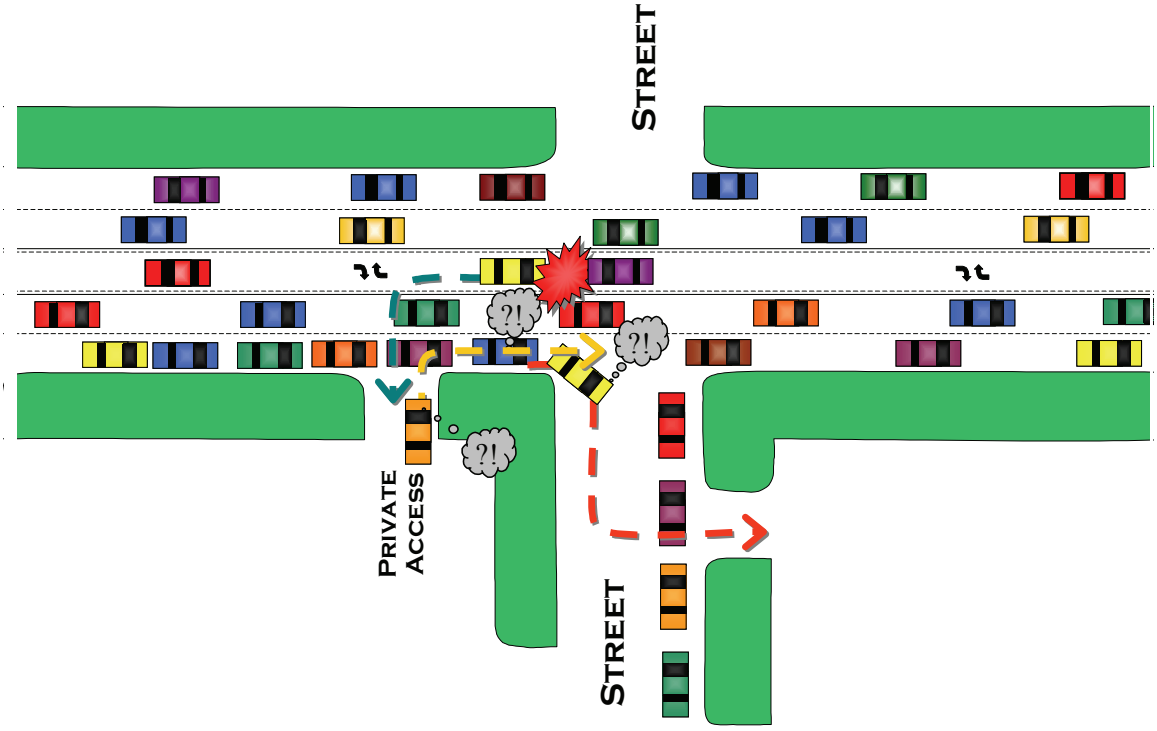
- Corner Clearance/Functional Area of an Intersection
- Access Point Spacing & Maximum number of Access Points / Mile
- Parcels with Multiple Access Points
- Alignment of Access Points on Opposite Sides of the Street

CORNER CLEARANCE/FUNCTIONAL AREA OF AN INTERSECTION

Corner clearance is the distance between an upstream/downstream at-grade public street intersection and a property access point (driveway). This criterion is more important in those cases where the at-grade public street intersection is signalized. Signalized intersections oftentimes have vehicle queues that block access to driveways that are in close proximity to the intersection on the upstream approaches. Vehicle queues in the left-turn lanes at signalized intersections also block left-turn access to/from driveways on the downstream side of the intersection. Although these corridors currently only have a few traffic signals more will be

needed in the future and maintaining proper clearance is important at this time. Examples of conflicts associated with inadequate corner clearance and access points within the functional area of an intersection are shown graphically below.

EXAMPLES OF CONFLICTS ASSOCIATED WITH INADEQUATE CORNER CLEARANCE



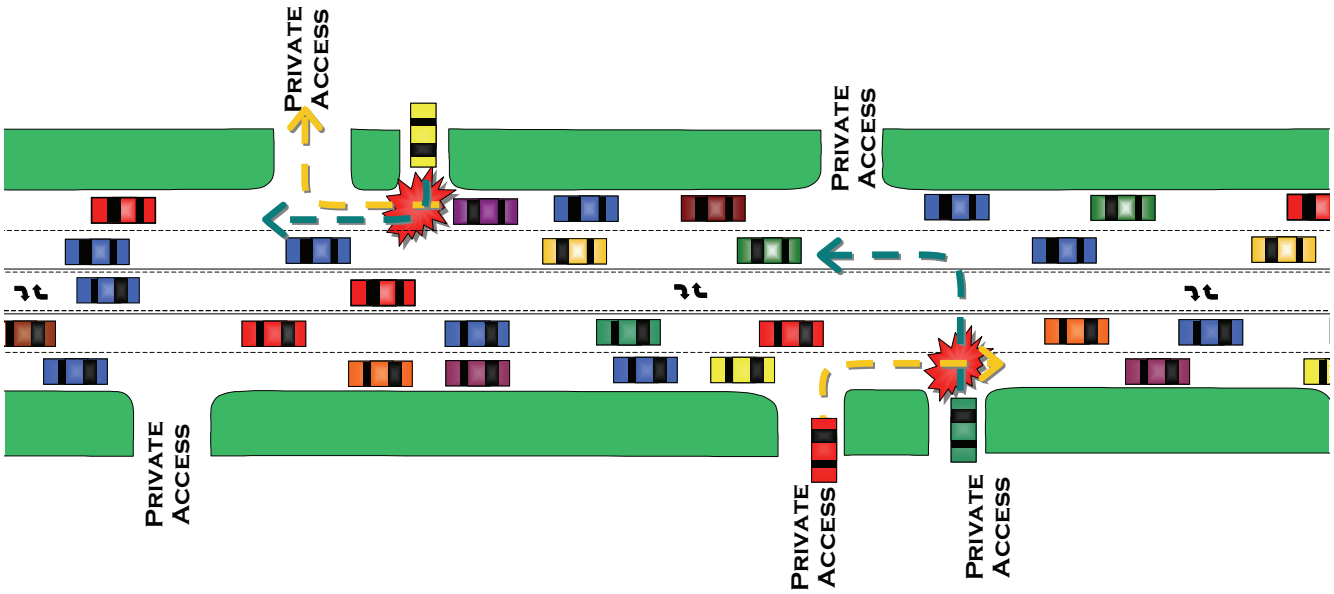
The concept of corner clearance also goes hand-in-hand with another concept called the functional area of an intersection. The functional area of an intersection is essentially the area up and downstream from an intersection that is influenced by the intersection operations. In the case of signalized intersections, this would include the approach length impacted by queuing. The attention level required of drivers traversing a signalized intersection is relatively high. Drivers at signalized intersections need to observe the numerous activities/elements, including the traffic control and conflicting traffic movements. These factors lead to an intersection functional area that extends a short distance onto the downstream legs of the intersection.

Thus, the intent of the corner clearance and intersection functional area assessment conducted as part of this study was to reflect the spirit of the concept, which is to provide as much setback from the intersection (both up and downstream) as is reasonably viable. While the corner clearance guidelines were intended for application adjacent to signalized intersections, for this assessment the spirit of the guidelines was also applied to unsignalized public road intersections in the corridor.

ACCESS POINT SPACING

Multiple access points to individual properties or closely spaced properties each with single unique access points create too many decision points for drivers. The proliferation of decision points tends to result in the need to react to the unpredictable surrounding environment, which tends to lead to an increase in accidents/crashes. Closely spaced access points can also lead to conflicts between vehicles using the adjacent access points. Examples of potential conflicts arising from closely spaced access points is provided in the graphic below. The spacing of access points must also take into consideration the known future access points associated with platted developments and additional streets identified in either the US 83 Study or the Bismarck-Burleigh County Fringe Road Master Plan.

EXAMPLES OF CONFLICTS ASSOCIATED WITH CLOSELY SPACED ACCESS POINTS



PARCELS WITH MULTIPLE ACCESS POINTS

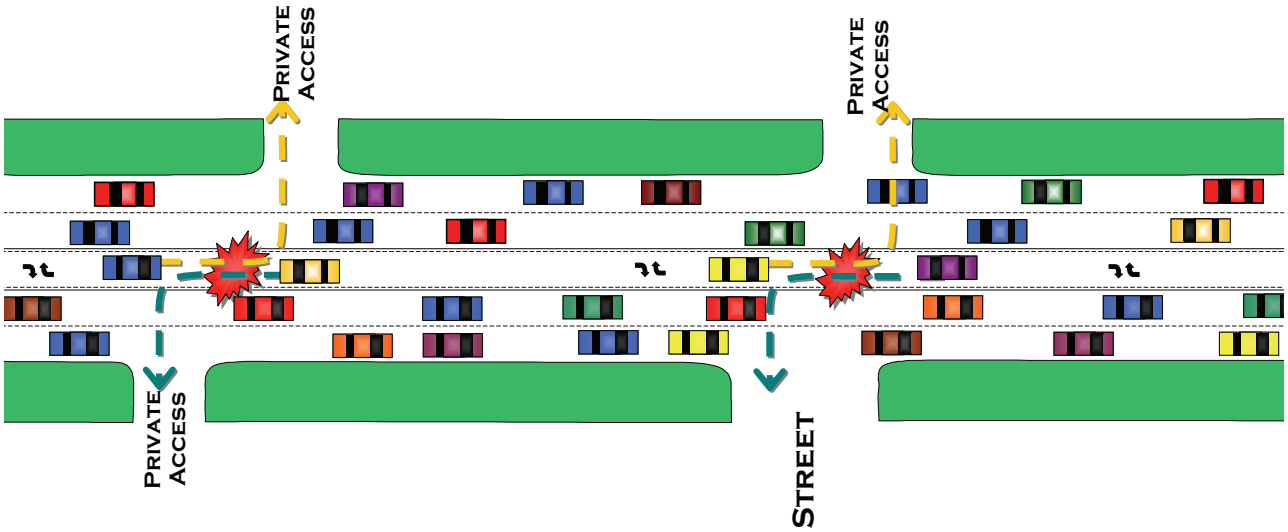
There are a few parcels within the study corridor that have multiple access points. Multiple access points per parcels can result in many of the problems that have already been discussed in this document (e.g., insufficient spacing between access points). One of the urban developed roadway guidelines discussed earlier suggests that if alternate access can be provided on a roadway with a lower functional class then access to the primary roadway can be denied. For parcels within the study area with multiple access points the goal would be for closures and/or consolidation.

ALIGNMENT OF ACCESS POINTS ON OPPOSITE SIDES OF THE STREET

The alignment of access points on opposite side of the street can affect both safety and traffic operations. When access points on opposite sides are offset from each other the potential for safety problems and negative impact on traffic operations will increase. These problems become more pronounced when a continuous center left-turn lane is utilized. This type of center median treatment can lead to significant conflicts between opposing left-turning vehicles if access points are not properly aligned with those on the opposite side of the street. This type of conflict is demonstrated below. The types of impacts that can result from the improper alignment or inadequate offset of access points on opposite sides of the street include the following:

- Possibility of head-on and sideswipe type collision between vehicles trying to access their opposing access points.
- Left-turn queues at one driveway blocking access to the opposing driveway. This can lead to traffic flow problems if a left-turning vehicle from the opposing direction chooses to wait in the through lane.

EXAMPLES OF CONFLICTS ASSOCIATED WITH OFFSET ACCESS POINTS



In those cases where consolidation of driveways was deemed an appropriate action the next step involves determining where the consolidated driveway should be located. Based on the above constraining factors it was sometimes necessary to leave a driveway in its current location. In other cases the driveways could be moved to a new location that aligns with the driveway or side street intersection located on the opposite side of the street.

SUMMARY OF ACCESS POINT EVALUATION

The existing and known future access points were evaluated along the 71st Avenue and Centennial Road corridors. The known future access points included access points associated with platted developments and additional streets identified in either the US 83 Study or the Bismarck-Burleigh County Fringe Road Master Plan. All of these access points were evaluated using the evaluation criteria listed below and described previously in this memorandum.

- Corner Clearance/Functional Area of an Intersection
- Access Point Spacing & Maximum number of Access Points / Mile
- Parcels with Multiple Access Points
- Alignment of Access Points on Opposite Sides of the Street

Many of the access points that were evaluated as part of this study were noted to be of concern for more than one of the evaluation criteria. Access points that appeared to be in conflict with corner clearance/functional area of intersections and access alignment were considered more critical than access points that conflicted with the other evaluation criteria.

For existing and known future access points that did not meet one or more of the evaluation criteria, the review tried to identify alternative(s) for that particular access point. As previously described, possible modification actions for access points in these corridors include:

- Closure of an Access Point
- Consolidation of Adjacent Access Points
- Access Moved to Side Street
- Frontage Roads / Backage Roads

The preliminary access management recommendations for this study are listed below:

- Remove unused access points.
- Close the field access points when those parcels are redeveloped.
- In most cases, close private access points if those parcels are redeveloped or when the expanded street network is completed.
- Do not allow any new private access points. Access to new developments or redevelopments should be provided on the minor cross streets.
- Closure is recommended for a few public streets due to alternate access availability.
- Backage roads are recommended for several undeveloped sections along these corridors.

In some cases there may be no reasonable solution for removal of a particular access point and it will simply have to remain. . The access management evaluation also looked at potential windows for additional future access points with respect to the evaluation criteria. The recommended access management plan recommendations are also presented graphically on a series of aerial maps at the end of this document.

For the intersection of 71st Avenue / Centennial Road there are two primary options. First, the current configuration (No-Build option) does a good job of accommodating the primary traffic movements at this intersection. The second long-term option is to reconstruct as a typical 4-leg intersection. With the 4-leg configuration it may be possible to have a free-right turn lane for the heavy eastbound to southbound movement, however the heavy northbound to westbound movement would have to make a left-turn at the intersection. The configuration of this intersection will be evaluated further during the geometric analysis.

RESULTS OF TURN LANE EVALUATION

The evaluation of turn lanes within the 71st Avenue and Centennial Road corridors considered the functional classification for the roadways and the expected level of traffic per access point. The following turn lane criteria were established with respect to roadway functional classification:

- Intersections with two roadways currently or will likely be classified as minor arterial and above will have left-turn and right-turn lanes installed. Intersections included in this category are listed below:
  - Centennial Road / Century Avenue
  - Centennial Road / 43rd Avenue
  - Centennial Road / 71st Avenue
  - 71st Avenue / 26th Street
- Intersections where the minor roadway is classified as a collector the recommendation is to provide left-turn lanes. Intersections included in this category are listed below:
  - Centennial Road / Calgary Avenue
  - Centennial Road / 57th Avenue
  - Centennial Road / 64th Avenue
  - 71st Avenue / 19th Street

The turn lane recommendations for the above intersections will be evaluated further once horizon year traffic forecasts have been developed. At that time the turn lane needs for the side street approaches will also be evaluated.

For the remaining public street access points along these two corridors the need for turn lanes was based on projected traffic volumes by movement. For many of these intersections there is currently no existing turn movement count data available. The level of peak hour traffic was developed based on trip generation rates and the current / proposed land uses. A summary of the resulting projected traffic volumes for each access point is provided in Table 2.

As documented earlier, the recommended volume thresholds for providing a left-turn or right-turn lane is the following:

- Minimum left-turn lane volume threshold of 11 vph
- Minimum right-turn lane volume threshold of 21 vph

The results of this assessment are displayed graphically on a map at the end of this document.

REQUESTED ACTION

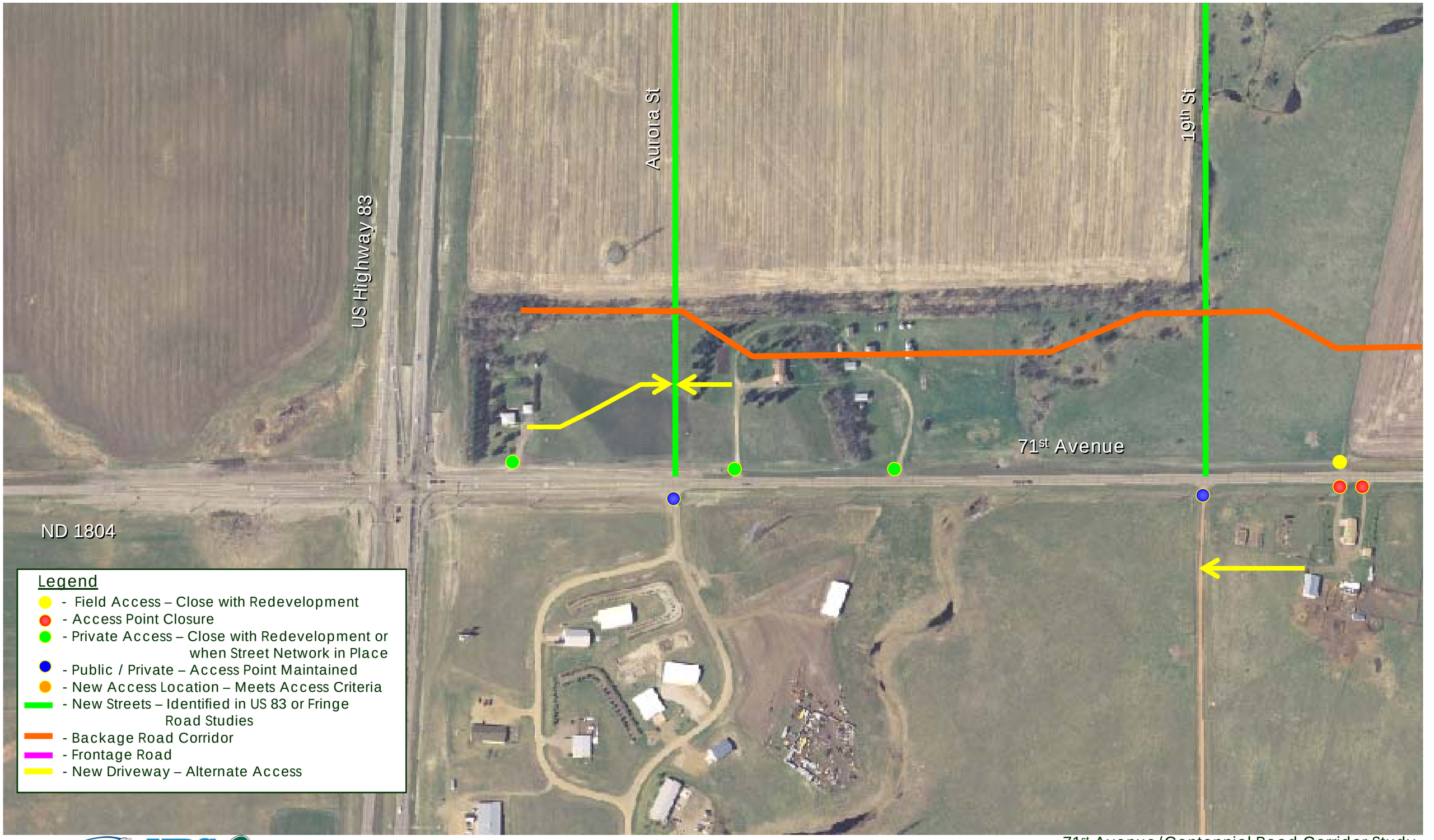
URS staff request that MPO, city, county, and DOT staff review the methods, assumptions, and findings/conclusions provided in this memorandum and provide comments. Please provide your comments to Steve Saunders. If you have any questions please contact Bill Troe (402) 952-2522 or Jim Kollbaum (402) 952-2556.

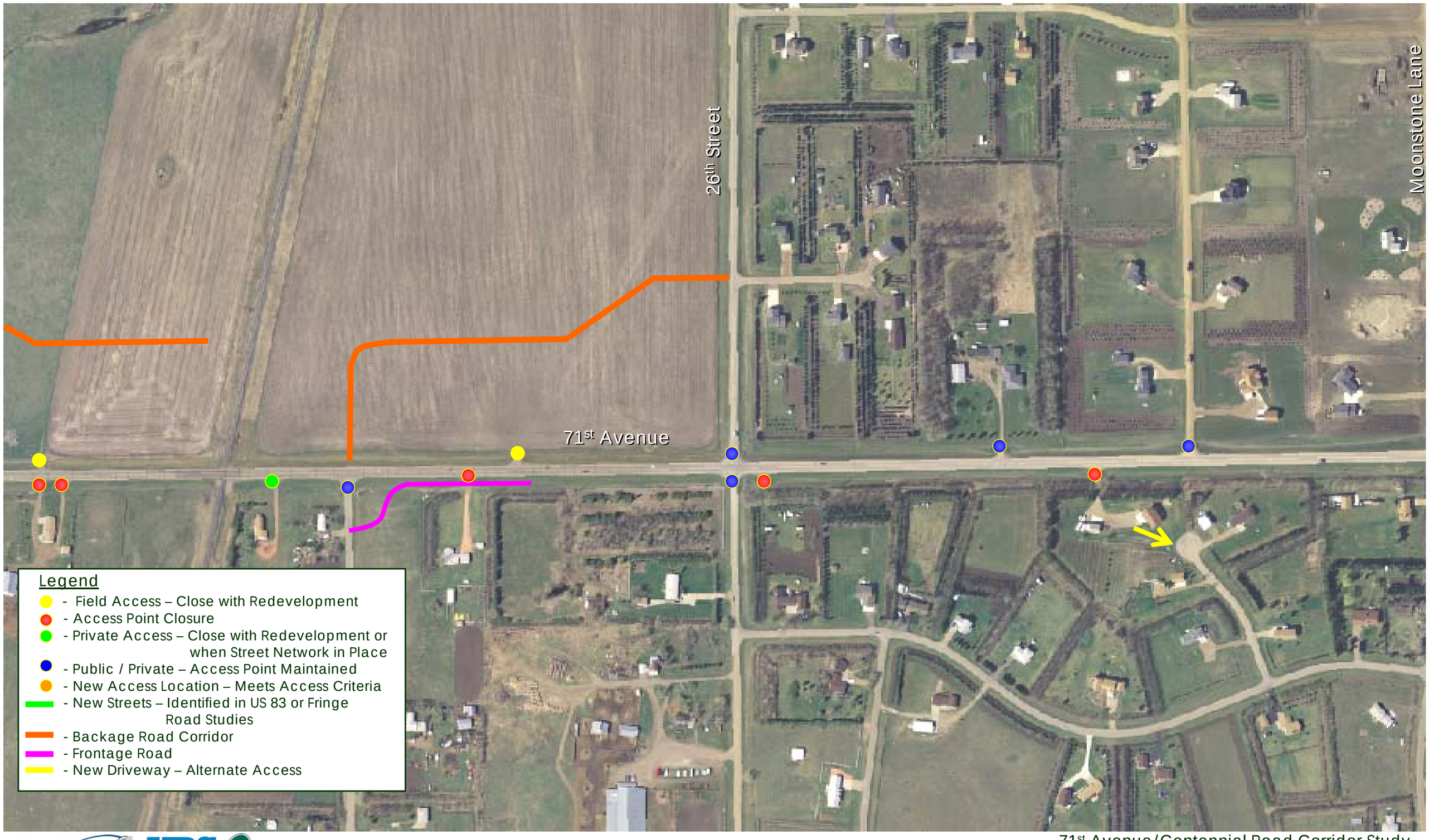
Table 2
Trip Generation by Access Point and Intersection Turn Movement Volumes

Access Point	Land Use (1,2)			Trip Generation (3)									Alt Route	Intersection Split (4)							
					Daily			AM Peak			PM Peak				Inbound				Outbound			
															Right Turn		Left Turn		Right Turn		Left Turn	
	Single Family (D.U.)	Indust Park (1000's SF)	Gas Station (Pumps)	Total	In	Out	Total	In	Out	Total	In	Out			AM	PM	AM	PM	AM	PM	AM	PM
Trenton Dr (W)	174.5		3	2153	1077	1077	164	49	115	217	131	86	33%		13	9	20	79	69	46	8	12
Trenton Dr (E)	68		8	1966	983	983	139	57	82	178	98	80	10%		15	79	36	9	15	58	59	14
Chatham (W)	88.5		3	1336	668	668	100	33	67	130	77	53	33%		13	5	9	47	40	28	5	8
Franklin (W)		282		1974	987	987	248	211	37	259	42	217	33%		42	6	99	22	20	102	5	43
Saratoga (W)		422		2954	1477	1477	371	316	55	388	62	326	33%		64	8	148	34	29	153	8	65
Saratoga (E)		192		1344	672	672	169	144	25	177	28	149	33%		68	13	28	6	3	30	14	70
Jericho (W)	73			694	347	347	55	14	41	74	46	28	0%		1	9	13	37	37	22	4	6
Yorktown (E)		192		1344	672	672	169	144	25	177	28	149	33%		68	13	28	6	3	30	14	70
Wildrose (W)	15			143	72	72	11	3	8	15	10	5	0%		0	1	3	9	7	4	1	1
Rawhide (W)	26			247	124	124	20	5	15	26	17	9	0%		1	2	4	15	14	8	1	1
Heartland (W)	7			67	34	34	5	1	4	7	4	3	0%		0	0	1	4	4	2	0	1
Rooster (S)	19.5			185	93	93	15	4	11	20	12	8	0%		2	6	2	6	6	4	5	4
Golden Crest (S)	19.5			185	93	93	15	4	11	20	12	8	0%		2	7	2	5	4	3	7	5
41st St (N)	14.5			138	69	69	11	3	8	15	9	6	0%		0	0	3	9	8	6	0	0
Foxhaven Lp (N)	25			238	119	119	19	5	14	25	16	9	0%		2	6	3	10	8	5	6	4
Moonstone (N)	66.5			632	316	316	50	12	38	67	42	25	0%		4	13	8	29	27	18	11	7
Moonstone (S)	27			257	129	129	20	5	15	27	17	10	0%		4	12	1	5	5	3	10	7
26th St (S)	30			285	143	143	23	6	17	30	19	11	0%		5	15	1	4	3	2	14	9
Hightop (N)	27			257	129	129	20	5	15	27	17	10	0%		1	3	4	14	12	8	3	2
26th St (N)	54			513	257	257	41	10	31	55	34	21	0%		2	7	8	27	25	17	6	4
North Star Acres (S)	20			190	95	95	15	4	11	20	13	7	0%		4	12	0	1	1	1	10	6
Aurora (S)		122		854	427	427	107	91	16	112	18	94	50%		27	5	19	4	7	45	1	2

Notes:
(1) Trip Generation, 7th Edition, Institute of Transportation Engineers
(2) Unit is the independent variable used to determine the trip generation rate. D.U. = Dwelling Unit; 1000's SF = 1000 Square Feet Gross Floor Area; Pumps = Vehicle Fueling Positions
(3) Trip generation rates determined by studies conducted throughout the United States
(4) Intersection split based on prevailing traffic flows and field observations

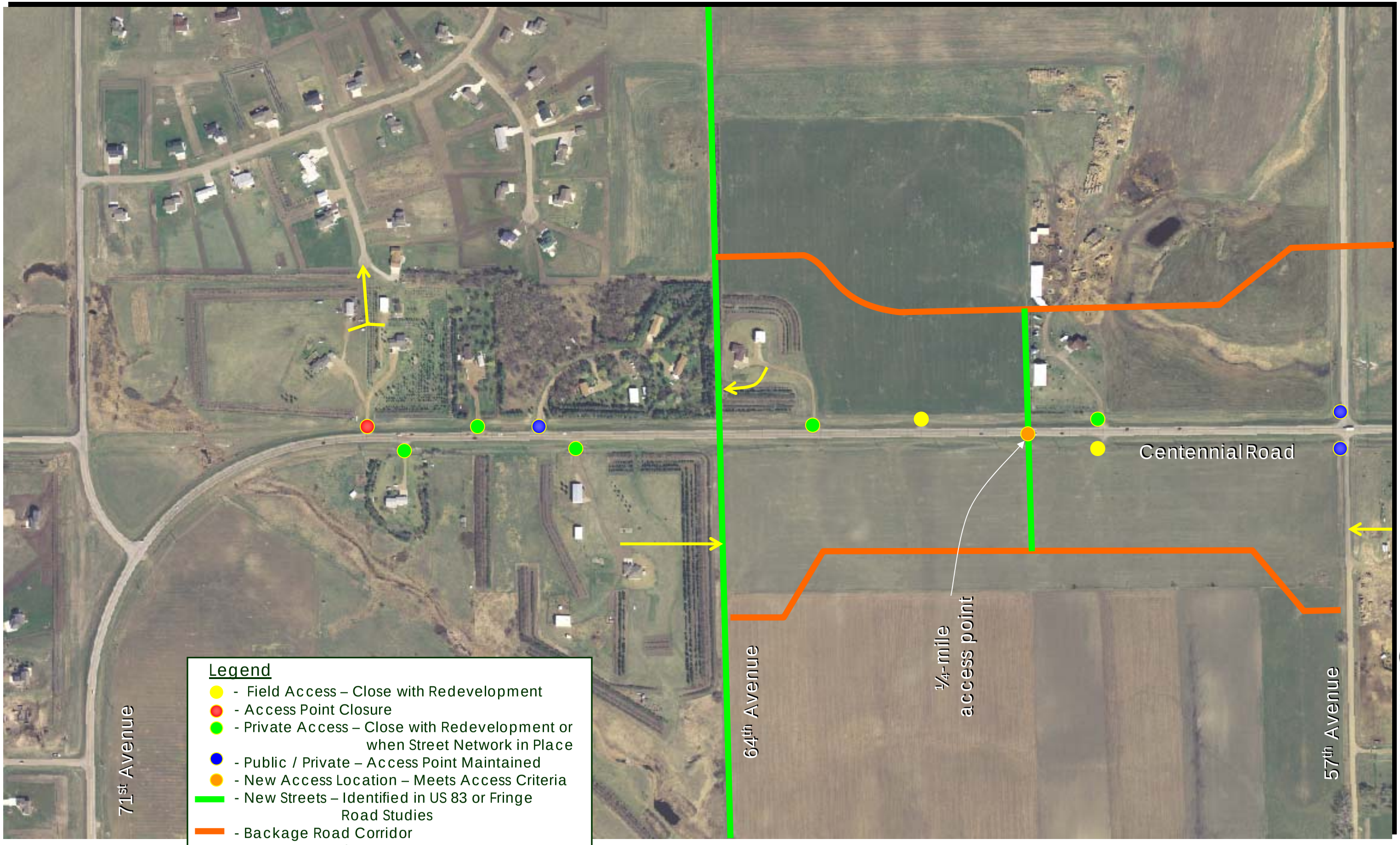
Turn Movement > 10
Turn Movement > 20
Turn Movement > 30
Turn Movement > 50
Turn Movement > 100


US Highway 83
Aurora St
19th St
71st Avenue
ND 1804
Legend
- Field Access – Close with Redevelopment
- Access Point Closure
- Private Access – Close with Redevelopment or when Street Network in Place
- Public / Private – Access Point Maintained
- New Access Location – Meets Access Criteria
- New Streets – Identified in US 83 or Fringe Road Studies
- Backage Road Corridor
- Frontage Road
- New Driveway – Alternate Access


26th Street
Moonstone Lane
71st Avenue
Legend
- Field Access – Close with Redevelopment
- Access Point Closure
- Private Access – Close with Redevelopment or when Street Network in Place
- Public / Private – Access Point Maintained
- New Access Location – Meets Access Criteria
- New Streets – Identified in US 83 or Fringe Road Studies
- Backage Road Corridor
- Frontage Road
- New Driveway – Alternate Access


Moonstone Lane
71st Avenue
Legend
- Field Access – Close with Redevelopment
- Access Point Closure
- Private Access – Close with Redevelopment or when Street Network in Place
- Public / Private – Access Point Maintained
- New Access Location – Meets Access Criteria
- New Streets – Identified in US 83 or Fringe Road Studies
- Backage Road Corridor
- Frontage Road
- New Driveway – Alternate Access
Cul-de-sac Rooster Rd?
- Sight Distance is Suspect
- Current Spacing is Borderline
- Future Spacing to Realigned Centennial/71st Intersection is Poor
Centennial Road

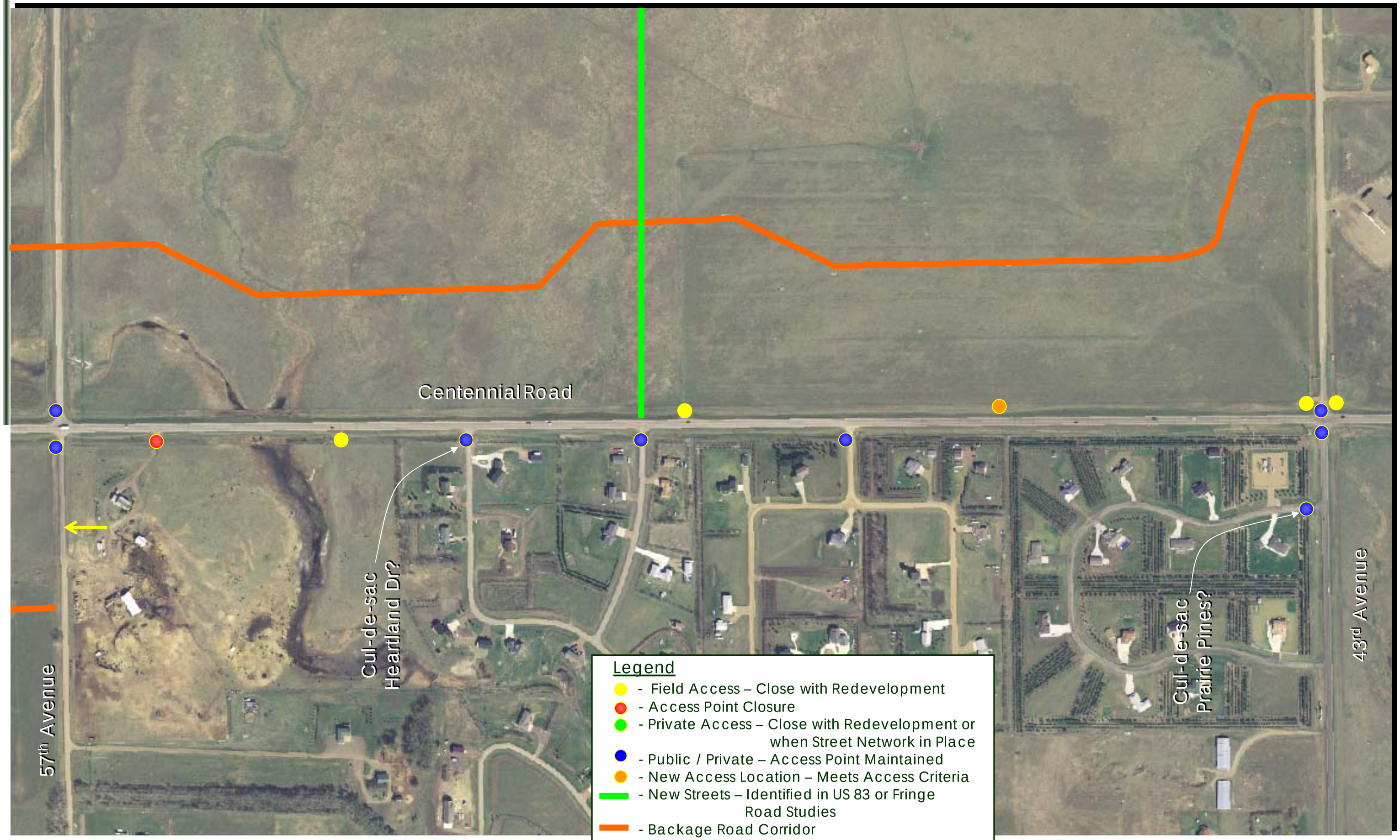
71st Avenue/Centennial Road Corridor Study
Preliminary Access Management Plan

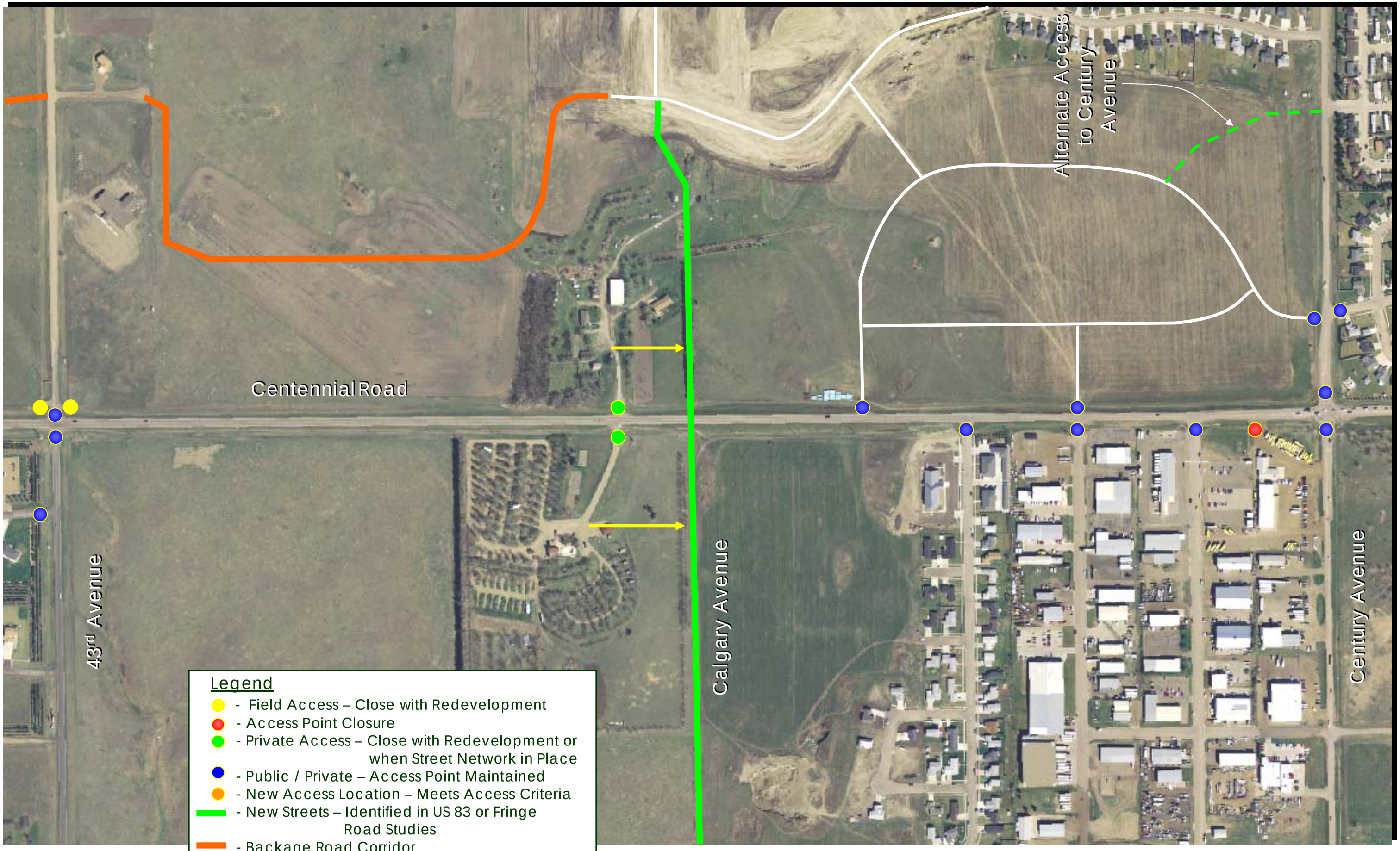


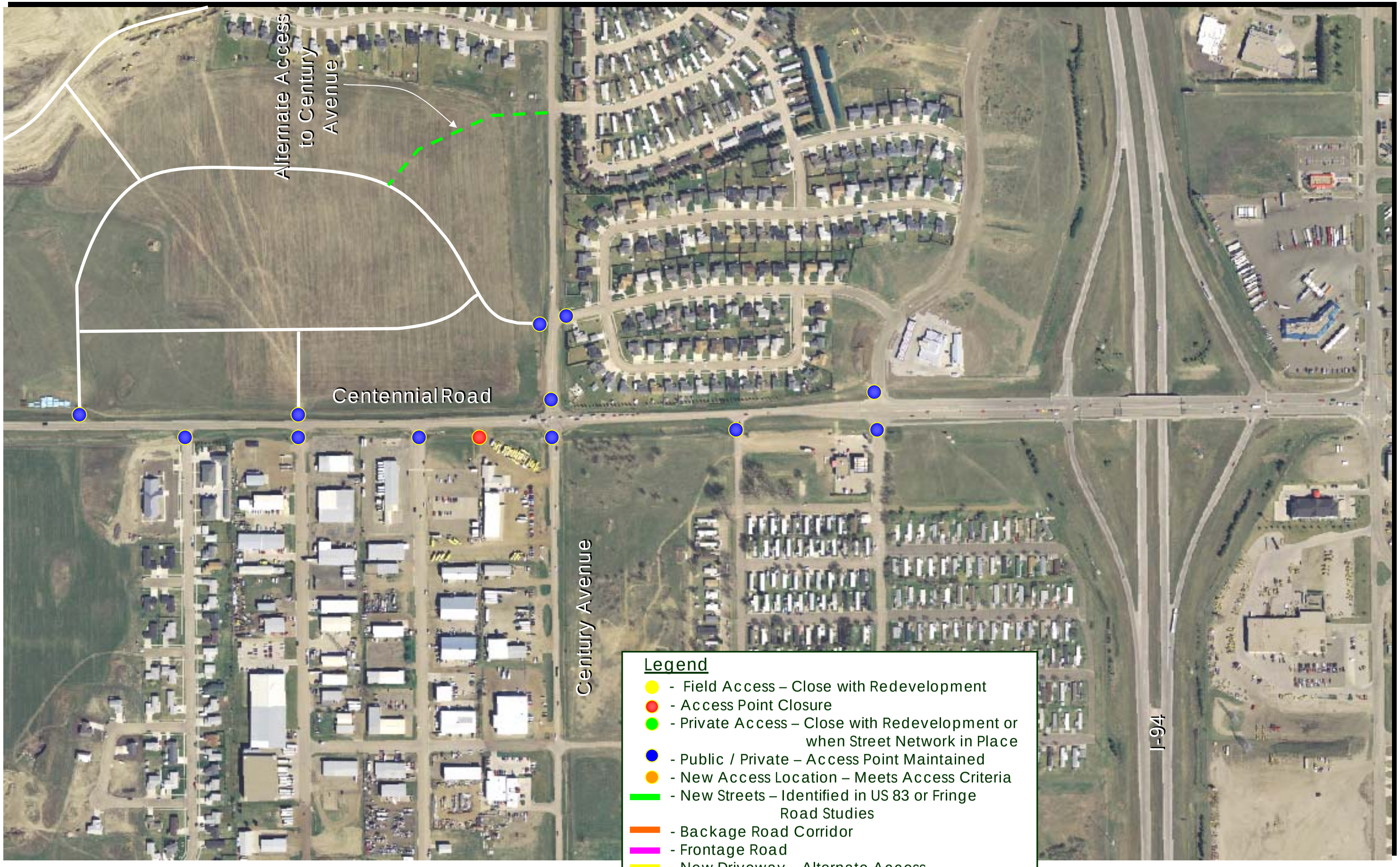
BismarckMandan Metropolitan Planning Organization

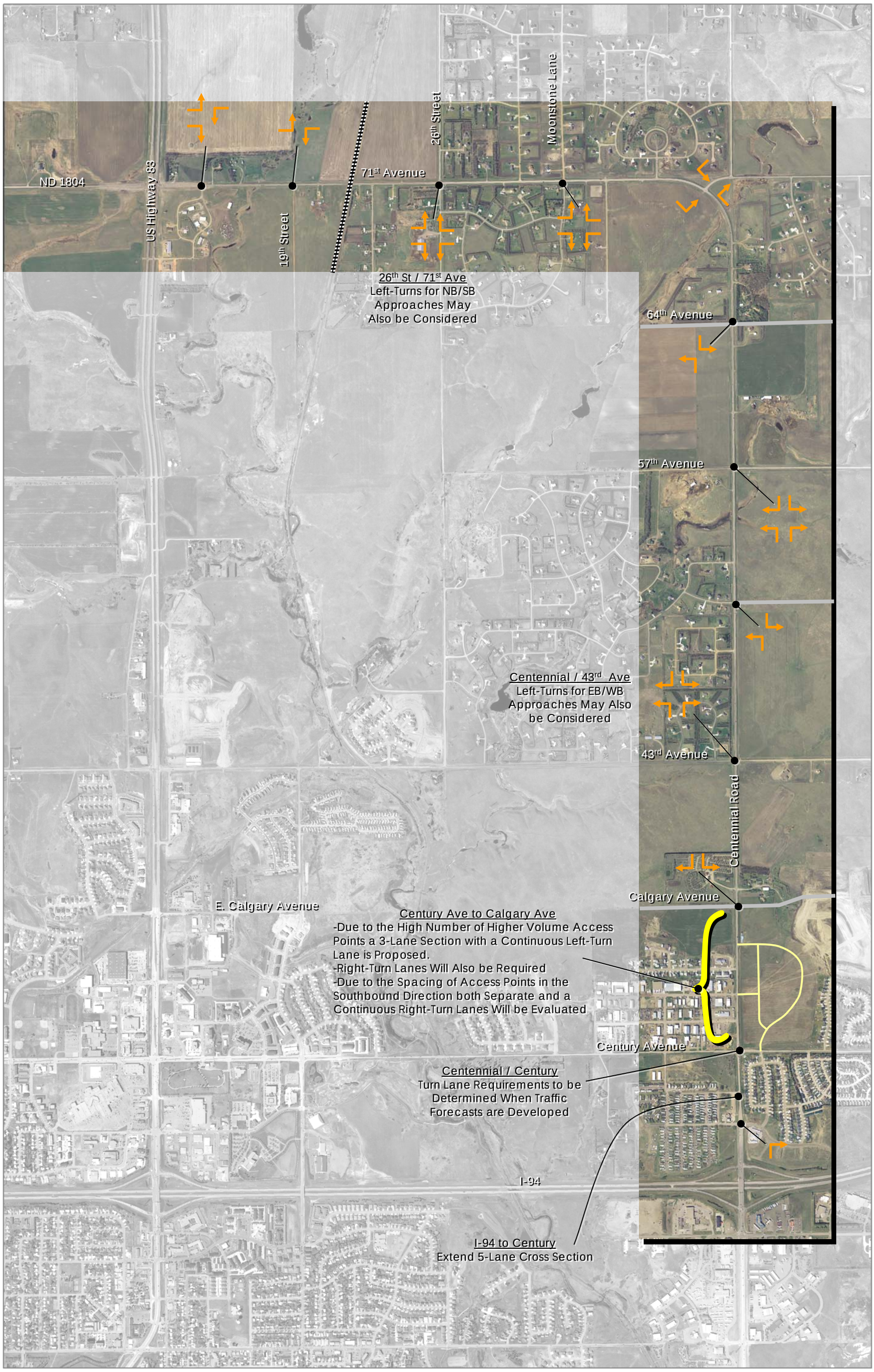
HF

URS Transportation


Centennial Road
57th Avenue
Cul-de-sac
Heartland Dr?
Cul-de-sac
Prairie Pines?
43rd Avenue
Legend
- Field Access – Close with Redevelopment
- Access Point Closure
- Private Access – Close with Redevelopment or when Street Network in Place
- Public / Private – Access Point Maintained
- New Access Location – Meets Access Criteria
- New Streets – Identified in US 83 or Fringe Road Studies
- Backage Road Corridor
- Frontage Road
- New Driveway – Alternate Access


Centennial Road
43rd Avenue
Calgary Avenue
Century Avenue
Alternate Access to Century Avenue
Legend
- Field Access – Close with Redevelopment
- Access Point Closure
- Private Access – Close with Redevelopment or when Street Network in Place
- Public / Private – Access Point Maintained
- New Access Location – Meets Access Criteria
- New Streets – Identified in US 83 or Fringe Road Studies
- Backage Road Corridor
- Frontage Road
- New Driveway – Alternate Access


Alternate Access to Century Avenue
Centennial Road
Century Avenue
I-94
Legend
- Field Access – Close with Redevelopment
- Access Point Closure
- Private Access – Close with Redevelopment or when Street Network in Place
- Public / Private – Access Point Maintained
- New Access Location – Meets Access Criteria
- New Streets – Identified in US 83 or Fringe Road Studies
- Backage Road Corridor
- Frontage Road
- New Driveway – Alternate Access


ND 1804
US Highway 83
19th Street
71st Avenue
26th Street
Moonstone Lane
26th St / 71st Ave
Left-Turns for NB/SB
Approaches May
Also be Considered
64th Avenue
57th Avenue
Centennial / 43rd Ave
Left-Turns for EB/WB
Approaches May Also
be Considered
43rd Avenue
Centennial Road
Calgary Avenue
E. Calgary Avenue
Century Ave to Calgary Ave
-Due to the High Number of Higher Volume Access Points a 3-Lane Section with a Continuous Left-Turn Lane is Proposed.
-Right-Turn Lanes Will Also be Required
-Due to the Spacing of Access Points in the Southbound Direction both Separate and a Continuous Right-Turn Lanes Will be Evaluated
Century Avenue
Centennial / Century
Turn Lane Requirements to be
Determined When Traffic
Forecasts are Developed
I-94
I-94 to Century
Extend 5-Lane Cross Section

APPENDIX C

Initial Corridor Concept Information

MEMORANDUM

Bill Troe, AICP
Jim Kollbaum, PE
12120 Shamrock Plaza
Suite 300
Omaha, NE 68154
(402) 334-8181
(402) 334-1984 (Fax)

To: **Steve Saunders**

Date: October 9, 2007

Subject: **71st Avenue / Centennial Road Corridor Study: Initial Corridor Concept**

BACKGROUND AND PURPOSE

The primary goal of the 71st Avenue-Centennial road corridor study is to develop a short to mid-term improvement concept that relative to the current conditions better reflects the combination of:

- Heavy commercial vehicle volume in the corridors.
- Safety issues associated with turning volume throughout the corridor and the potential for increases in the level of conflicts as development in the corridors continues.
- The assumption that a beltway along 71st Avenue and 66th Street will influence the corridor in the longer term period and any short to mid-term improvements should consider the longer term corridor needs and potential actions.

The purposes of this memorandum are to provide documentation of the background information used in developing the assumptions and inputs to the initial corridor concept and to serve as a transmittal for the drawings of the initial concept.

ACTION REQUESTED

The assumptions and design criteria documented in this memorandum will be the subject of the meeting on Monday, October 15, 2007 at 1:00 PM at Bis-Man Transit. Thus, we ask that you review the material prior to the meeting and bring any questions/comments that you may have. You may also desire to review the Access Management technical memorandum that was distributed in May 2007. This memo will provide documentation of the assumptions and reasoning behind the recommended access locations and intersection turn lane needs throughout the corridor.

If you have any questions or comments about this memorandum, please contact Bill Troe at (402) 952-2522 or Jim Kollbaum at (402) 952-2556.

DETERMINATION OF THE TYPICAL CROSS SECTION

As the project is addressing existing and short to mid-term (the next 5 to 10 years) needs in the corridor, the typical cross section for the corridor improvement concept was based primarily on current volume and vehicle mix and traffic estimates through the next 10 to 15 year period. Current daily traffic volume in the corridor obtained from the North Dakota DOT classification counts completed at two locations:

- Centennial Road north of Century Avenue.
- 71st Avenue east of US 83 (State Street).

In addition, peak hour turning movements at either end of the corridor and at I-94/US 83 were obtained during the truck survey that was conducted as part of the corridor study. Peak hour turning movements for the AM and PM peak periods and current daily traffic volumes at count stations in the corridor are displayed in Figure 1 and Figure 2, respectively.

Forecasted corridor volumes were taken from the US 83 Corridor Study report that was completed in February 2006. The traffic forecasting coverage for the US 83 Corridor Study included the 71st Avenue and Centennial Road corridors. The forecasts incorporated the following assumptions:

- Increments of development assumed to be in place by 2030.
- Completion of the Fringe Area Master Plan routes.
- No Beltway.

Forecasted ADT for the 2030 period are displayed in Figure 3. Through review of the information in the figure, the following can be observed:

- 2030 daily traffic ranges from a low of approximately 3,400 vehicles per day on Centennial Road at the 71st Avenue curve to a maximum of 26,000 vehicles per day on Centennial Road from Century Avenue to I-94. The maximum volume in the 71st Avenue corridor is forecasted for the segment just east of US 83, which is approximately 7,200 vehicles per day.
- Average daily volume for 2030 in the 71st Avenue corridor is approximately 6,000 vehicles per day.
- Average daily volume for 2030 in the Centennial Road corridor is 9,500 vehicles per day.

As the focus of this corridor study is the short and mid-term periods, an interim forecast of a horizon year of at most 15 years into the future is needed as input data to the cross section needs determination. The interim period forecast was derived through interpolating between the current counts and future forecasts to get to a 2020 forecast year. 2020 was selected because it simply represented a rounded decade in the future. Forecasted ADT in the corridor assumed to be representative of 2020 are displayed in Figure 3.

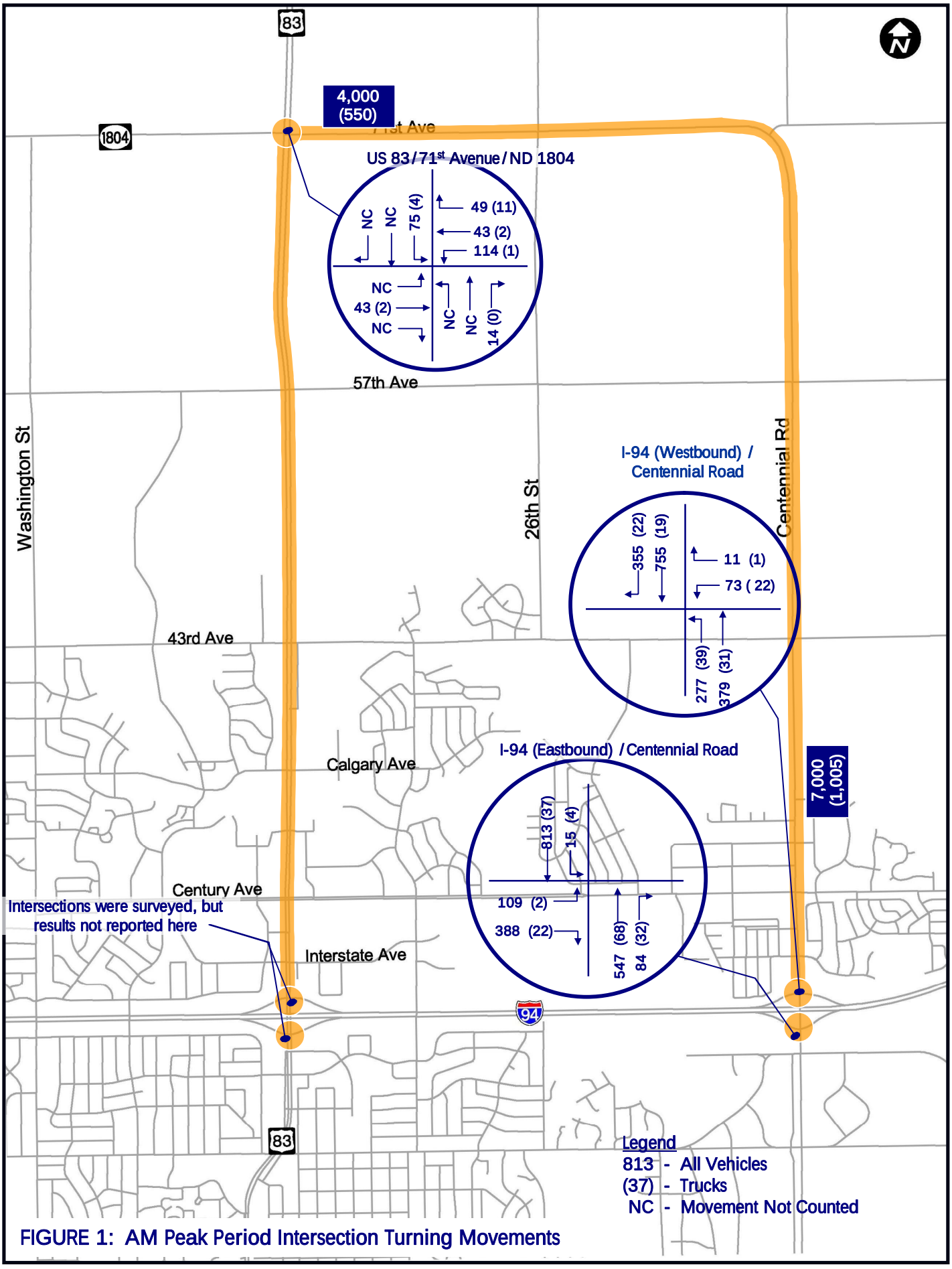


FIGURE 1: AM Peak Period Intersection Turning Movements

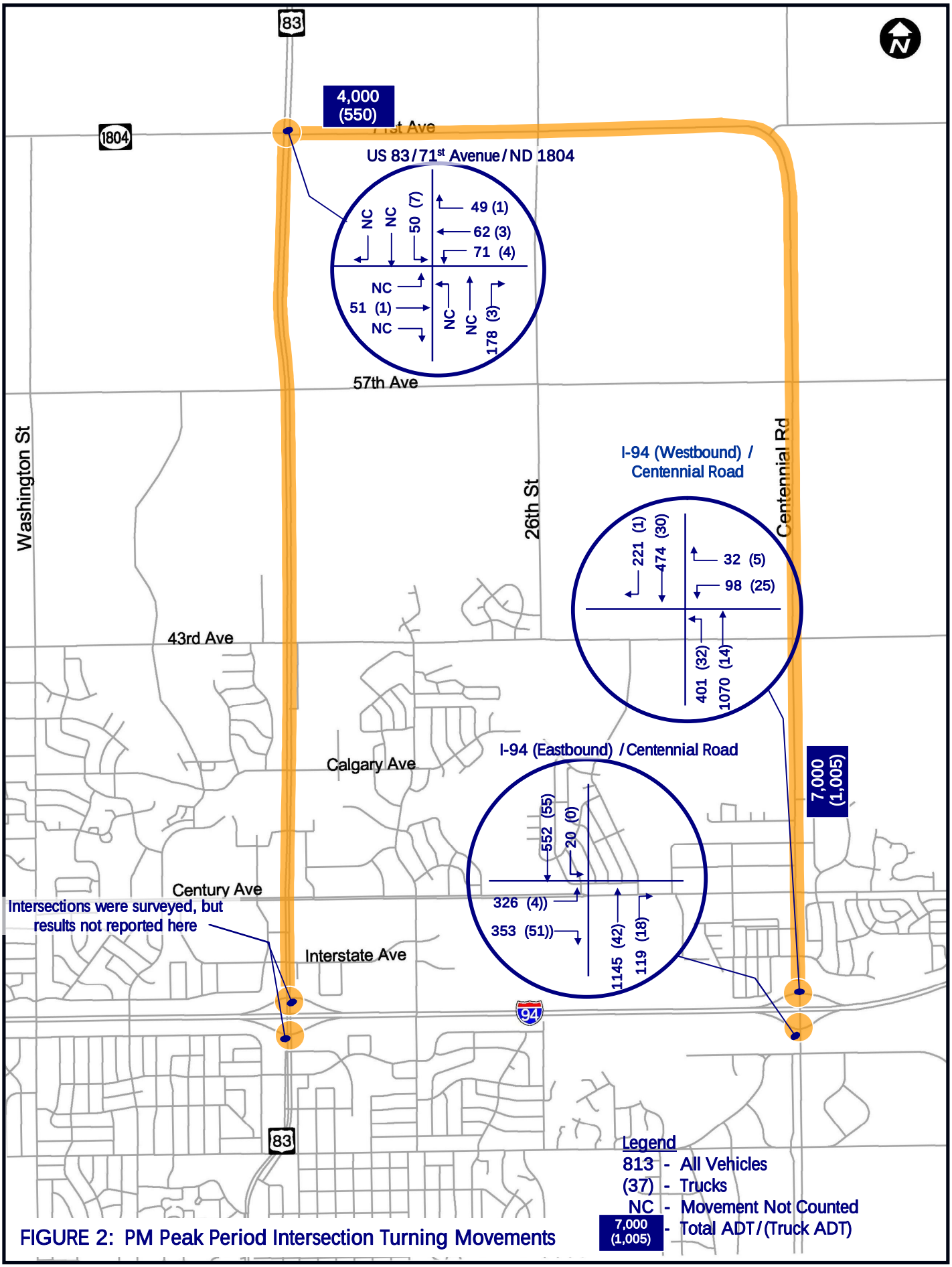


FIGURE 2: PM Peak Period Intersection Turning Movements

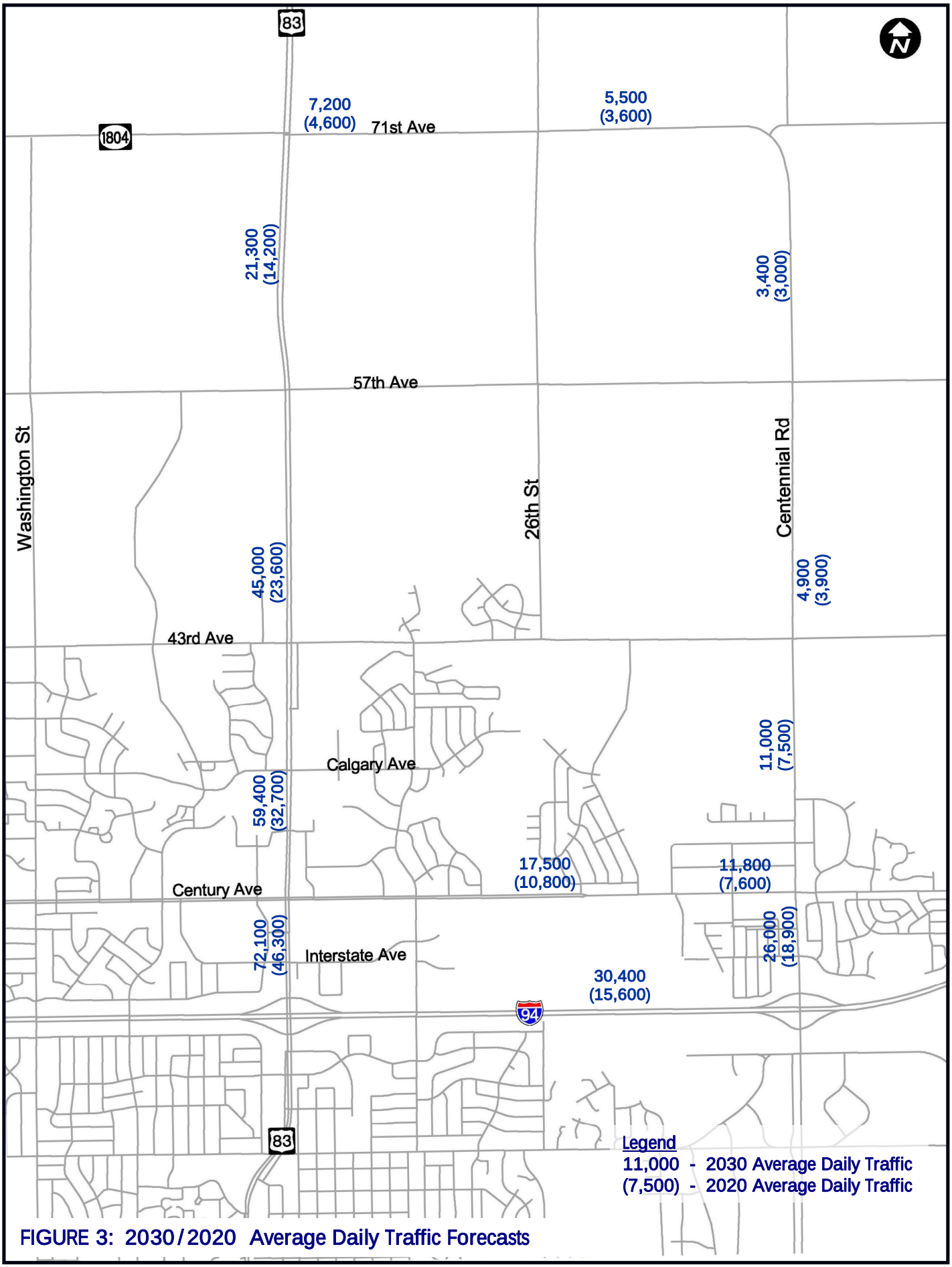


FIGURE 3: 2030/2020 Average Daily Traffic Forecasts

Based on a review of the forecasted 2020, and to a certain extent the 2030 traffic, the following general conclusions have been developed:

- South of Century Avenue in the Centennial Road corridor forecasted volumes reflect the need for a four-lane corridor, with turn lanes at the key access locations.
- From Century Avenue to approximately Calgary Drive the forecasted volumes along Centennial Road reflect the need for one through lane in each direction and, at a minimum, left turn lanes at the key access points (public or private).
- North of Calgary Drive the forecasted Centennial Road volumes are in a range that a two-lane corridor could reasonably accommodate as long as there are left turn lanes at key arterial crossings.
- Forecasted volumes throughout the 71st Avenue corridor reflect levels that would warrant one through lane in each direction and left turn lanes at the arterial cross routes.

CORRIDOR DESIGN CRITERIA

Based on the forecasted traffic through approximately 2020, current access density, and the potential to consolidate selected current access points as the corridor is improved, the recommended corridor cross section would be as follows:

- Centennial Road:
  - I-94 to Century Avenue: 5-lane composed of two through lanes in each direction and a left turn lane at each intersection. Right turn lanes should be provided at the interstate terminals, Century Avenue, and the northbound approach to Trenton Drive.
  - Century Avenue to Calgary Drive: 3-lane composed of one through lane in each direction and a center two-way left turn lane. Right turn lanes should be provided at each intersection in this segment.
  - North of Calgary drive to 71st Avenue: Two-lane typical section with left and right turn lanes at the one-mile arterial crossings and left turn lanes at those locations documented in the Access Management Recommendations.
- 71st Avenue:
  - US 83 through Centennial Road: Two-lane typical section with left and right turn lanes at the one-mile arterial crossings and left turn lanes at those locations documented in the Access Management Recommendations.

Outlined below are additional corridor design assumptions:

- Design Speed:
  - Centennial Road from Calgary Avenue to 71st Avenue - 65 MPH/Posted at 55 MPH.
  - Centennial Road from Calgary Avenue to I-94 - 50 MPH/Posted at 40 MPH.
  - 71st Avenue from US 83 to Centennial Road - 65 MPH/Posted at 55 MPH.
- An urban section has been assumed along Centennial Road south of Calgary Avenue to

I-94 and a rural (ditch) section has been assumed along the remainder of Centennial Road and all of 71st Avenue.

- Lane Width – 12 feet.
- Shoulder Width – 4 feet.
- Shoulder Type – Paved.
- Turn Lane Width – 12 feet / 14 feet for continuous left-turn lane between Calgary Avenue and Century Avenue
- Redirect (Roadway Widening) Taper = 65:1 (based on design speed, alternative would be to use posted speed); the basic equation for this is L=WS, with L=taper length (ft), W=width of taper (ft), S=speed (mph) - - e.g., roadway widening for 12' left-turn lane around the center line for a 65 mph design speed would be L= 6 x 65 = 390'.
- Left-Turn Bay Taper – 20:1.
- Left-Turn Deceleration is assumed to occur within the left-turn taper and the left-turn lane (i.e., not in the through lane).
- Left-Turn Storage – 50 feet with the following exceptions:
  - 100 feet for Trenton Dr, Chatham Dr, 57th Ave, 64th Ave, and 19th St
  - 150 feet for Calgary Ave.
  - 200 feet for 43rd Ave.
  - 200 feet for 71st Ave
  - 200 for 26th St.
- Right-Turn Bay (Widening) Taper – 20:1 (NDDOT D-203-6 "Standard 90 degree Flared Intersection" drawing used for dimension for right-turn lanes).
- Key Intersection Concepts:
  - Centennial Road/71st Avenue intersection lane configuration and geometry are based on recent improvements implemented by Burleigh County.
  - Centennial / Century intersection lane configuration based partially on recommendations from East Century Avenue Corridor Study.

The majority of the above design assumptions are based NDDOT standards and/or the AASHTO Green Book. At the meeting on Monday we will have a chance to discuss these design assumptions for possible adjustments. Adjustments to the design assumptions can have a measurable impact on material quantities and project cost. For example, using the posted speed limit instead of the design speed affects both the taper lengths and deceleration lengths.

DESIGN CONCEPT PACKAGES

Enclosed with this memorandum are two corridor design concept packages. Each of the concepts use the same assumptions on the number of through lanes and locations for turn lanes (left and right). The initial design concept (Left-Turn Lanes with Tangent Segments) is the result of

applying the design criteria outlined above. As can be observed through review of the concept is that the combination of access points where turn lanes are recommended and the distance required to develop the turn lane and provide vehicle storage results in:

- Locations where the back of a westbound left turn lane overlaps with the back of an eastbound left turn lane (Example: 71st Avenue between Aurora Loop and 19th Street).
- Numerous very short tangent sections created by eastbound-west bound and/or northbound-southbound left turn lanes almost backing up into each other. An example is along Centennial Road between 57th and 64th Avenue, with a resulting tangent segment of approximately 250 feet. The result is a condition where the driver is almost continually moving into or out of a taper area, which creates a "coke bottle" type path through the corridor.

As a result of the "coke bottle" path through the corridor, the second concept (Continuous Left-Turn Lane section) that reflects a three-lane cross section through much of the corridors from north of Century Avenue through US 83 was developed. This concept results in:

- Removing turning vehicles from the through travel lane, which is a safety improvement relative to the current conditions.
- A through lane travel path that does not include any horizontal curvature (no moving in and out of taper areas).
- A substantial amount of earthwork, which would add to the overall project cost.

In addition to the general packages provided here, additional spot location alternatives will be presented at the meeting on Monday.

Again, if you have any questions prior to the meeting, contact Bill or Jim.

Thanks.

URS
URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

REVISIONS			
NO.	DESCRIPTION	DATE	INITIALS
1			
2			
3			
4			
5			
6			

URS PROJECT NO:	####
DRAWN BY:	B.TENNANT
DESIGNED BY:	A.BLEA
CHECKED BY:	
DATE CREATED:	10/5/2007
PLOT DATE:	10/9/2007
SCALE:	1"=200'
ACAD VER:	17.1S (LMS TECH)

71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
01
SHEET OF

MATCHLINE 1

MATCHLINE 2

JERICHO RD.

CENTENNIAL RD.

POTOMAC DR.

CALGARY AVE.

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

URS

URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

REVISIONS			
NO.	DESCRIPTION	DATE	INITIALS
1			
2			
3			
4			
5			
6			

URS PROJECT NO:	####
DRAWN BY:	B.TENNANT
DESIGNED BY:	A.SILEA
CHECKED BY:	
DATE CREATED:	10/5/2007
PLOT DATE:	10/9/2007
SCALE:	1"=200'
ACAD VER:	17.1S (LMS TECH)

71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
02

SHEET OF

MATCHLINE 2

43rd AVE.

WILDROSE CRES

MATCHLINE 3

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

URS

URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

REVISIONS

NO.	DESCRIPTION	DATE	INITIALS
1			
2			
3			
4			
5			
6			

URS PROJECT NO:	####
DRAWN BY:	B.TENNANT
DESIGNED BY:	A.BLEA
CHECKED BY:	
DATE CREATED:	10/9/2007
PLOT DATE:	10/9/2007
SCALE:	1"=200'
ACAD VER:	17.1S (LMS TECH)

71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
03
SHEET OF

MATCHLINE 3

MATCHLINE 4

RAWHIDE DR.

HEART LAND DR.

CENTENNIAL RD.

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

URS

URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

REVISIONS			
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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
04

SHEET OF

MATCHLINE 4

57th Ave.

64th AVE.

MATCHLINE 5

100 0 100 200

SCALE IN FEET

N

PRELIMINARY NOT FOR CONSTRUCTION

URS

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH TANGENT SEGMENTS

SHEET NUMBER
05
SHEET OF

MATCHLINE 6

MATCHLINE 5

CENTENNIAL RD.

EVERGREEN AVE.

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
06

SHEET OF

MATCHLINE 7

71st AVE.

HIGHTOP LANE

MOONSTONE LANE

GOLDEN CREST RD.

FOXHAVEN LOOP

MATCHLINE 6

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

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71ST. AVENUE/CENTENNIAL ROAD CORRIDOR STUDY

LEFT TURN LANES WITH TANGENT SEGMENTS

SHEET NUMBER 07

SHEET OF

MATCHLINE 8

N STAR ACRES RD

26th STREET

MATCHLINE 7

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

URS
URS Center
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Denver, Co. 80237-2637
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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
08
SHEET OF

Aurora Loop

19th STREET

MATCHLINE 8

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

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URS Center
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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

LEFT TURN LANES WITH
TANGENT SEGMENTS

SHEET NUMBER
09
SHEET OF

TRENTON DR.

CHATAM DR.

E. CENTURY AVE.

FRANKLIN AVE.

SARATOGA AVE.

MATCHLINE 1

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

URS

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
01
SHEET OF

URS
URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
02
SHEET OF

MATCHLINE 2

43rd AVE.

WILDROSE CRES

MATCHLINE 3

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
03

SHEET OF

MATCHLINE 3

RAWHIDE DR.

HEART LAND DR.

CENTENNIAL RD.

MATCHLINE 4

N

100 0 100 200

SCALE IN FEET

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
04
SHEET OF

MATCHLINE 4

57th Ave.

64th AVE.

MATCHLINE 5

100 0 100 200

SCALE IN FEET

N

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
05
SHEET OF

MATCHLINE 6

MATCHLINE 5

CENTENNIAL RD.

EVERGREEN AVE.

N

100 0 100 200

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
06

SHEET OF

MATCHLINE 7

71st AVE.

HIGHTOP LANE

MOONSTONE LANE

GOLDEN CREST RD.

FOXHAVEN LOOP

MATCHLINE 6

N

100 0 100 200

SCALE IN FEET

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71ST. AVENUE/CENTENNIAL ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER 07

SHEET OF

MATCHLINE 8

N STAR ACRES RD

26th STREET

MATCHLINE 7

N

100 0 100 200

SCALE IN FEET

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SCALE:	1"=200'
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71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
08
SHEET OF

PRELIMINARY NOT FOR CONSTRUCTION

URS
URS Center
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Denver, Co. 80237-2637
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ACAD VER:	17.1S (LMS TECH)

71ST. AVENUE/CENTENNIAL
ROAD CORRIDOR STUDY

CONTINUOUS LEFT LANE

SHEET NUMBER
09
SHEET OF

APPENDIX D

Detailed Cost Estimate Information

Project Number: 16170177 **Project Name: BISMARCK**

Subaccount: **Location of Project: BISMARCK, ND**

Engineers (Semi) Detailed Estimate (FY 05 Cost Index)	Alternative:	Concrete
	Prepared By:	ACB
	Date Prepared:	1/10/2008

	Item		Unit Cost	Quantity	Extended Cost
1	Item 202-Rem of Concrete	SY	$19.00	488	$9,272.00
2	Item 202-Rem of Bituminous Surfacing	SY	$2.75	15,753	$43,320.75
3	Item 203-Embankment	CY	$5.00	103,182	$515,910.00
4	Item 302-Aggregate Base Course	CY	$13.00	19,537	$253,981.00
5	Item 408-Hot Bituminous Pavement	TON	$40.00	42,192	$1,687,680.00
6	Item 550-8" Non-Reinf. Conc Pavement	SY	$83.00	29,016	$2,408,328.00
7	Item 748-Curb & Gutter	LF	$25.00	8,744	$218,600.00
8	Item 750-Sidewalk Concrete Bikeway	SY	$40.00	29,202	$1,168,080.00
9	Item 750-Concrete Median Paving	SY	$38.00	268	$10,184.00
10	Item 772-Intersection Signal	EA	$150,000.00	1	$150,000.00
	Sub Total				**$6,465,355.75**

PROJECT CONSTRUCTION BID ITEMS **$6,465,355.75**

NOTES:
1. Assumed typical section of 8" asphalt over 6" of ABC on widening section of road.
2. 2" Asphalt overlay on existing pavement.
3. Quantity of excavation within project limits is 61,274 CY.
4. Removal of sidewalk is paid for as removal of concrete.

Project Number: 16170177 **Project Name: BISMARCK**

Subaccount: **Location of Project: BISMARCK, ND**

Engineers (Semi) Detailed Estimate (FY 05 Cost Index)		
	Alternative:	**Concrete**
	Prepared By:	**ACB**
	Date Prepared:	**1/10/2008**

Item	Unit Cost	Quantity	Extended Cost	*Shaded Fields are for INPUT*
FROM PAGE 1, BID ITEM TABULATION			**$6,465,355.75**	
			$6,465,355.75	

	% Range	% Used	Cost	
Project Construction Bid Items	Project Dependent	**N / A**	$6,465,355.75	**(A)**
Contingencies	(15 - 30%) of **A**	30.0%	$1,939,606.73	**(B)**
ITS	(6 - 10%) of (**A+B**)	0.0%	$0.00	**(C)**
Drainage / Utilities	(3 - 10%) of (**A+B**)	10.0%	$840,496.25	**(D)**
Signing and Striping	(1 - 5%) of (**A+B+C+D**)	2.5%	$231,136.47	**(E)**
Clearing & Grubbing	(1 - 5%) of (**A+B+C+D**)	1.5%	$138,681.88	**(F)**
Construction Signing & Traffic Control	(5 - 25%) of (**A+B+C+D+E+F**)	15.0%	$1,442,291.56	**(G)**
Mobilization	(4 - 7%) of (**A+B+C+D+E+F+G**)	5.0%	$552,878.43	**(H)**
Total of Construction Bid Items	(**A+B+C+D+E+F+G+H**)		$11,610,447.07	**(I)**
Force Account - Utilities	(1 - 2%) of **I**	0.0%	$0.00	**(J)**
Force Account - Misc.	(5 - 15%) of **I**	0.0%	$0.00	**(K)**
Subtotal of Construction Cost	**(I+J+K**)		$11,610,447.07	**(L)**
Total Construction Engineering	(17%) of **L**	0.0%	$0.00	**(M)**
Total Preliminary Engineering	(15%) of **L**	0.0%	$0.00	**(N)**
Utilities	Project Dependent	N / A	$0.00	**(O)**
Right-of-Way (Acre)	Project Dependent	$7000/AC		**(P)**
		Total Project Cost	$11,610,000.00	**(Q)**

NOTES:

APPENDIX E

Public Involvement Summary

Bismarck-Mandan Metropolitan Planning Organization

Project Information Summary

Study Purpose

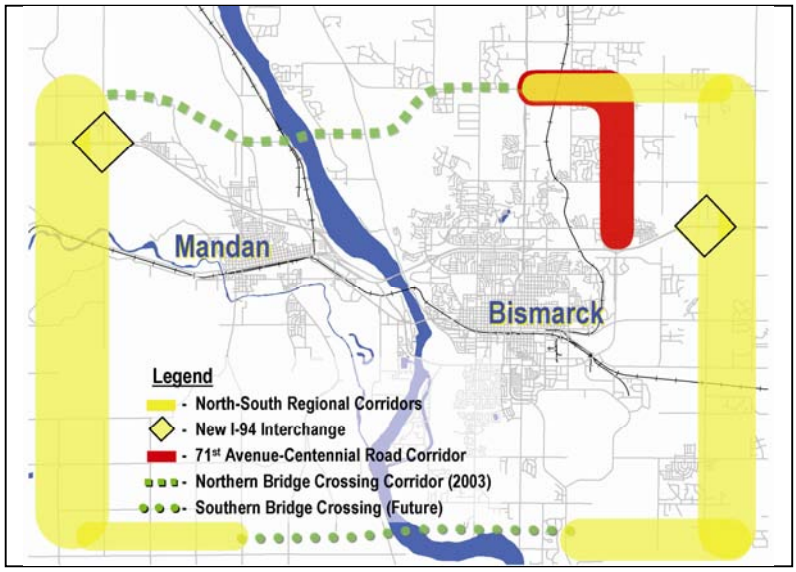
The Long Range Transportation Plan (LRTP) includes a partial or complete regional beltway corridor on the fringe of the metropolitan area. The regional beltway is assumed to be implemented in the long-term period, which would be prior to 2035. City and county staff have expressed concern that currently there are safety issues in the 71st Avenue and Centennial Road corridors and that while the issues would be at least partially addressed by the regional beltway, there may be smaller scale interim improvement needs in the corridor.

The purpose of the 71st Avenue-Centennial Road Corridor Study is to investigate the need for interim improvements (prior to 2015), assess the adjacent impacts of alternatives and develop a planning level cost estimate for the alternatives.

The corridor study area encompasses:

- 71st Avenue: US 83 to Centennial Road.
- Centennial Road: 71st Avenue to I-94

Figure 1 – Study Areas



Corridor Issues

Transportation issues to be addressed through completion of the corridor study are:

- Safety:
  - Trucks travel within and through the corridor conflicting with automobile traffic turning into and out of the corridor to access developed areas along the corridor.
  - Sight distance to/from private driveways and public streets at specific locations within the corridor.
- Bike and pedestrian accommodation along (lateral to the corridor) and across the corridor. Currently, sidewalks and/or bike paths are not provided through the majority of the corridor.
- Development driven traffic increases: As the area adjacent to the 71st Avenue and Centennial Road corridors is expected to develop as residential, commercial and mixed-use (office, industrial, commercial) activities, traffic volume is expected to increase over time. The conflicts presently observed in the corridor will increase as development-driven traffic is added to the corridor and through traffic continues to increase, especially due to a significant portion of the through traffic being trucks.

Traffic Volumes (Present/Future)

2006 traffic counts in the corridor by segment are listed below:

- Centennial Road:
  - I-94 to Century Avenue: 13,000 vehicles per day.
  - Century Avenue to 43rd Avenue: 7,700 vehicles per day.
  - 43rd Avenue to 57th Avenue: 4,100 vehicles per day.
  - 58th Avenue to 71st Avenue: 3,500 vehicles per day.
- 71st Avenue:
  - Centennial Avenue to US 83: 4,000 vehicles per day.

2020 traffic forecasts by segment:

- Centennial Road:
  - I-94 to Century Avenue: 18,900 vehicles per day.
  - Century Avenue to 43rd Avenue: 10,300 vehicles per day.
  - 43rd Avenue to 57th Avenue: 4,900 vehicles per day.
  - 58th Avenue to 71st Avenue: 4,200 vehicles per day.
- 71st Avenue:
  - Centennial Avenue to US 83: 4,600 vehicles per day.

Recommended Number of Lanes

The recommended number of lanes by segment is displayed in Figure 2.

Typical Cross Sections

Typical cross sections for the 71st Avenue and Centennial Road corridors are displayed in Figure 3.

FIGURE 2 – RECOMMENDED NUMBER OF LANES

For More Information

Visit the project website:
www.71st-Centennial.com

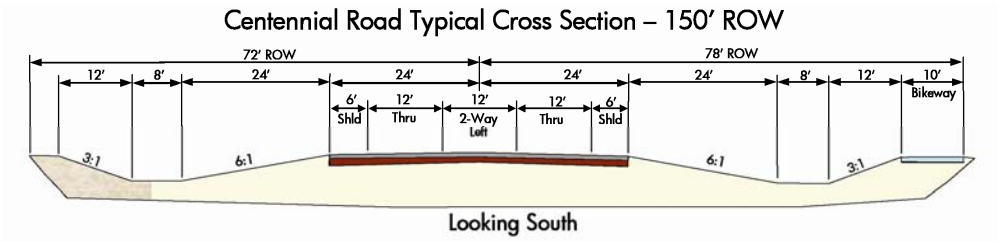
Public Information Meeting

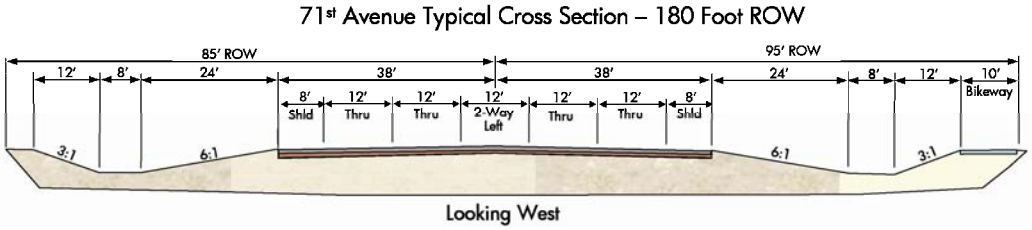
November 29, 2007
Century High School
6:00 PM to 8:00 PM

Talk to the Project Manager

URS Corporation, Inc.
Bill Troe, AICP
402-952-2522
Bill_Troe@urscorp.com

FIGURE 3 – TYPICAL CROSS SECTIONS





Bismarck-Mandan
METROPOLITAN PLANNING ORGANIZATION

P.O. Box 5503 • 221 North 5th Street
Bismarck, North Dakota 58506
Telephone 701 222 6447
TDD Dial 711
Email cobplan@state.ne.us
Web www.bismarck.org

November 16, 2007

Dear Resident/Property Owner/Occupant:

The Bismarck-Mandan Metropolitan Planning Organization (MPO), Burleigh County, the City of Bismarck, Ulteig Engineers, Inc. and URS invite you to attend a public input meeting which will be held at the Century High School Auditorium in Bismarck, North Dakota.

All interested persons are invited to participate in this meeting. The meeting will begin at 6:00 p.m. with an open house and will end at 8:00 p.m. on Thursday, November 29, 2007. A formal presentation will be given at 6:15 p.m. with opportunities to review project materials before and after the presentation.

Meeting Purpose: To discuss alternative locations for a future major north-south roadway and interchange on Bismarck's east side. The 66th Street and 80th Street corridors are front-runners for the corridor location. This Study covers roadway improvements as follows:

- Along 71st Avenue from US 83 to 66th Street or 80th Street
- Along 66th Street or 80th Street from 71st Avenue N. to 48th Avenue S.
- Along 48th Avenue S. from 66th Street or 80th Street to Hwy 1804

In addition, the MPO is also evaluating shorter term improvement needs to better accommodate truck and auto traffic along 71st Avenue and Centennial Road between US 83 and I-94.

Issues: Right of way needs and impacts, property impacts, environmental impacts, traffic impacts, constructability, access needs and impacts on existing and future development will be discussed.

Additional Information: Additional information regarding the beltway study can be found on the project website: www.nscorridors.ulteig.biz. Additional information regarding the shorter term period study along 71st Avenue and Centennial Road can be found at www.71st-Centennial.com.

If you are unable to attend the meeting but still wish to provide comments, please submit comments by Monday, December 10, 2007. Comments regarding either study or requests for special facilities should be directed to J. Steven Windish at 1412 Basin Avenue, Bismarck, ND 58504; email Steve.Windish@Ulteig.com or by phone at 701-355-2333.

Bismarck-Mandan
Metropolitan Planning Organization

North-South Regional Beltway and 71st Avenue-Centennial Road Corridor Studies

Public Meeting Presentation

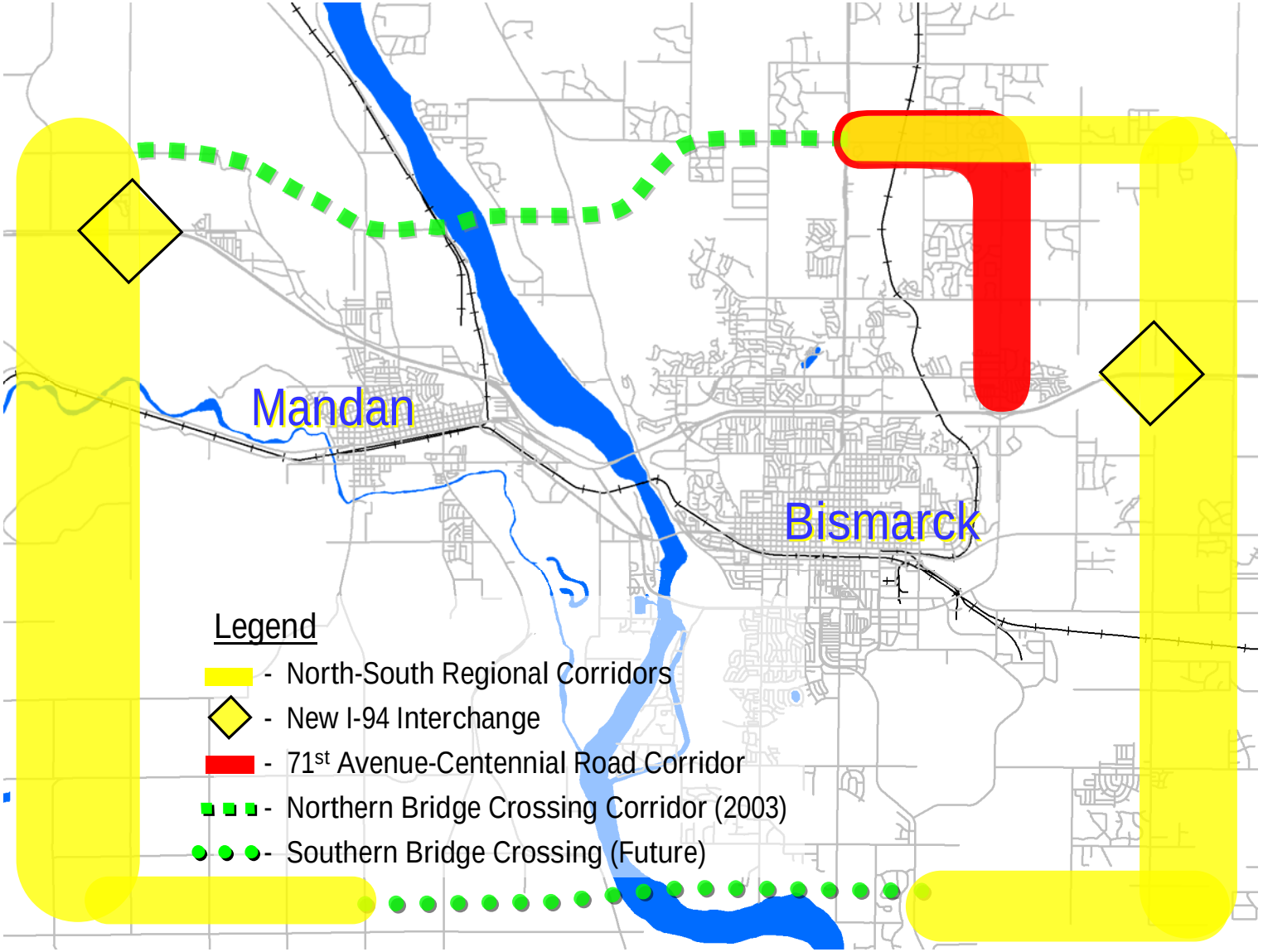
November 29, 2007

Overview of the Meeting

- Introductions
- Purpose of the Meeting
- Introduction of the Projects
  - North-South Regional Beltway Study
  - 71st Avenue-Centennial Road Corridor Study
- Project Status Updates
- Input/Questions/Comments
  - Comment Forms
  - Email Through Websites

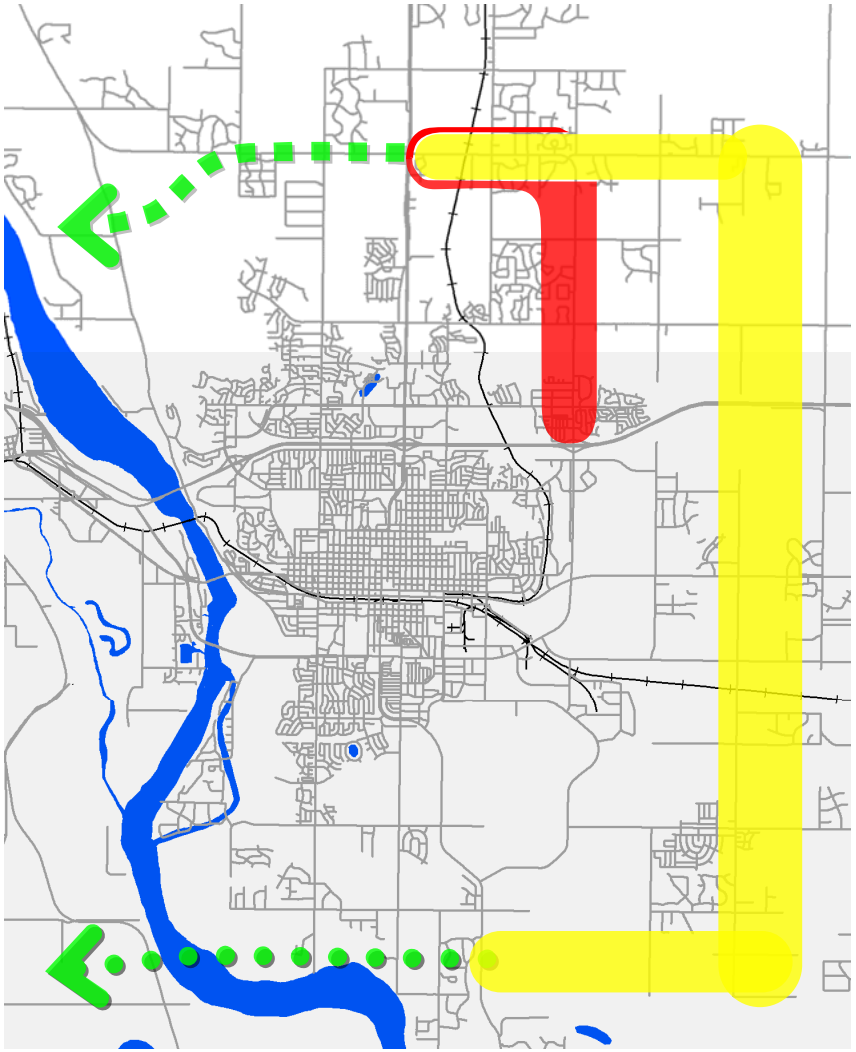
71st Avenue-Centennial Road
www.71st-Centennial.com
N-S Regional Beltway
www.nscorridors.ulteig.biz

Study Areas


Mandan
Bismarck
Legend
- North-South Regional Corridors
- New I-94 Interchange
- 71st Avenue-Centennial Road Corridor
- Northern Bridge Crossing Corridor (2003)
- Southern Bridge Crossing (Future)

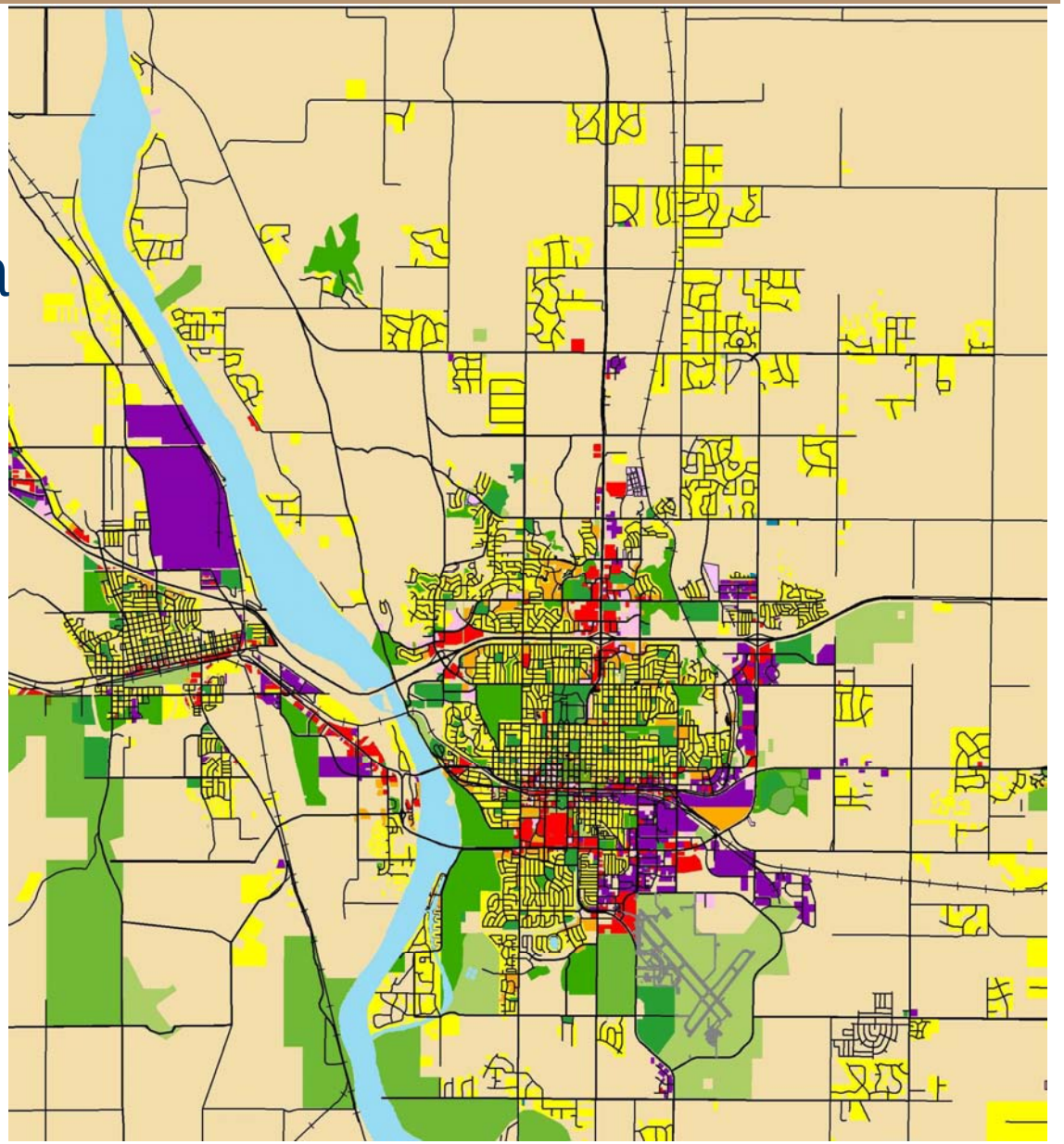
Overview of the Studies – Burleigh Side

- Why?
  - Development on Fringe Continues
  - Past/Future Development Alters Traffic Patterns and Corridor Function
  - Mixing Trucks, Cars and Bikers/Peds – Safety Concerns
- Short and Long Term Issues/Concerns



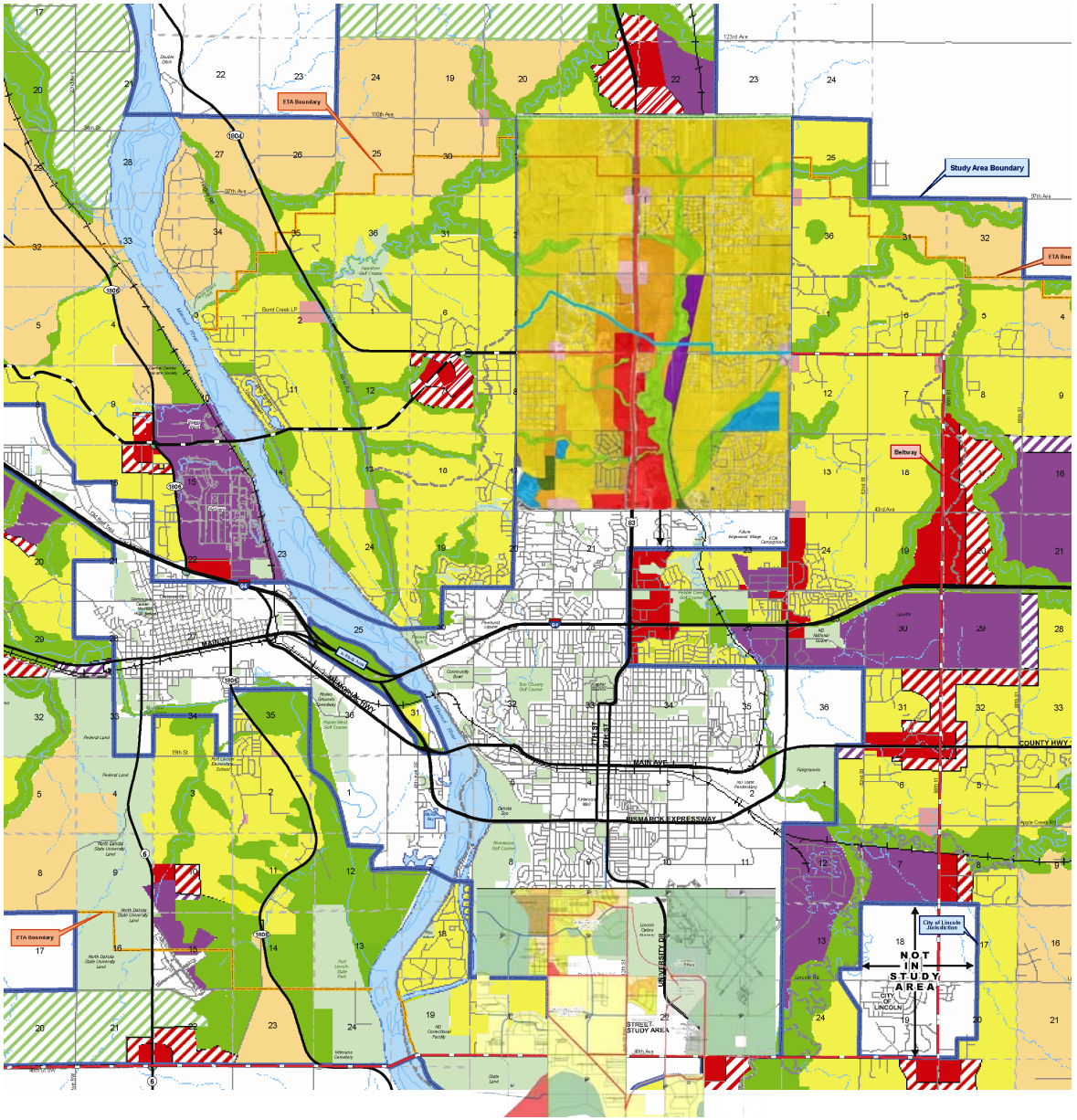
Existing Land Use

- Study Areas on Fringe
- Much Adjacent Area – Ag/Undeveloped/ Open Space
- New Development Proposals Being Submitted



Future Land Use Concept

- Primarily Residential (Land Area)
- Commercial Extends North on US 83
- Pockets of Commercial on Centennial Rd
- Mixed-Use – Affords Flexibility

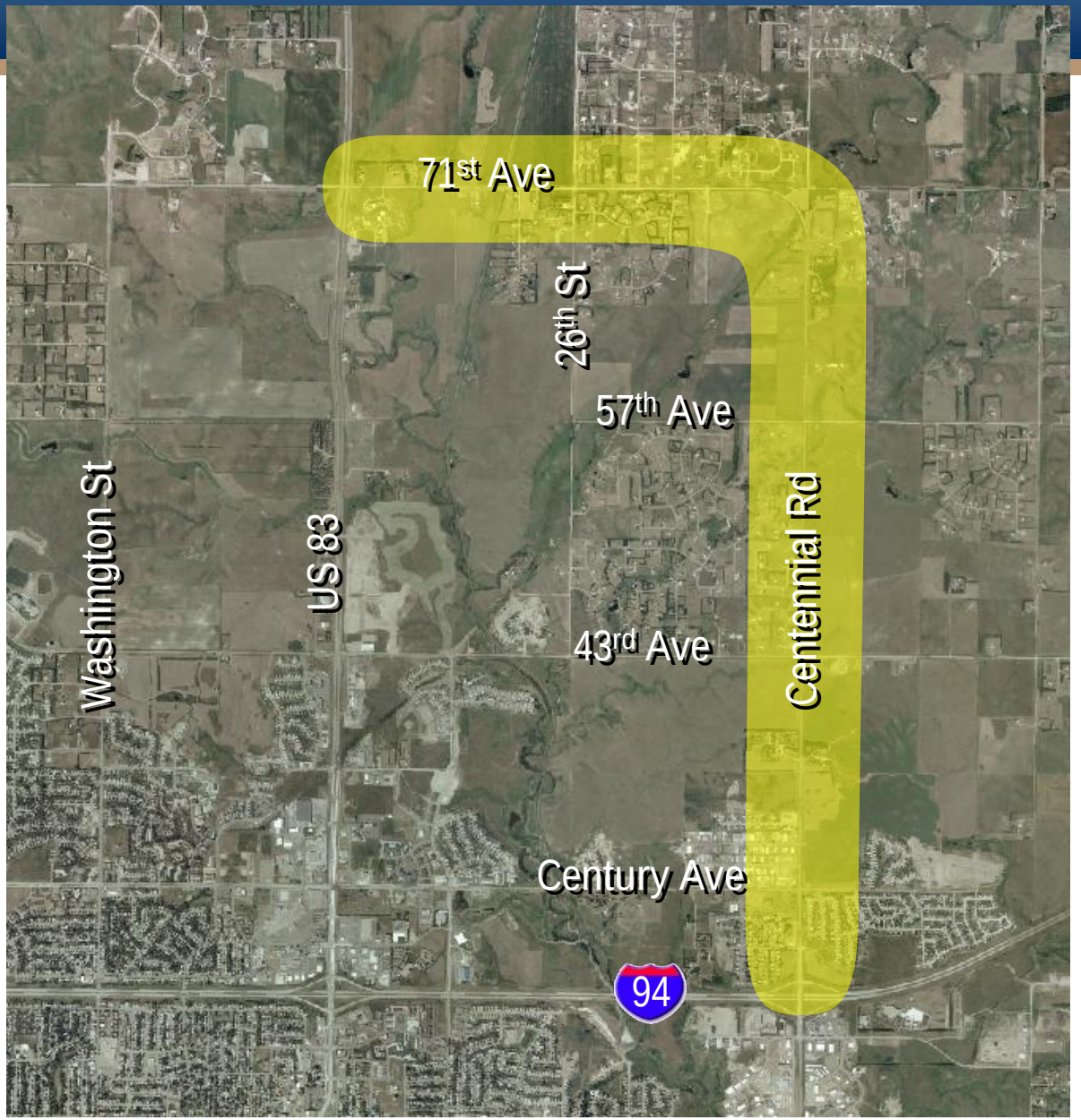


71st Avenue-Centennial Road Corridor Study

Status Report

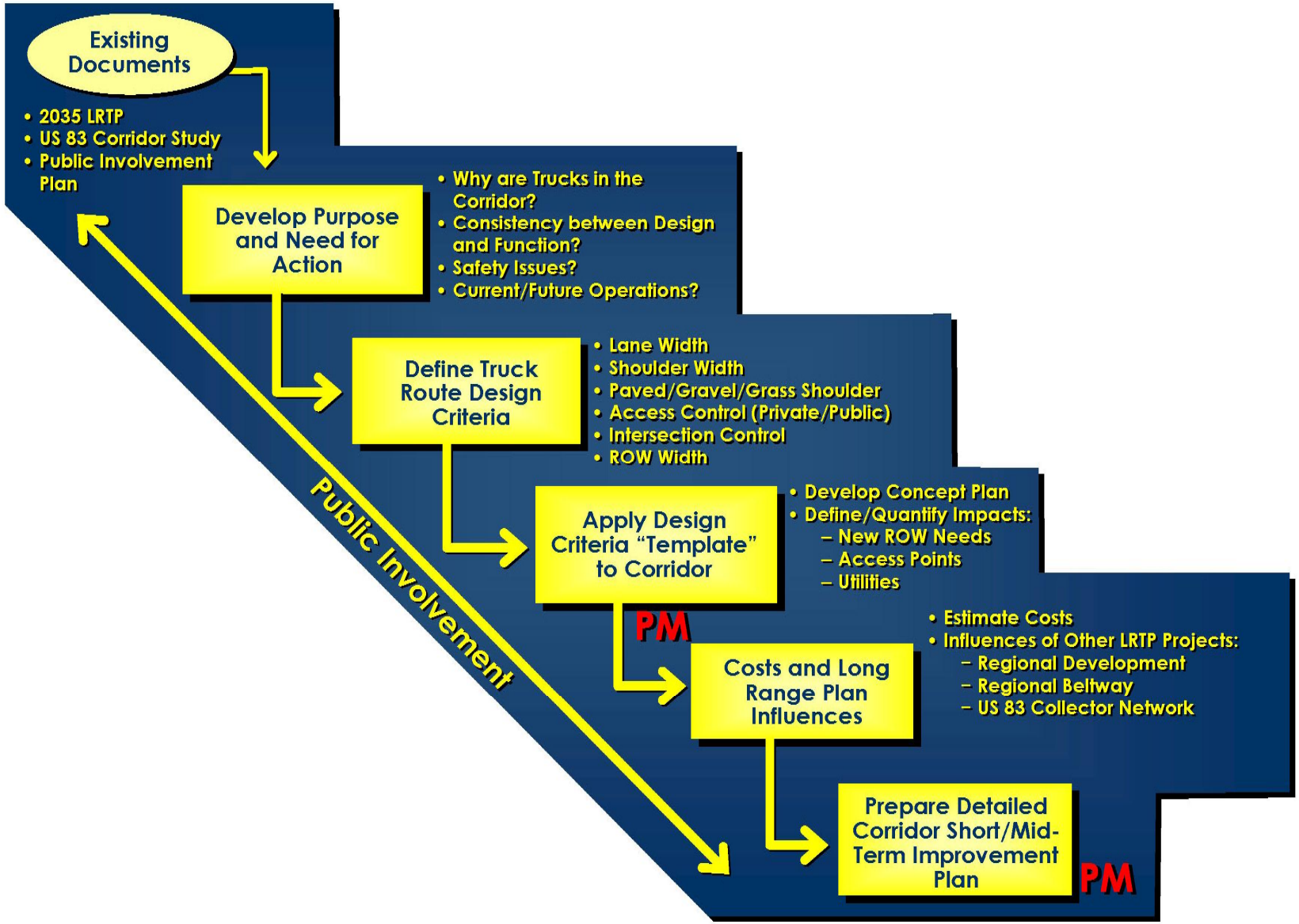
71st Avenue-Centennial Road Study Limits

Bismarck-Mandan Metropolitan Planning Organization



71st-Centennial Corridor Study Overview

Bismarck-Mandan Metropolitan Planning Organization



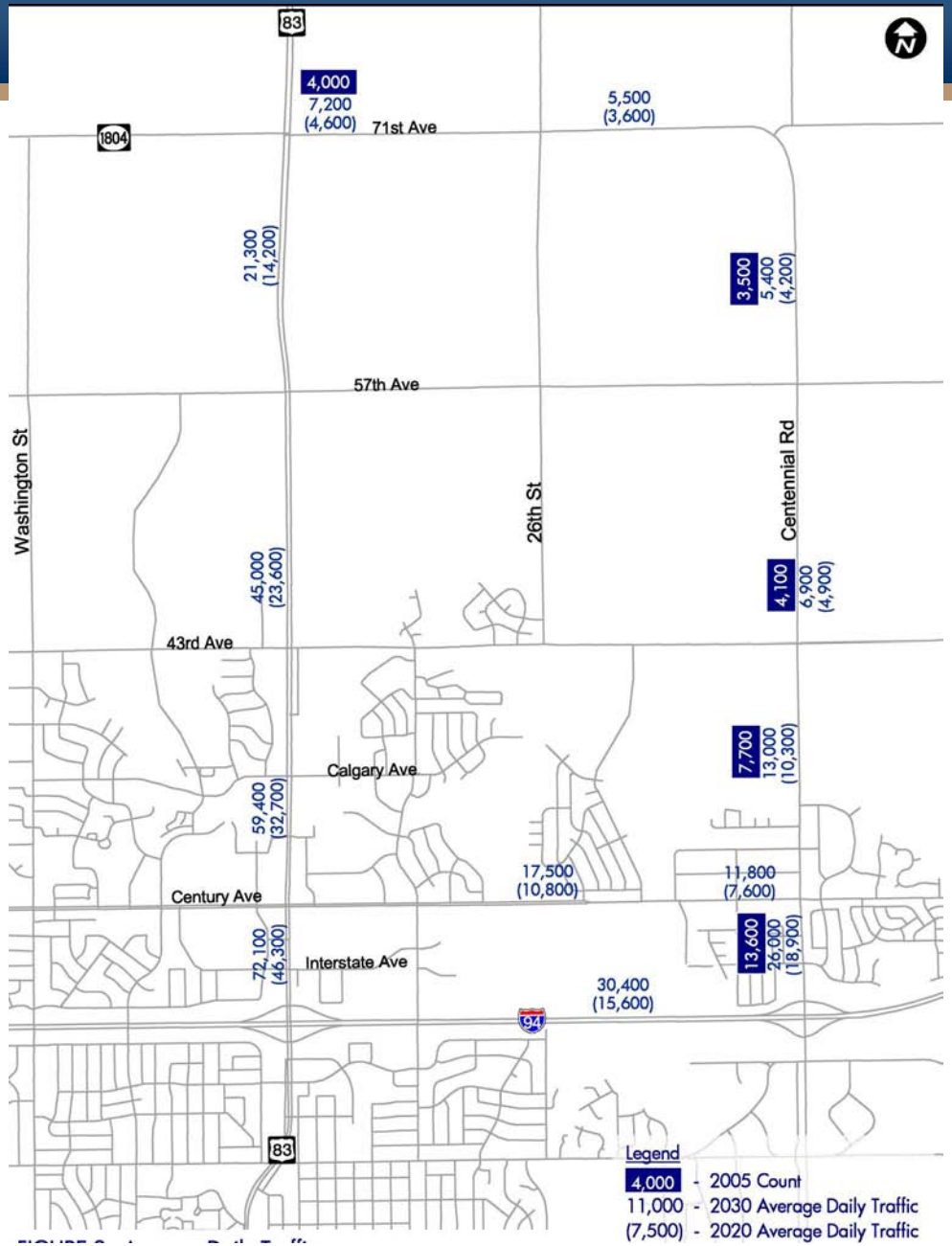
71st Avenue- Centennial Road Issues

Bismarck-Mandan Metropolitan Planning Organization

- Safety:
  - Truck Traffic – Driveway Access
  - Sight Distance
- Bike and Pedestrian Accommodation:
  - Bike/Pedestrian Trails/Sidewalks
  - Controlled Crosswalks
- Development Driven Traffic Increases:
  - More Truck-Auto Conflicts

Corridor Traffic

- Current Volume – 4,000 to 14,000 VPD
- Forecasts (2020) – 4,200 to 19,000



Truck Traffic Flow - Survey

Bismarck-Mandan Metropolitan Planning Organization

Destination/Origin		Route Choice
• I-94	⟹	• US 83
• Bismarck	⟹	• 71st Ave/Centennial Rd
• South of Bismarck	⟹	• 71st Ave/Centennial Rd

FIGURE 2. Daily Southbound Truck Estimates

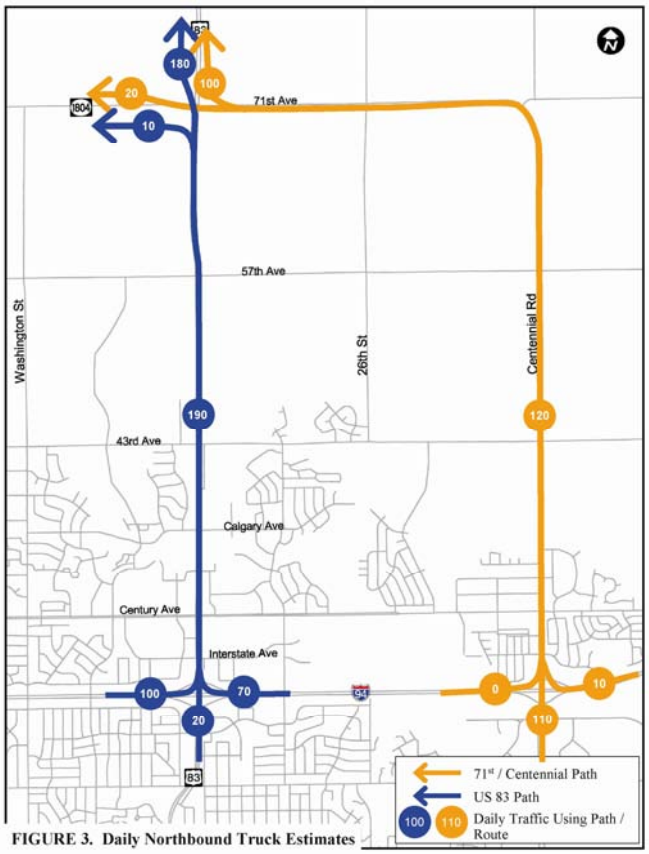


FIGURE 3. Daily Northbound Truck Estimates

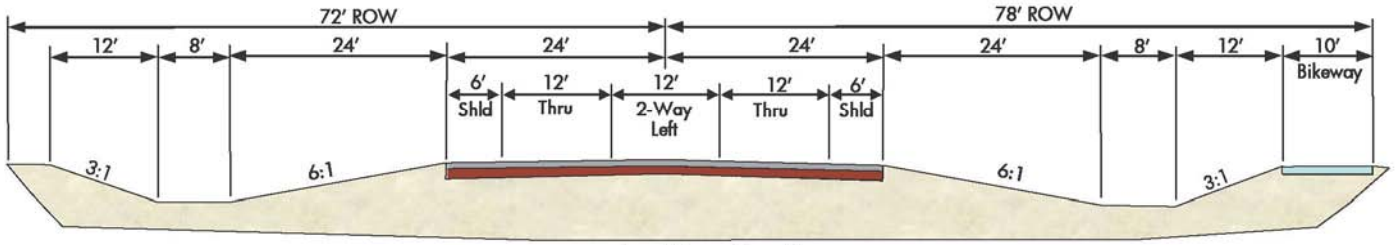
Corridor Recommendations - Lanes

- Centennial Road:
  - I-94 to Century Ave: 4-Lane + Turn Lanes
  - Century Ave to Jericho Rd: 5-Lane
  - Jericho Rd to Calgary Ave: Transition to 3-Lane
  - Calgary Ave to 71st Ave: 3-Lane
- 71st Avenue:
  - Centennial Rd to US 83: 3-Lane

Cross Sections - Preliminary

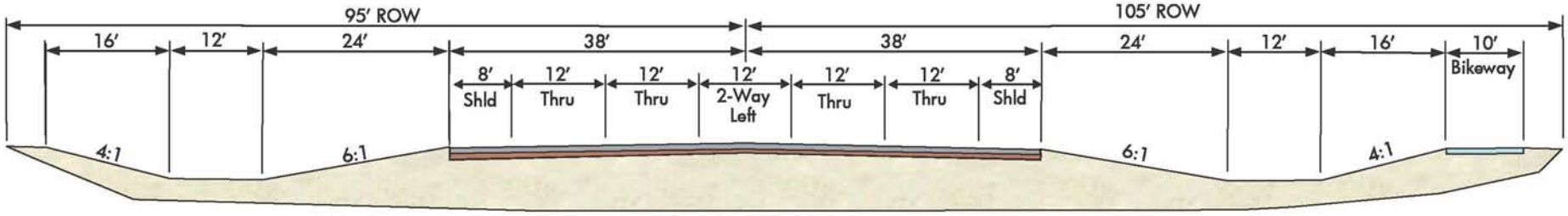
Bismarck-Mandan Metropolitan Planning Organization

Centennial Road Typical Cross Section – 150′ ROW



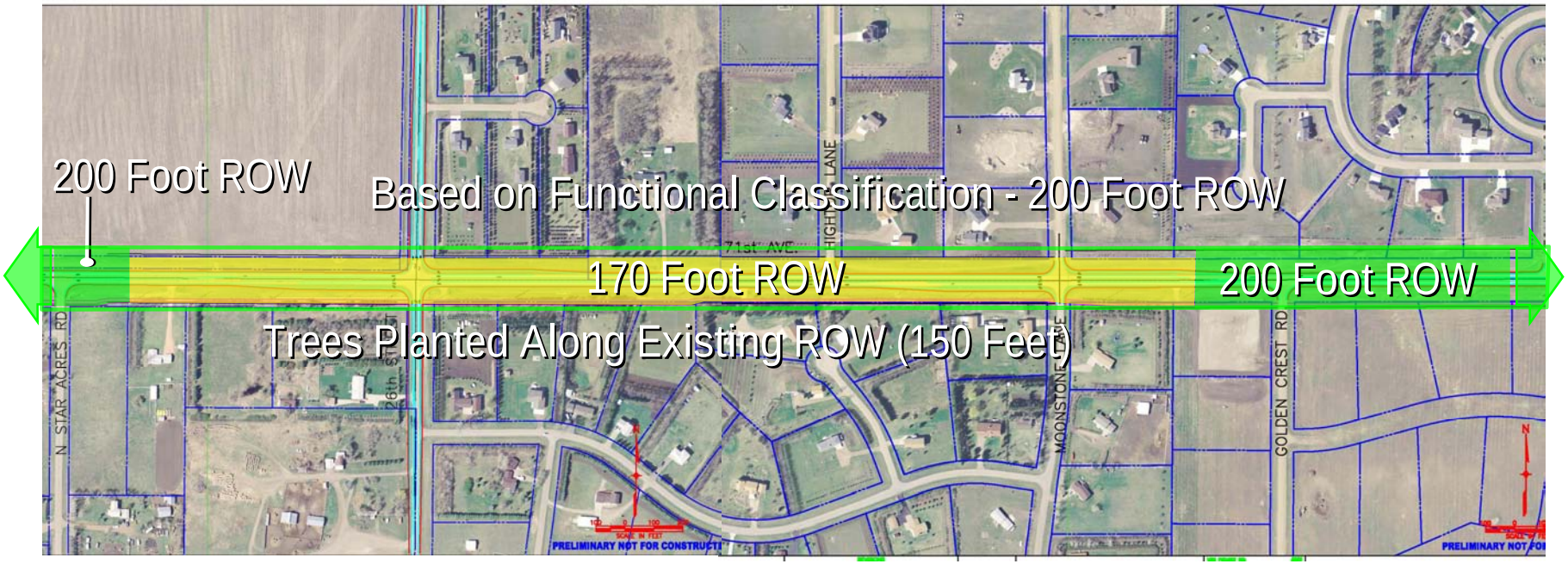
Looking South

71st Avenue Typical Cross Section – 200 Foot ROW



Looking West

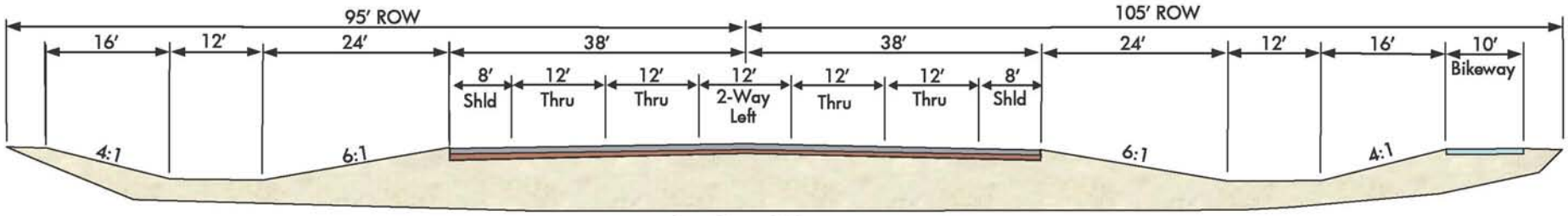
Constrained ROW Area – 71st Avenue



Cross Sections - Preliminary

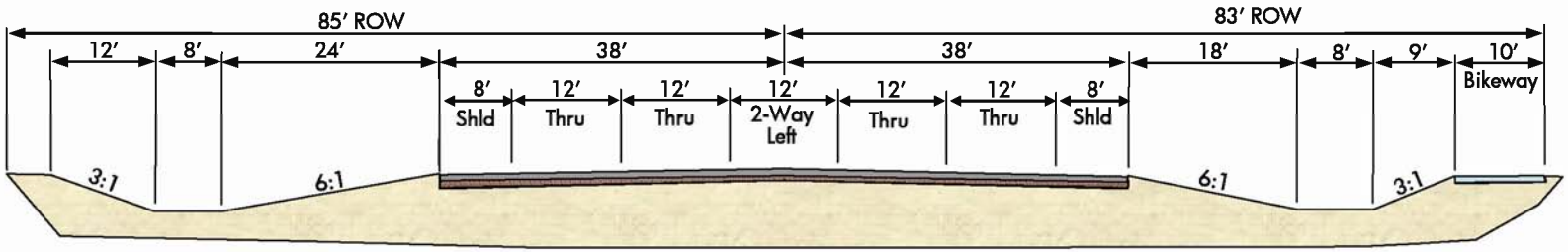
Bismarck-Mandan Metropolitan Planning Organization

71st Avenue Typical Cross Section – 200 Foot ROW



Looking West

71st Avenue Typical Cross Section – 170 Foot ROW



Looking West

Next Steps – 71st Ave/Centennial Rd

Bismarck-Mandan Metropolitan Planning Organization

- Receive Comments Tonight and For Next Two Weeks
- Modify Concept as Needed Based on Comments
- Complete Cost Estimates
- Determine Influences on Current Long Range Plan
- Finalize Concept
- Present to Public

Additional Information

Bismarck-Mandan Metropolitan Planning Organization

Presentation, Plots and Handout will be on Website by

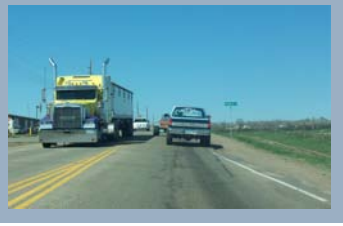
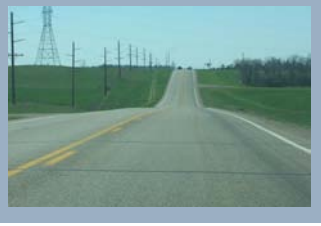
Tuesday, December 4, 2007

www.71st-Centennial.com

You can email comments and questions!

Thanks



Bismarck-Mandan
METROPOLITAN PLANNING ORGANIZATION

P.O. Box 5503 • 221 North 5th Street
Bismarck, North Dakota 58506
Telephone 701 355-1804
TDD Dial 711
Email cobplan@state.ne.us
Web www.bismarck.org

February 11, 2008

Address

Dear Resident/Property Owner/Occupant:

The Bismarck-Mandan Metropolitan Planning Organization (MPO) is currently conducting the 71st Avenue-Centennial Road Corridor Study, covering the area from the US 83/ND 1804/71st Avenue intersection to I-94/Centennial Road. The primary goal of the study is to identify short to mid-term safety and operations improvements in the corridor.

On February 20, 2008, the Bismarck-Mandan MPO and their consultants, URS Corporation and Houston Engineering, will host a public information open house meeting to discuss the preliminary study recommendations. The purpose of the meeting will be to:

- Update residents and stakeholders on the overall study.
- Present for public comment the preliminary recommendations for roadway improvements in the study area.
- Provide information on the final steps for the study.

We hope you can attend the meeting. If you cannot attend, additional information will be available on the project website at www.71st-Centennial.com. If you are unable to attend the meeting but still wish to provide comments, please submit comments by Friday, March 7, 2008. Comments can be submitted via the project website, email Bill_Troe@urscorp.com or by phone at 402-952-2522.

For more information please contact Steve Saunders from the MPO at 355-1848, or Bill Troe from URS at 402-952-2522. Requests for special facilities should be directed to Steve Saunders at the phone number listed above.

Meeting Information:

Date: February 20, 2008
Location: Century High School - Auditorium
1000 Century Avenue
Time: 6:00 PM through 8:00 PM

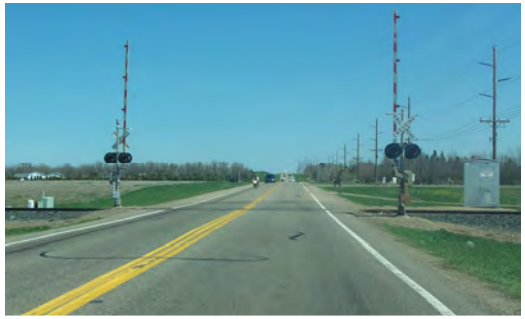
A presentation of the project background will be provided at approximately 6:15 PM

Bismarck-Mandan
Metropolitan Planning Organization

71st Avenue-Centennial Road Corridor Study

Public Meeting Presentation

February 20, 2008



Overview of the Meeting

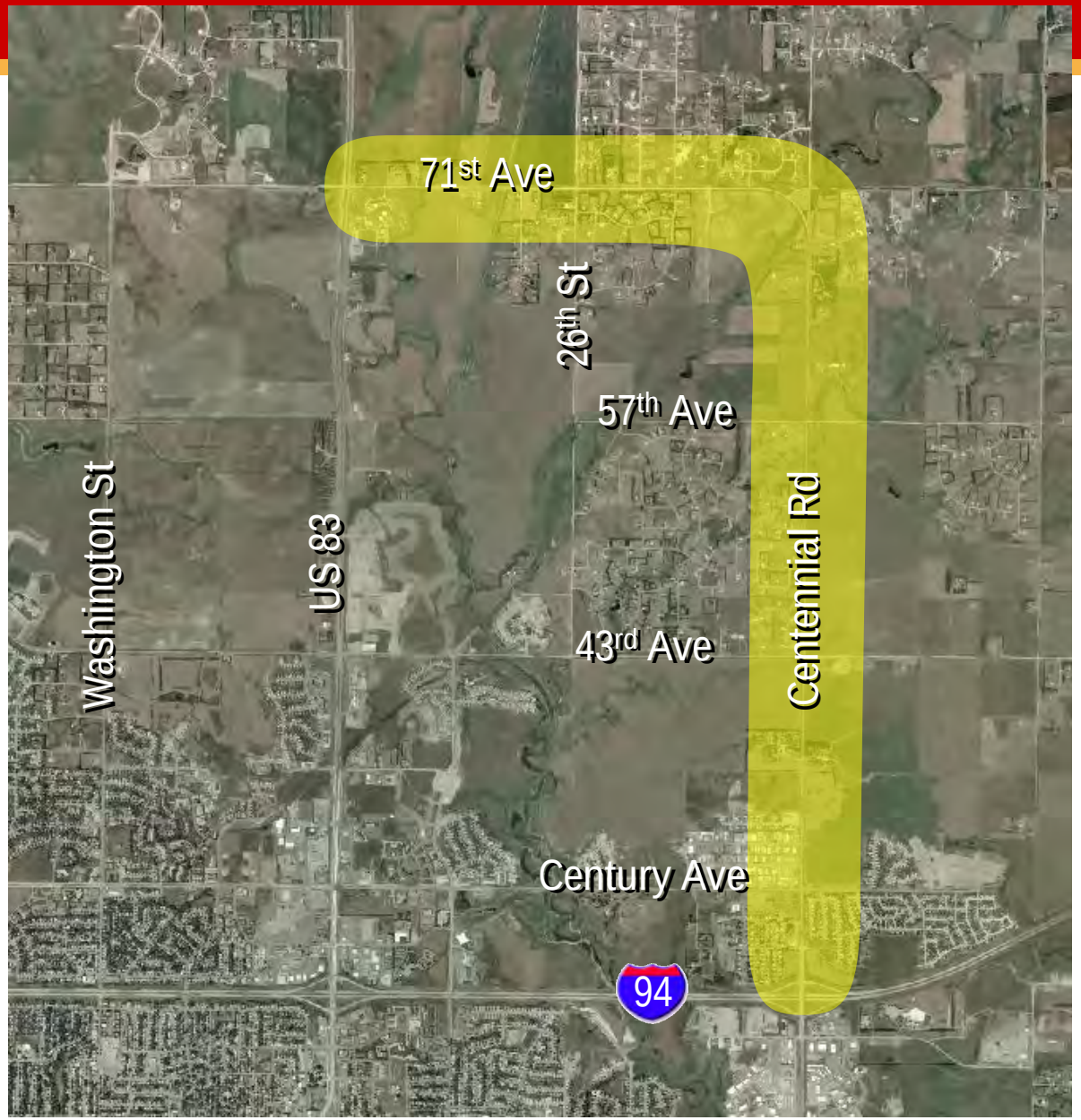
Bismarck-Mandan Metropolitan Planning Organization

- Introductions
- Purpose of the Meeting
- Project Status Updates
  - Preliminary Recommendations
  - Next Steps
- Input/Questions/Comments
  - Comment Forms
  - Email Through Websites

Web Site
71st Avenue-Centennial Road
www.71st-Centennial.com

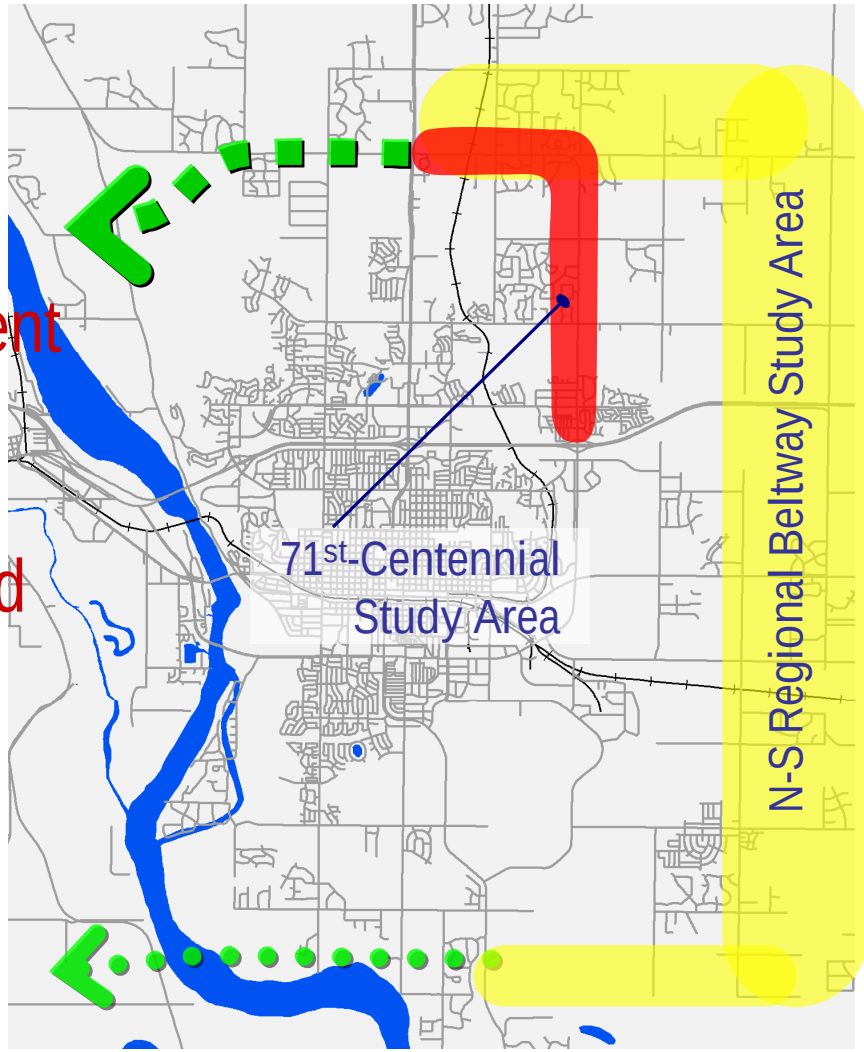
71st Avenue-Centennial Road Study Limits

Bismarck-Mandan Metropolitan Planning Organization



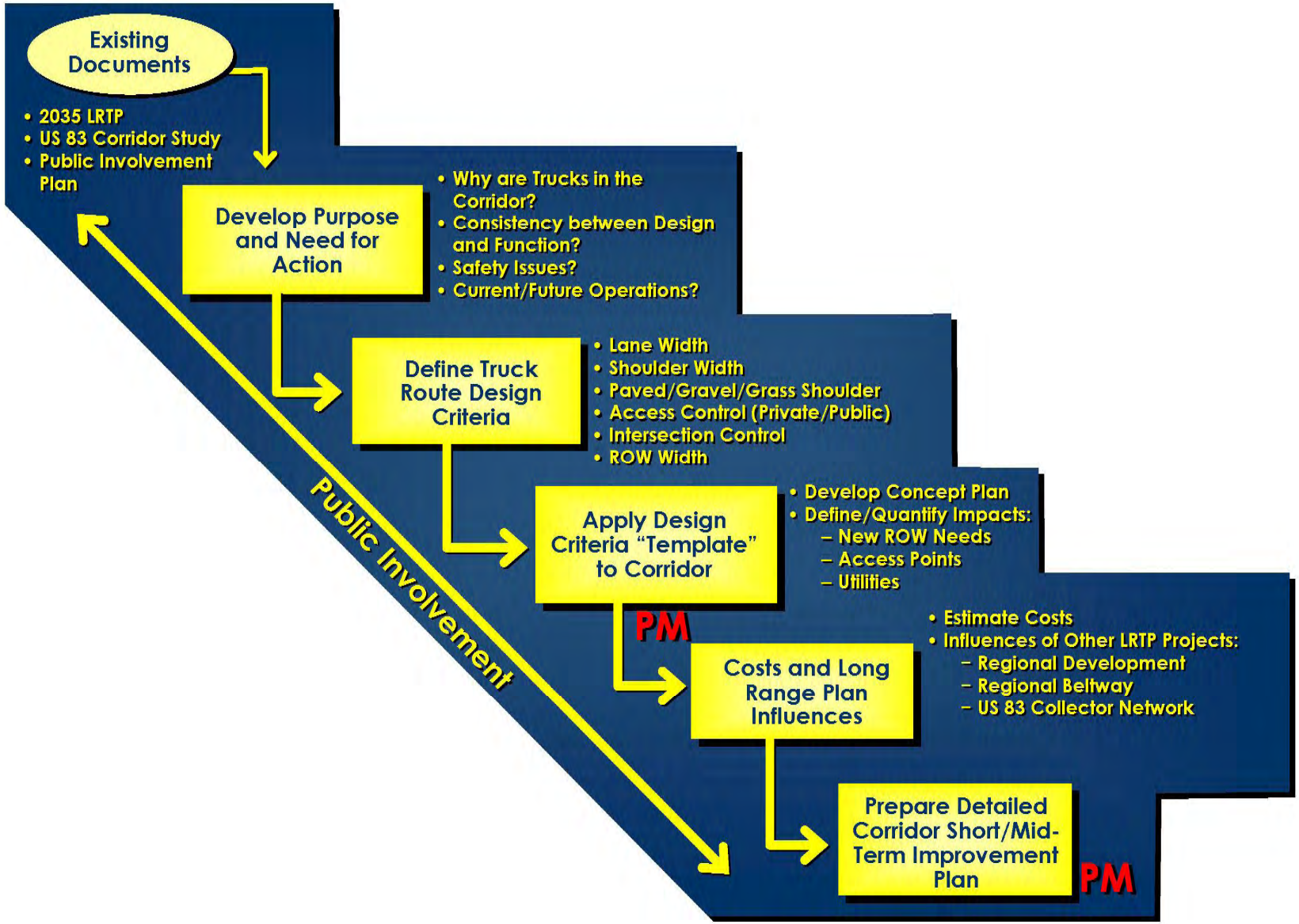
Overview of the Study

- Why?
  - Development on Fringe Continues
  - Past/Future Development Alters Traffic Patterns and Corridor Function
  - Mixing Trucks, Cars and Bikers/Peds – Safety Concerns
- Short and Long Term Issues/Concerns



71st-Centennial Corridor Study Overview

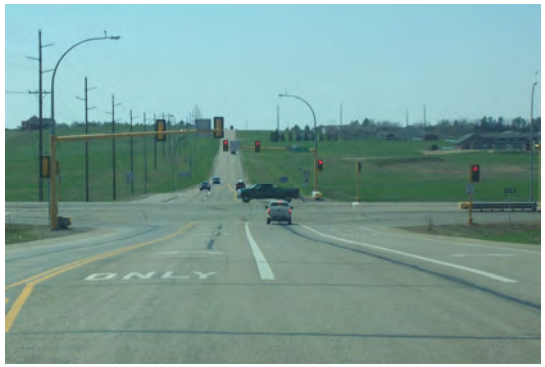
Bismarck-Mandan Metropolitan Planning Organization



71st Avenue- Centennial Road Issues

Bismarck-Mandan Metropolitan Planning Organization

- Safety:
  - Truck Traffic – Driveway Access
  - Sight Distance
- Two Lanes – Multiple Functions
- Bike and Pedestrian Accommodation:
  - Bike/Pedestrian Trails/Sidewalks
  - Controlled Crosswalks
- Development Driven Traffic Increases:
  - More Truck-Auto Conflicts
- Funding



Existing Multi-use Trails

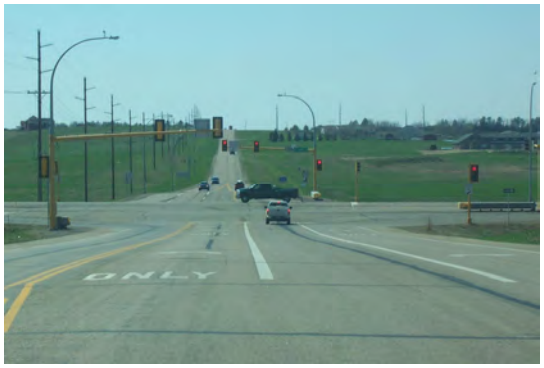
Bismarck-Mandan Metropolitan Planning Organization

Bismarck Trails

- 0.36 Miles - Igoe Park Loop
- 2.25 Miles - Pebble Creek Loop
- 3.14 Miles - Hay Creek Loop One
- 2.47 Miles - Hay Creek Loop Two
- 1.06 Miles - Cottonwood Park Loop
- 3.78 Miles - Sleepy Hollow Loop
- 1.64 Miles - Solheim to Wachter School
- 1.10 Miles - Chief Looking's Village
- 1.83 Miles - Expressway Trail
- 1.13 Miles - Bill Mills Nature Trail
- 1.01 Miles - Sertoma Park Loop
- 3.62 Miles - Riverwood Golf Course One
- 6.00 Miles - Riverwood Golf Course Two
- 2.05 Miles - Pioneer Park to Sertoma Park
- 2.30 Miles - Tom O'Leary Golf Course

71st Avenue- Centennial Road Issues

- Safety:
  - Truck Traffic – Driveway Access
  - Sight Distance
- Bike and Pedestrian Accommodation:
  - Bike/Pedestrian Trails/Sidewalks
  - Controlled Crosswalks
- Development Driven Traffic Increases:
  - More Truck-Auto Conflicts



Truck Traffic Flow - Survey

Bismarck-Mandan Metropolitan Planning Organization

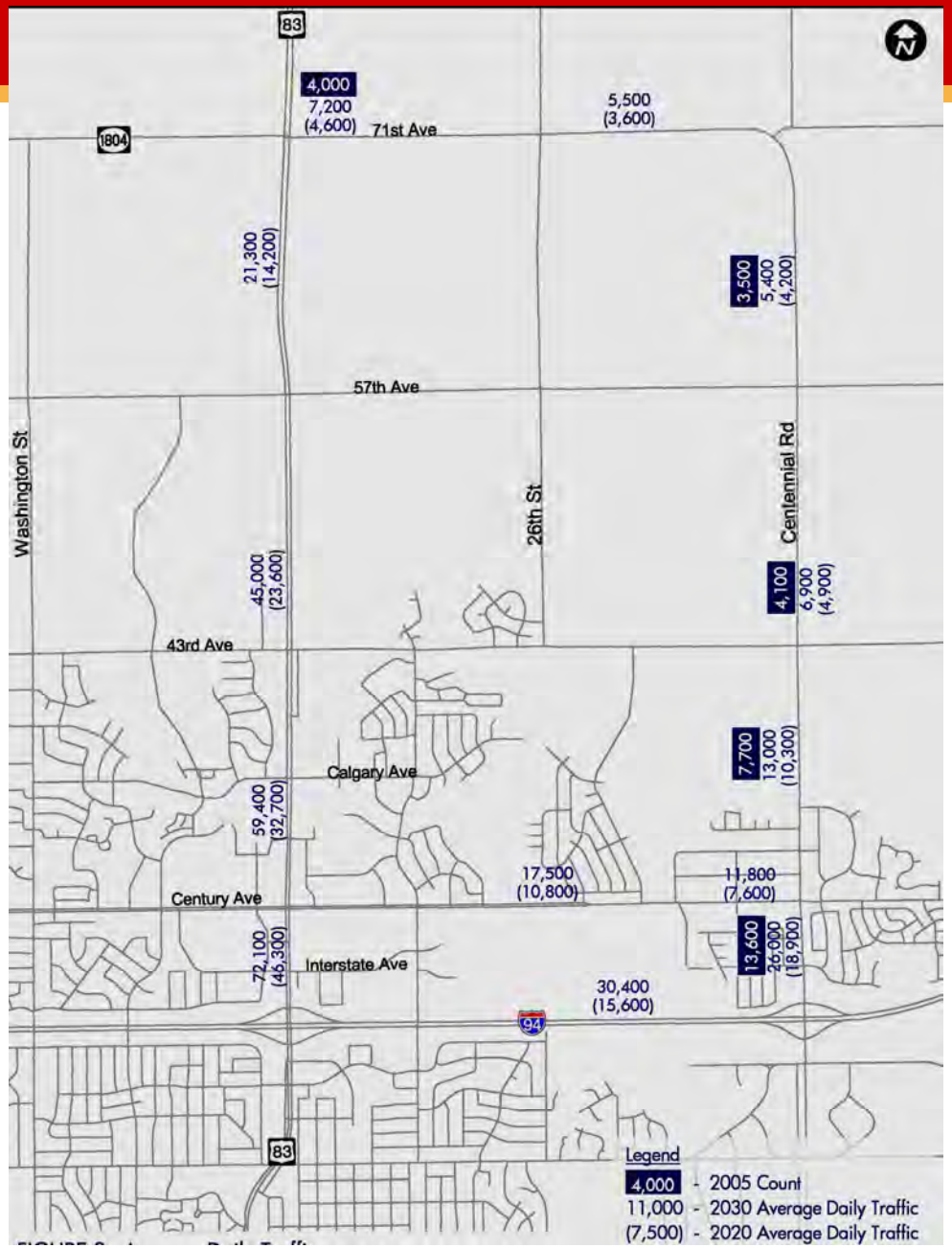
Destination/Origin		Route Choice
• I-94	⟹	• US 83
• Bismarck	⟹	• 71st Ave/Centennial Rd
• South of Bismarck	⟹	• 71st Ave/Centennial Rd

FIGURE 2. Daily Southbound Truck Estimates

FIGURE 3. Daily Northbound Truck Estimates

Corridor Traffic

- Current Volume – 4,000 to 14,000 Vehicles Per Day
- Forecasts (2020) – 4,200 to 19,000 Vehicles Per Day
- Forecasts (2030) – 4,600 to 26,000 Vehicle Per Day



Corridor Recommendations - Lanes

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  - I-94 to Century Ave: 4-Lane + Turn Lanes
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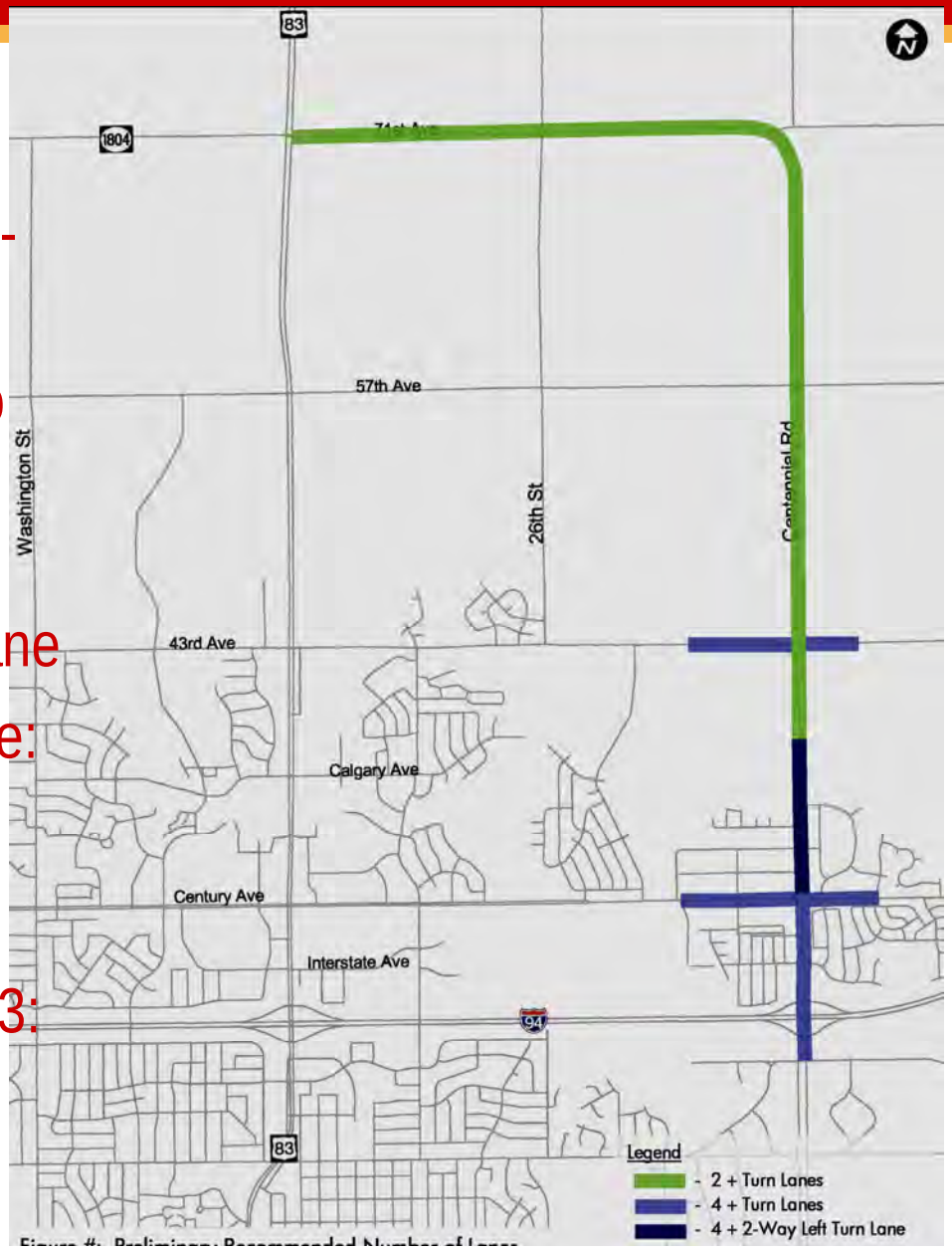
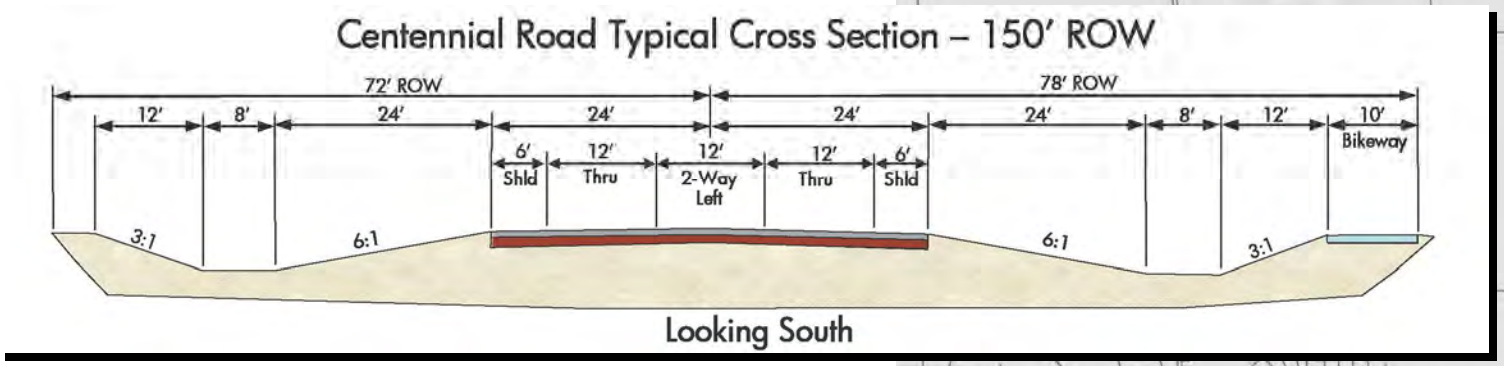
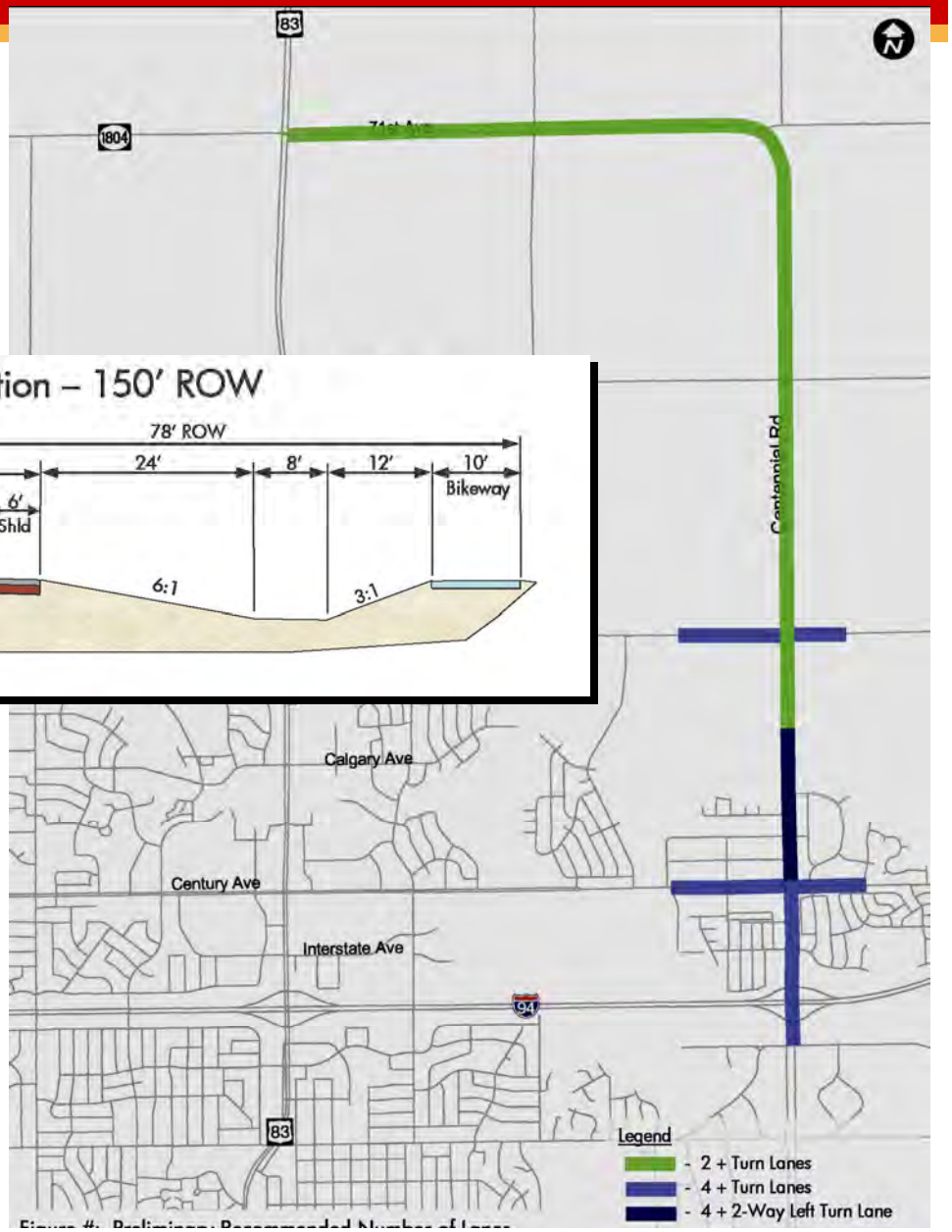
  - Jericho Rd to Calgary Ave: Transition to 3-Lane
  - Calgary Ave to 71st Ave: 3-Lane
- 71st Avenue:
  - Centennial Rd to US 83: 3-Lane



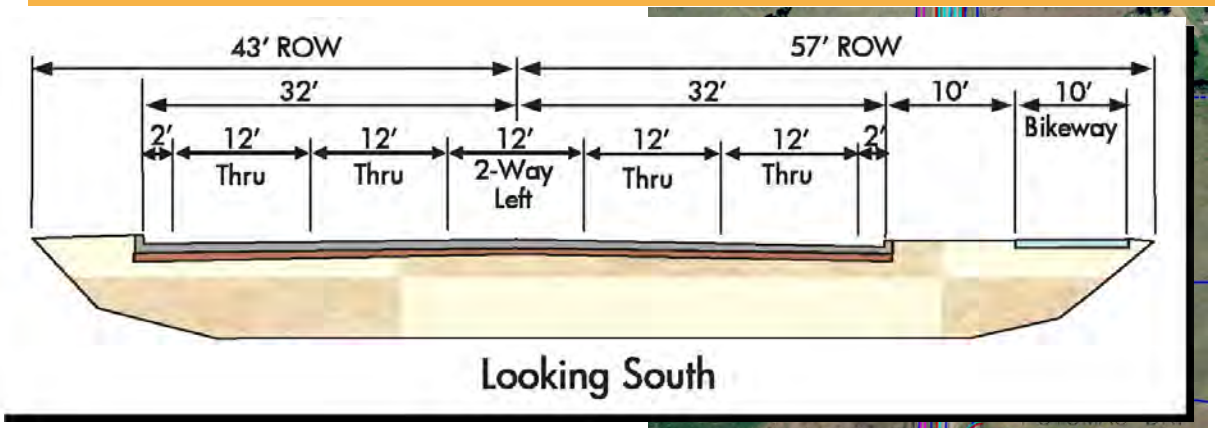
Cross Sections – Centennial Road 3-Lane

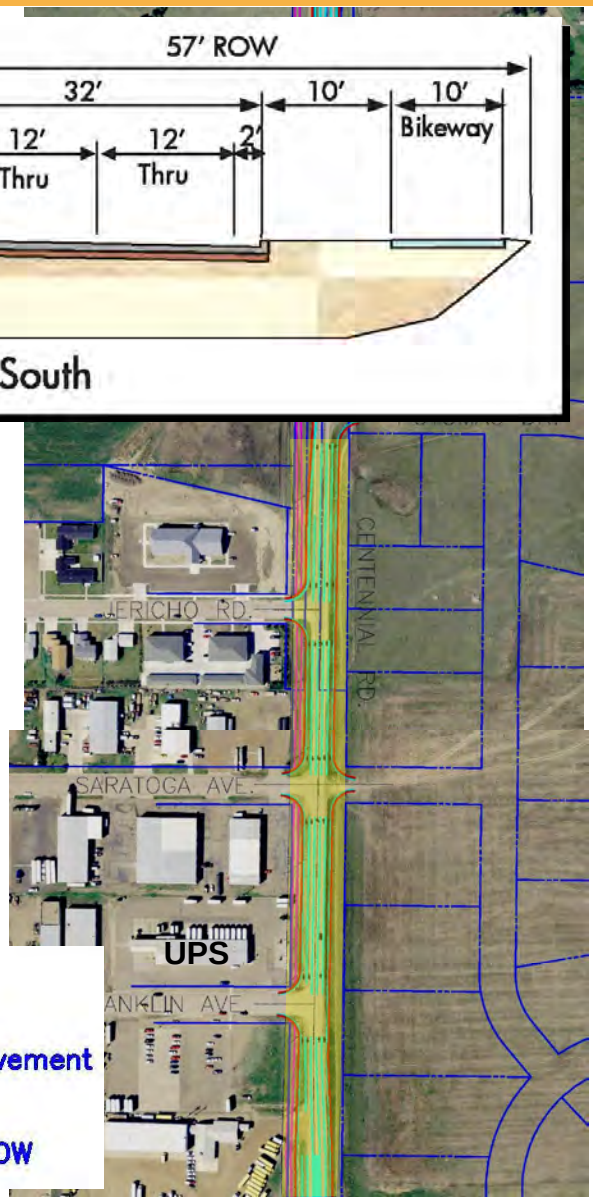
Bismarck-Mandan
Metropolitan Planning Organization

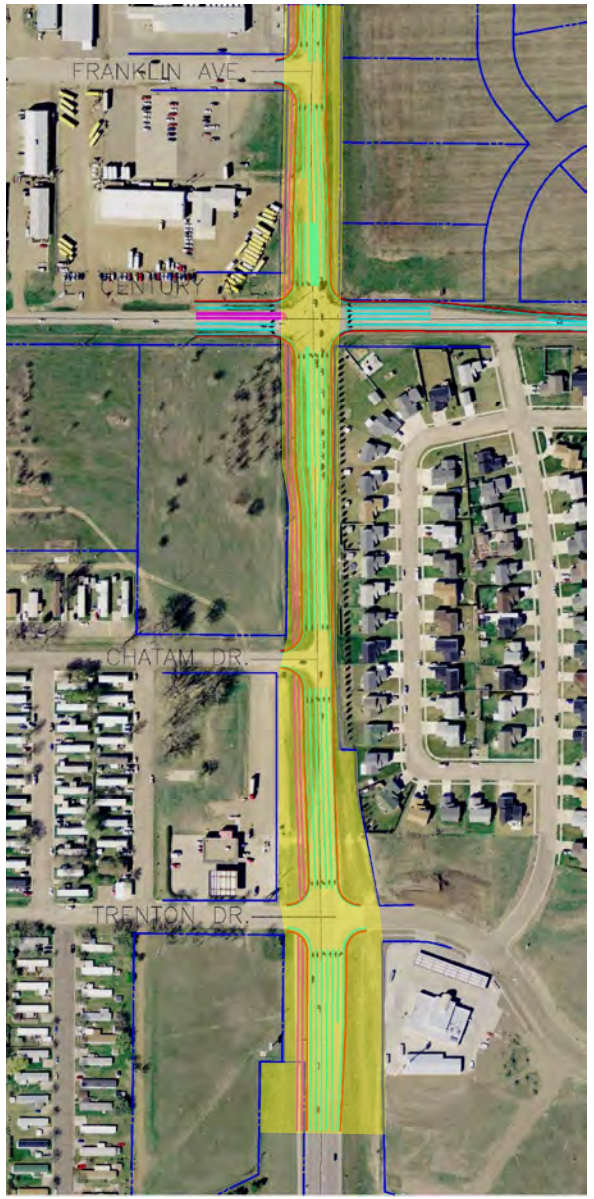




Constrained ROW Area – Centennial Road



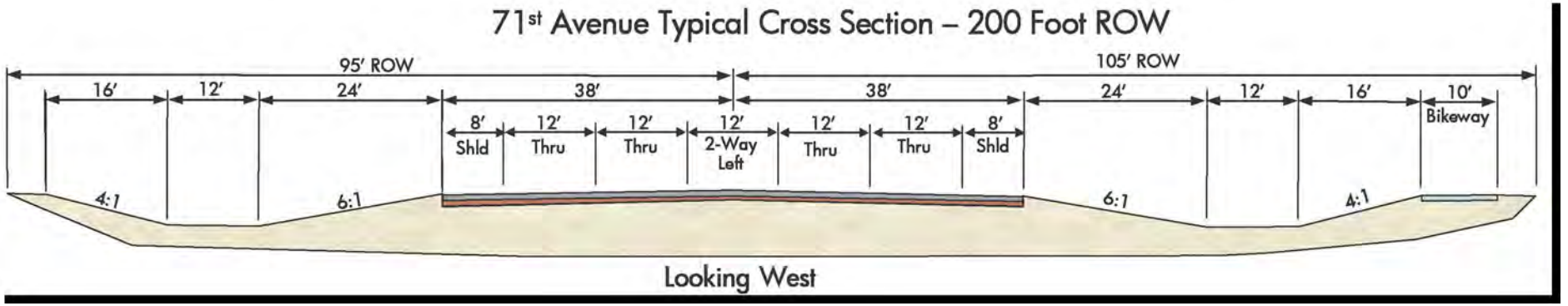




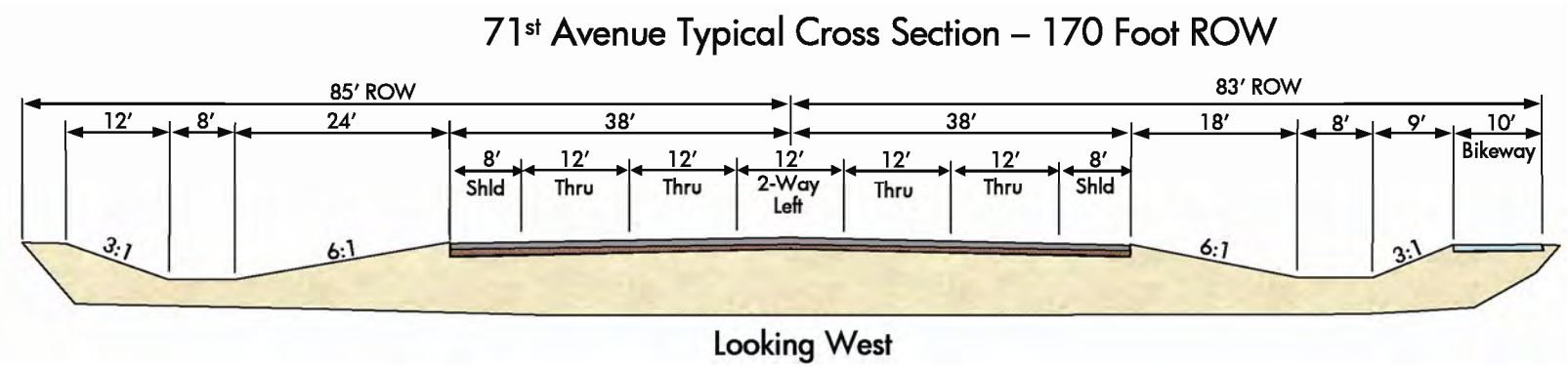
Legend

- Centerline
- Lane Lines
- Edge of Pavement
- Trail
- Parcels
- Proposed ROW

Cross Sections – 71st Avenue



Constrained ROW Area – 71st Avenue



Construction Cost Estimates (2007$)

Bismarck-Mandan Metropolitan Planning Organization

Estimated Cost by Item Description (2007 Dollars)	Expansion Concept			
	Widen Rural/ Asphalt Urban	Rebuild Rural/ Asphalt Urban	Widen Rural/ Concrete Urban	Rebuild Rural/ Concrete Urban
Construction Bid Items[1]	$4,344,000	$6,519,000	$6,465,000	$8,640,000
Contingencies[2]	$1,520,400	$2,281,700	$2,262,800	$3,024,000
Drainage/ Utilities[3]	$434,400	$651,900	$646,500	$864,000
Signing/ Striping[4]	$108,600	$163,000	$161,600	$216,000
Clearing/ Grubbing[5]	$65,200	$97,800	$97,000	$129,600
Construction Signing/Traffic Control[6]	$651,600	$977,900	$969,800	$1,296,000
Mobilization[7]	$217,200	$326,000	$323,300	$432,000
Cost Estimate	$7,341,400	$11,017,300	$10,926,000	$14,601,600

Notes:

1 - Bid items include materials required to construct the roadway and multi-use path - concrete for roadway/curb and gutter; aggregate; embankment material; etc.

2 - Contingencies - 35% of the Construction Bid Items. Factor to cover potential unknowns not uncovered in this very early design investigation.

3 - Drainage/Utilities - 10% of the Construction Bid Items.

4 - Signing and Striping - 2.5% of the Construction Bid Items.

5 - Clearing and Grubbing - 1.5% of Construction Bid Items.

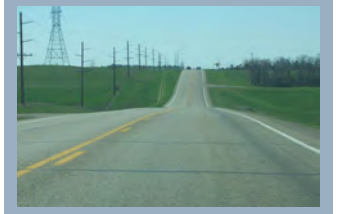
6- Construction Signing/Traffic Control - 15% of Construction Bid Items.

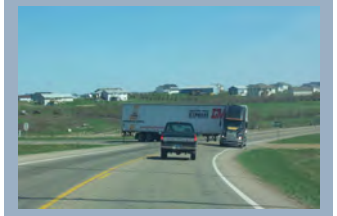
7 - Mobilization - 5% of Construction Bid Items.

Summary of Corridor Study

Bismarck-Mandan Metropolitan Planning Organization

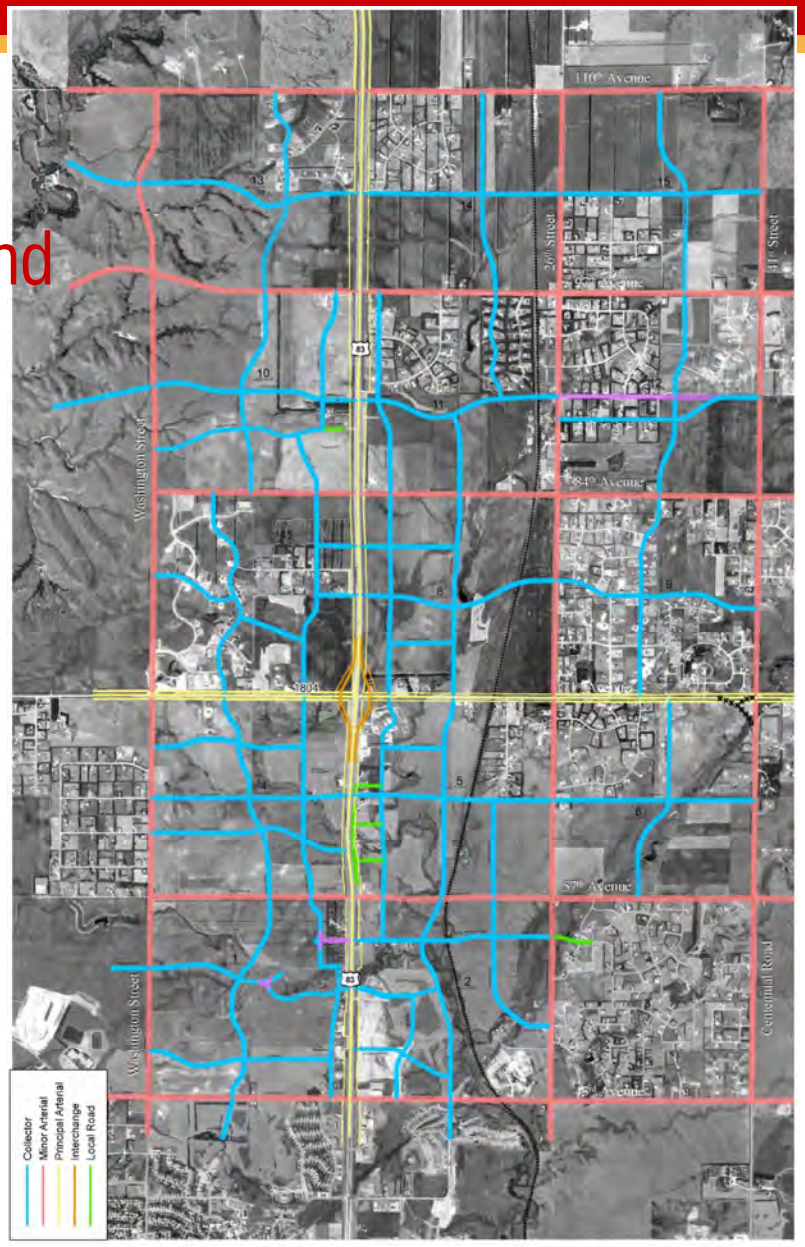
- Turn Lanes are More Critical Need for Much of Corridor
- Maintain Most Access Points:
  - Close/Consolidate Field Accesses If Develop
- Limited New Right-of-Way
- No Building Acquisition Required
- Few Potential Environmental Impacts
- Part of a Larger Regional Plan





Regional Improvements

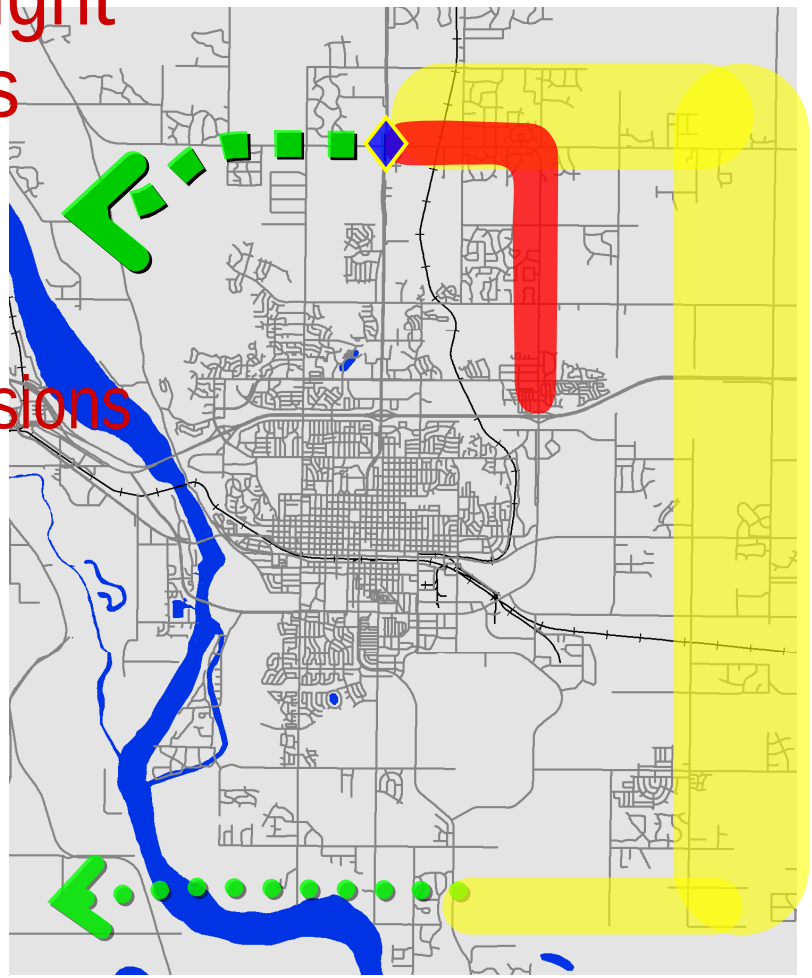
- US 83 Recommendations
  - Complementary Arterial and Collector Routes
  - Expanded US 83
- Beltway:
  - Greater Impact on 71st Avenue



Next Steps – 71st Ave/Centennial Rd

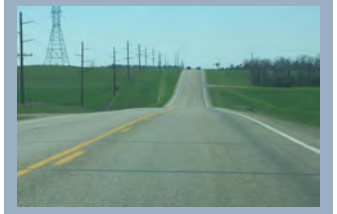
Bismarck-Mandan Metropolitan Planning Organization

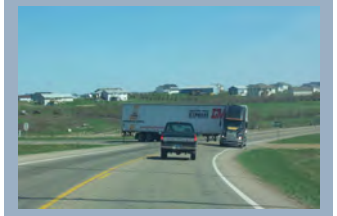
- Receive Comments Tonight and For Next Two Weeks
- Modify Concept:
  - Comments
  - Influence of Beltway Decisions
- Expand Improvement Prioritization
  - Individual Projects
- Finalize Documentation



Additional Input Opportunities

- Project Design/Environmental Phases
  - Public Meetings as Developed
- Long Range Plan
  - Public Meetings
- Website:
  - Comments
  - Report





Additional Information

Bismarck-Mandan Metropolitan Planning Organization

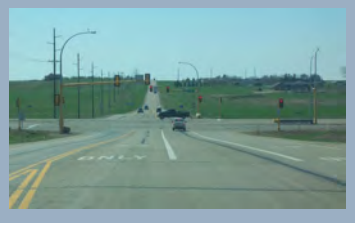
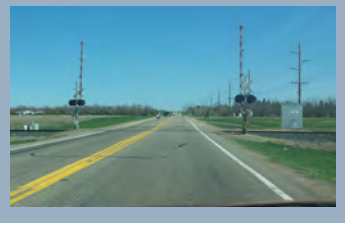
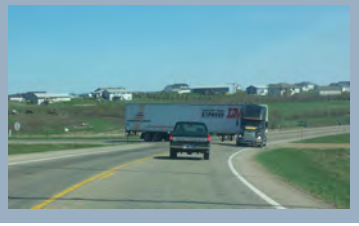
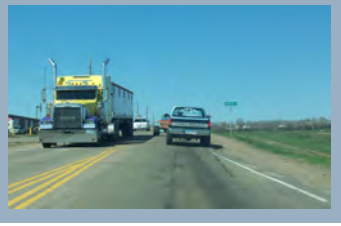
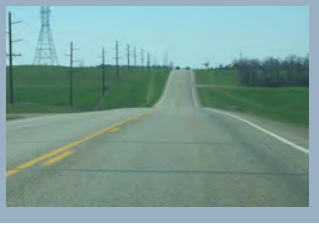
Presentation, Plots and Handout will be on Website by

Tuesday, February 26, 2008

www.71st-Centennial.com

You can email comments and questions!

Thanks

-----Original Message-----
From: BILLY JACKSON [mailto:millstrm@btinet.net]
Sent: Thursday, November 29, 2007 8:23 AM
To: Steve Windish
Subject: 71st Avenue

MR. Steve Windish, P.E.
Ulteig Engineers, Inc.

Steve,

This is in response to your letter dated November 14, 2007 @ Public Input for Road Improvements.

I am a property owner on North Star Acres Road, south of 71 St. Avenue. I would like to make known some concerns of my neighbors - whom I have spoke with, as well as myself and family. It has been our understanding for a sometime that 71 St. Avenue would be widened to 4 lanes to accommodate the increasing traffic and also be used as a truck by-pass. Also, due to the large increase in the number of homes built in this area, a large increase in traffic has occurred along 71 St. Avenue, which I am sure you are well aware of.

The problem for residents on North Star Acres Road is making a turn south onto North Star Acres Road from 71 St. Avenue whenever going east or west on 71 St. The traffic has become much heavier and it seems other drivers do not realize that North Star Acres Road is there, probably since there is no road to the north. I have been in several close calls by nearly being rear ended by semis and others even though I have my turn signals on and flash my brake lights several times. It is a bit scary to look in your rear view mirror and see a vehicle closing fast on you when you are trying to slow down to make a turn. I have driven to the next intersection several times to avoid being in an accident. Neighbors have reported much the same situation. Other vehicles have nearly been in the ditches when they finally realize that I am slowing to turn onto North Star Acres Road. The speed limit seems to be mostly ignored but that is another matter.

We would very much appreciate your serious consideration for adding turning lanes in the eastbound and westbound lanes of 71 St. Avenue when road improvements are made. This is a somewhat dangerous condition as it exists today and will only get worse as traffic increases. With the inclusion of turning lanes as a traffic safety measure perhaps a tragic accident at this intersection could be avoided.

Please contact me if I can be of any assistance.

Sincerely,

Billy E Jackson.
6607 N Star Acres Road
Bismarck, ND 58503

702-258-7892

Construction Representative, Retired
U.S.B.R.

Bill_Troe@URSCorp.com wrote:

Billy:
The safety concerns you voiced regarding vehicles waiting to turn from 71st Avenue are also one of the major concerns the city and county share and is an issue that is at the center of our study. The preliminary recommendations that we will be discussing tonight at the public information meeting will include a center left turn lane through the corridor. The center left turn lane is being proposed because there are numerous other access points that are and/or will be experiencing the same concerns you voiced.

Whether the corridor is ultimately built to a four-lane with turn lanes is yet to be determined. The short to mid-term recommendations are to reconstruct the corridor as a three-lane from US 83 to Centennial Road and then on Centennial Road from 71st Avenue to Calgary. outh of Calgary we are recommending a four-lane road with turn lanes as the volume begins to climb over that which can be accommodated in three lanes.

Our meeting is tonight at 6:00 and Century HS. I hope to see you there.

Bill Troe, Transportation Planner - Project Manager
URS Corporation, Inc.

From: BILLY JACKSON [mailto:millstrm@btinet.net]

Bill,

Thanks for your attention to this matter.

A center left turn lane would certainly make a big improvement in the situation. I would like to point out one other concern - while traveling east on 71st Avenue and turning right, there is no noticeable shoulder on 71st Avenue at North Star Acres Road. The roadway is on fill approximately 2-3 ft higher than adjacent lands in this area. This results in no space to get off the road and out of the way of vehicles following too close. Perhaps the 71st Avenue south shoulder could be built up and/or widened to allow some room to get off the roadway and into a safer situation to make a right turn south onto North Star Acres Road.

Hope I have not labored over this point in excess. Thanks again for your attention.

Billy Jackson

To: "Steve Grabill" <Steve.Grabill@ulteig.com>, "Bill Troe" <Bill_Troe@URSCorp.com>
From: "Steve Windish" <Steve.Windish@ulteig.com>
Date: 11/30/2007 11:02AM
Subject: public input meeting, 11-30-07

Gentlemen

Mr. Cordell Dick, resident along 71st Avenue was unable to attend the meeting last night. He would like a copy of the handouts. If the handouts will be on the website, that would be acceptable to him.

His email address is cordelld@cordelld.com . Please let me/him know, thank you.

J. Steven Windish PE
Transportation Market Leader - Bismarck
Ulteig Engineers, Inc.
1412 Basin Avenue
Bismarck, ND 58504

To: <Myron.Lepp@nd.usda.gov>
From: "Steve Grabill" <Steve.Grabill@ulteig.com>
Date: 11/30/2007 12:08PM
cc: "Brant Malsam" <Brant.Malsam@ulteig.com>, "Steve Windish" <Steve.Windish@ulteig.com>, "Steve Saunders" <ssaunder@nd.gov>, <Bill_Troe@URSCorp.com>
Subject: RE: Comments from Last Nights Meeting

Dear Mr. Lepp,
Thank you for your very detailed comments. We will pass them on to the other people who serve on our technical steering committee and consider them as we evaluate the current route alternatives, and consider the potential for new ones.

Our intent at last night's meeting was to seek input on the route alternatives, and we certainly received that. It is also obvious to us that there are some very strong opinions for and against either the 66th Street or 80th Street corridors.

Our task over the coming months will be to sort through the pros and cons in order to identify a preferred alignment. You comments are very important in assisting us to do that. Please stay posted and we will welcome your further insights as we continue the Study into next year.

Best Regards,
Steve A. Grabill

From: Steve Windish
Sent: Friday, November 30, 2007 10:49 AM
To: Steve Grabill; Brant Malsam
Subject: FW: Comments from Last Nights Meeting

Good comments!

J. Steven Windish PE
Transportation Market Leader - Bismarck
Ulteig Engineers, Inc.
1412 Basin Avenue
Bismarck, ND 58504
Phone: 701.355.2333
Cell: 701.471.5621
Fax: 701.224.1163

Steve.Windish@Ulteig.com
http://www.ulteig.com

From: Lepp, Myron - Bismarck, ND [mailto:Myron.Lepp@nd.usda.gov]
Sent: Friday, November 30, 2007 8:48 AM
To: Steve Windish
Subject: Comments from Last Nights Meeting

Steve, we are trying to understand the logic of put another beltway on 66th Street...It just seems way to close to Centennial... and will not really improve the current traffic bottle-neck situations...If you go out and watch the traffic flow, 80th Street is already being used very heavily as well as highway 10.

What is really confusing is what you are trying to accomplish by having the highway go through Lincoln and all the way down to highway 1804. Are you really trying to support truck traffic to the Commercial Distribution Center or to connect to 1804 ...and what for? Highway 10 and Highway 83 South are used almost exclusively by truckers to avoid Highway 1804....because of all the curves and hills on Highway 1804. Highway 1804 is a more scenic route, but not used much by heavy trucks because of the curves and hills. The majority of all trucks go up and down highway 83.

I don't believe the Lincoln citizens even realize what they are asking for...why would they want a major beltway (66th Street) going through part of their city? If, if the beltway even needs to go South of Lincoln, we believe 80th Street would be a much wiser choice because the I-94 over-pass would be on a more leveled ground location...instead on the edge of the hill like 66th street would be...Plus, 80th street would connect with 84th avenue and reduce the traffic congestion ...if you are sincerely concerned about the citizens safety and the well-being of the community.

We strongly believe you could reduce traffic congestion for Burleigh County and the City of Bismarck if the beltway was on 80th street and then improvements were made to the Apple-Creek road and the Lincoln road which goes all the way out to Highway 83 South. Hundreds of trucks use Highway 83 South for freight, lumber, and cattle...and many of them come or go to the Southwest side of Bismarck. If the Lincoln road was improved (made wider and paved) all the way East to Highway 83 you would greatly reduce the traffic congestion coming and leaving Bismarck every day.

The biggest, biggest complaint we all have is that the City, County, and Townships are not doing their planning together....each entity is doing their planning independently and there is no coordinated effort... Why aren't the City, County and Township Leaders up in front on the stage with you when these proposals are being presented to the public. Why are independent contractors called in to lay down a template? Why were we told last night, where the rest of the trucks go to when they are heading South...What is the hidden agenda??? Those trucks certainly, certainly do not go down to highway 1804 when they go South of I-94. Those trucks are freight trucks going to STAMART-TRUCK STOP, Walmart, Melroe, MCQUADEs, Coca-Cola, Lumber Yards, Farmers Livestock, etc...(I am one of those truckers) ...and if those trucks were routed on 84th Avenue to 80th Street down to Apple Creek road...we the truckers could get to all the locations we needed to get to...without all the stop lights that we have on Centennial Road and 71st Avenue. Truckers do not like congestion and multiple stop lights anymore than anyone else does...and every intersection is a possible accident...

Putting a beltway on 66th Street seems like a tremendous waste of money because you are stacking one beltway right next to the existing Centennial beltway...and you will still have all the same bottlenecks on Centennial road. If you listen to what the public said last night...and use 84th Avenue East to 80th Street South and then develop Apple Creek road or Lincoln Road...We the truckers could avoid all the pedestrian areas...and could get to the South side of town with the least amount of congestion, stop lights, and intersections...We could come off of a off-ramp of Highway 83 NON-STOP....go East to 80th Street...NON-STOP...head South to Highway 94, or Highway 10 interchange, or to Apple Creek/Lincoln exchange and keep going right into Bismarck.

You said you wanted to plan for the future...But it still seems like your trying to do quick fixes...or short term patches to fix a larger problem....and your not completely following the trucks SOUTH... Going South of Lincoln to highway 1804 seems like a tremendous waste of highway dollars...I believe you need to track the truckers destinations.

In regards to JAKE-BRAKES, the way citizens drive cars in and around trucks...If it were not for Jake-Brakes or compression brakes, many truckers would not be able to stop in time to avoid accidents...Citizens in cars do not signal, or if they do signal... they signal at the last minute and expect a 84,000 pound load to slow down as quick as a light four cylinder car...That does not happen...Furthermore, the JAKE-BRAKE volume and sound is as much for the car drivers as it is for the truckers...To let everyone know the trucker is coming and is trying to slow down...and that the little car that just hit the brakes in front of the truck...better get going or they will be hit from behind....But the best recommendation would be to get the truckers farther North of 71st Avenue...There are times we avoid that road (71st Avenue) and go on the gravel road farther North anyway...and then head down 80th Street to Apple Creek Road.

All in all, if your going to plan for the future...Then get ahead of this problem and build up on 84th Avenue East/West, 80th Street South, and then Apple Creek/Lincoln Road so we the truckers have a separate truck route with the least congestion, the least stop signs, and the least intersections....A beltway, should be a beltway...or a bypass should be a bypass with the least intersections and stop lights possible...The only way to make that happen will be to use 84th Street and 80th street and improve Apple Creek road or Lincoln road.

Myron C. Lepp
701-255-2471

Mr. Halverson:
I would like to thank you for attending the public meeting and for taking the additional time to provide the project team with comments. Your email included several questions/comments that we wanted to make sure to get back to you on. I have attached the body of your email and we have included responses to your comments, based on the information we know to this point. Your comments are in black type the team responses are in red. If you have any additional questions on either the Regional Beltway information or the 71st Avenue-Centennial road information, please let us know. If your questions/comments are strictly for the Beltway, please send them to Steve Windish at steve.windish@ulteig.com. If your comments/questions are strictly for 71st Avenue-Centennial Road, please send them to bill_troe@urscorp.com. If you have a mixture, please direct them to Steve Windish and he will make sure they get distributed to the right people.

1. The impact upon Apple Creek wetlands and the necessary Environmental Impact Statements necessary to pass through the region are the same as the 80th Street Corridor
We will take the wetlands issue into consideration when comparing the two corridors.

2. This maintains a roughly 2 mile interval between interchanges currently in existence and proposed - US 83 & Centennial Road, etc.
We see this as one of the strongest indicators that 66 th Street would provide a good location for a beltway facility.

Regarding north - south traffic on Centennial between US 94 & 1804

1. My property is adjacent to the road and I have noted an increased traffic count to the point that I have had to change my work schedule with my employer in order to accommodate the congestion coming out of Sattler's various additions. I've lived on Lexington for 10 years now and have been amazed at the increase in traffic from the north.
I think staff from the city and MPO would agree with you that volume on both Centennial and Century east of Centennial has increased quite a bit in the last 5 years. During the course of the traffic study we have observed morning and evening traffic at Century/Centennial and have witnessed the congestion and vehicle queuing that occurs. The preliminary recommendations that would address the growing traffic problem include:

- Expanding Centennial Road to a five-lane cross section (similar to Bismarck Expressway south of I-94) from I-94 to north of Jericho Avenue.
- Expanding Century Avenue east of Centennial to include two westbound left turn lanes, a westbound through lane and a westbound right turn lane.

These improvements, along with the Century Avenue expansion west of Centennial will improve the situation quite a bit. In addition, the plat for the undeveloped parcel(s) between the Sattler subdivision north of Century Avenue will include two additional access points to/from Centennial Road. Where today everyone from the subdivisions to the north have to use Century (conflicting with your trips), more will have the opportunity to use the access routes to Centennial. There will still likely be backups on Century Avenue to or beyond Yorktown Drive, but the period should be shorter. With the distance between Centennial Road and Yorktown being less than 400 feet, it would be very difficult to completely resolve the issue of the westbound Century Avenue cars in the peak stacking to Yorktown. In addition, adding a signal at Yorktown would not likely help the situation to any measurable extent, and could very well cause more harm than good (eastbound cars would stack back to Centennial in the peak). Improvements on Centennial through Century Avenue are anticipated over the next two to three years.

2. If the Bismarck Public School district builds an new elementary school to the north of the Century Road, somewhere off Centennial, I hope that someone looks at any "bottle necks" that may be caused by parents sitting in the turn lane, prior to turning in to deposit or retrieve children. Yes, the traffic impacts of drop-off/pick-up would be assessed as part of the planning/design for a school.

3. Traffic noise is part of the urban environment; I'll be planting additional bushes in an attempt to provide noise reduction, wildlife habitat, and visual screening of the flotsam and debris that is scattered to the wind by passing motorists. I pick it up out of the ditch when it accumulates, but am constantly amazed at the type and amount scattered. Additional ROW may be required to support expansion of Centennial Road to 5-lanes north of I-94. It is anticipated that the majority/all of the ROW expansion would occur to the west. Thus, as long as your plantings are located outside the existing ROW, there would not be the need to disturb them during a reconstruction project.

4. Does the city anticipate that United Parcel Service or Hartley's (Harlow's) Bus Service, or any of the other heavy industrial users to the north and west of the Centennial Road and Century interchange will be re-locating . . . . or will this area continue to have heavy night-time traffic of UPS triples (tractor & trailer + 2 pony trailers). The area in the northwest quadrant of Centennial Road/Century Avenue is expected to remain in an industrial use category. How long UPS and/or Harlow's remain in their present locations is up to them. The city has not plans to encourage/promote redevelopment nor has any one submitted a redevelopment plan for that area. Thus, for the foreseeable future, those uses will likely remain.

Regarding linking the north south corridor with the traffic on the north side of the University of Mary; I'm not sure what to suggest there, since you have to deal with the issue of Apple Creek drainage and Environmental Impact Statements. If you can keep the crossings to minimum, that would be the best solution for the water and the species that inhabit the Apple Creek ecosystem, such at the red-winged blackbird, muskrat, mink, painted turtle, cottontails, and jackrabbits, that I have observed in my routine wanderings.
Thank you for your comments.

B ill Troe, AICP
Vice President - Surface Transportation

12120 Shamrock Plaza, Suite 300
Omaha, NE 68154
402.952.2522
402.334.1984 (Fax)
402.319.6331 (Mobile)

From: Halvorson, Mark J. [mailto:mhalvorson@nd.gov]
Sent: Tuesday, December 11, 2007 2:34 PM
To: Steve Windish
Subject: Bismarck-Mandan MPO meeting - 29 November 2007

Greetings!

Thank you for your invitation to the meeting, I was, unfortunately, unable to attend. Just a few thoughts:

Regarding a North - South exterior corridor - I believe the 66th Street corridor is the best option:

1. The impact upon Apple Creek wetlands and the necessary Environmental Impact Statements necessary to pass through the region are the same as the 80th Street Corridor

2. This mantains a roughly 2 mile interval between interchanges currently in exisitence and proposed - US 83 & Centennial Road, etc.

Regarding north - south traffic on Centennial between US 94 & 1804

1. My property is adjacent to the road and I have noted an increased traffic count to the point that I have had to change my work schedule with my employer in order to accomodate the congestion coming out of Sattler's various additions. I've lived on Lexington for 10 years now and have been amazed at the increase in traffic from the north.

2. If the Bismarck Public School district builds an new elementary schoold to the north of the Century Road, somewhere off Centennial, I hope that someone looks at any "bottle necks" that may be caused by parents sitting in the turn lane, prior to turning in to deposit or retrieve children.

3. Traffic noise is part of the urban environment, I'll be planting additional bushes in an attempt to provide noise reduction, wildlife habitat, and visual screening of the flotsam and debris that is scattered to the wind by passing motorists. I pick it up out of the ditch when it accumulates, but am constantly amazed at the type and amount scattered.

4. Does the city anticipate that United Parcel Service or Hartley's Bus Service, or any of the other heavy industrial users to the north and west of the Centennial Road and Century interchange will be re-locating. or will this area continue to have heavy night-time traffic of UPS triples (tractor & trailer + 2 pony trailers).

Regarding linking the north south corridor with the traffic on the north side of the University of Mary; I'm not sure what to suggest there, since you have to deal with the issue of Apple Creek drainage and Environmental Impact Statements. If you can keep the crossings to minimum, that would be the best solution for the water and the species that inhabit the Apple Creek ecosystem, such at the red-winged blackbird, muskrat, mink, painted turtle, cottontails, and jackrabbits, that I have observed in my rountine wanderings.

Thank you for taking the time to read my notes. If you have any questions, feel free to drop me an e-mail at mhalvorson@nd.gov or give me a jingle at (701) 527-4284. I remain,

Yours truly,

Mark J. Halvorson
2640 Lexington Drive
Bismarck, North Dakota 58503-7825

Hi Bill

I attended the public input meeting on 11/29/07 about The Bismarck Regional North-South corridor study. First, thanks for the information and the good meeting. I think that 66th is a better N-S alternative. It is close enough to town to be utilized, it will tie right into Lincoln, and this is the time to get the project in progress.

I spoke with you about some concerns I had about the bike path running on the West side of Centennial Road and impacting the right of way/ditch that my parking lots are along. You asked that I send you a reminder and in the design phase this could be accommodated by moving it towards the East. That will impact my parking lots less. Either the bike path or the road would be moved to the East about 10 feet you thought would be an easy fix at this time. My parking lots are on the North and South side of Saratoga Ave and Centennial Road intersection. If you have questions or would like more info please contact me.

Thanks
Erv
ezrental@bis.midco.net

To: "ezrental" <ezrental@bis.midco.net>
From: Bill Troe/Omaha/URSCorp
Date: 01/16/2008 02:44PM
Subject: Re: Regional N-S Beltway corridor

Thanks for getting me your comments. I will be contacting you next week after reviewing this location more closely.
Bill Troe, AICP
Vice President
URS Corporation, Inc.

402-952-2522 (Office)
402-319-6331 (Mobile)

To: <ezrental@bis.midco.net>
From: "Steve Windish" <Steve.Windish@ulteig.com>
Date: 01/15/2008 09:50AM
cc: <Bill_Troe@URSCorp.com>, "Steve Grabill" <Steve.Grabill@ulteig.com>, "Steve Saunders" <ssaunder@nd.gov>
Subject: RE: Regional N-S beltway corridor

Erv

Thank you for your comments. The gentleman's name is Bill Troe. His email address is Bill_Troe@URSCorp.com .

Don't hesitate to contact us if you have any more questions.

J. Steven Windish PE
Transportation Market Leader - Bismarck
Ulteig Engineers, Inc.
1412 Basin Avenue
Bismarck, ND 58504

Phone: 701.355.2333
Cell: 701.471.5621
Fax: 701.224.1163

Steve.Windish@Ulteig.com
http://www.ulteig.com

-----Original Message-----
From: ezrental@bis.midco.net [mailto:ezrental@bis.midco.net]
Sent: Tuesday, January 15, 2008 9:40 AM
To: Steve Windish
Subject: Regional N-S beltway corridor

Hi Steve
I attended the public input meeting on 11/29/07 about the Bismarck Regional North-South corridor study. First, thanks for the information and the good meeting. I spoke with a person from a design/consultant team I think it was USR and he asked to contact him about some specific design criteria. Do you have his contact info? Also, I think that 66th is a better N-S alternative. It is close enough to town to be utilized, it will tie right into Lincoln, and this is the time to get the project in progress.

Thanks
Erv
ezrental@bis.midco.net

To: "Steve Saunders" <ssaunder@nd.gov>
From: "Chuck Peterson" <C.Peterson@jobberswarehouse.com>
Date: 01/30/2008 03:40PM
cc: <Bill_Troe@URSCorp.com>
Subject: RE: To Confirm With Chuck Peterson

Bill:
I have discussed the question you pose with members of our staff. It is not surprising that the figures shown on figure 6 and 7 exist in the study. Information concerning the Centennial 71 st Avenue route is not readily available to those who are infrequent travelers into the Bismarck area. Our dispatcher states that he frequently advises drivers to take the by pass around the city. He often finds that they are unaware of the route even though they have previously been in the area.

We believe that better signage is needed east of exit 161 and west of the I 94 83 exit and north of the 71 st Avenue exit advising of the by pass. Some of our drivers south bound on 83 approaching Bismarck intending to travel west on I 94 take the 71 st Avenue exit and access 94 via exit 161. Their opinion is that that it easier and safer. We believe that the number of trucks accessing 83 north and southbound on 83 bound for I 94 west would be less with sufficient signage making a stronger case the proper construction of 71 st Ave and Centennial.

From: Steve Saunders [mailto:ssaunder@nd.gov]
Sent: Tuesday, January 29, 2008 11:18 AM
To: Chuck Peterson
Subject: FW: To Confirm With Chuck Peterson

I am sending this question on to you as per Bill's request.
Thanks Chuck.

From: Bill_Troe@URSCorp.com [mailto:Bill_Troe@URSCorp.com]
Sent: Tuesday, January 29, 2008 11:01 AM
To: ssaunder@nd.gov
Subject: To Confirm With Chuck Peterson

Steve:
What I was thinking you could confirm with Chuck regarding the truck survey results is:

We are seeing that the vast majority of the truck traffic traveling between I-94/Centennial and US 83/71st Avenue either has an origin/destination directly along Centennial Road in the study area or is coming from/going to Bismarck Expressway south of I-94. Very little truck traffic uses Centennial Road to access the interstate. On the other hand, we are seeing that very little of the truck traffic entering/leaving the corridor at US 83/71st Avenue leaving/entering the corridor on State Street South of I-94. If a truck enters or leaves the US 83 corridor at 71st Avenue/ND 1804, it has an origin/destination in the corridor (say Menards, WalMart, etc) or is going to/coming from the interstate. Most of the trucks that are entering/leaving the US 83 corridor at 71st Avenue/ND 1804 travel all the way through the corridor to I-94.

Are these observations consistent with what Chuck would characterize is his experience?

B ill Troe, AICP
Vice President - Surface Transportation

12120 Shamrock Plaza , Suite 300
Omaha, NE 68154
402.952.2522
402.334.1984 (Fax)
402.319.6331 (Mobile)

To: "Miller, Jim" <Jim.Miller@MDU.com>
From: Bill Troe/Omaha/URSCorp
Date: 03/03/2008 09:57AM
Subject: Re:

Mr. Miller, you hit the nail right on the head. The 71st-Centennial Road Corridor is simply an introductory study for a future design project. We did not get into a lot of investigation as to all of the potential implications of a suggested access modification.

The intent of the access management assessment was to provide the MPO, city and the county with an idea of which locations access locations should be reviewed in the event that there is a change in activity on the particular parcel. Yours is one of just two accesses on the south side of the road between 26th and Moonstone. Thus, it would be nice if both could be relocated. Thus, we suggested the changes to your location and the access closer to 26th Street. If the activity on your parcel was to change at some point in the future (just for the sake of argument I will say someone gets a wildhair that your parcel would make a good location for a C-store as the are continues to develop) using the recommendations from this study the city/county would not likely allow that change in use to occur unless the access was to be modified to another location.

As long as it is maintained as a SF residential property and 71st Avenue to a three-lane, there should not be a reason to force a change in access (unless for some reason a bunch of crashes start to ocur at your driveway).

Hopefully, this email provides some clarification.

Let me know if you would like any more information.

-----"Miller, Jim" <Jim.Miller@MDU.com> wrote: -----

To: <bill_troe@urscorp.com>
From: "Miller, Jim" <Jim.Miller@MDU.com>
Date: 03/03/2008 09:30AM
Subject:

This e-mail is for comments on the 71st Avenue -Centennial Road Corridor Study. I live at 2901 71st Ave NE and my approach is designated as being eliminated and moved to a different area in my yard to an adjacent cul-de-sac. I know this is just a study but it needs to be noted that there are several major and some minor problems to this solution. The yard from the cul-de-sac down to the homes garage grade is a good 20 to 25' difference with maybe a 150' + length to accomplish this in without severally affecting the whole yard. There are two utilities going through this portion of the yard also. The water and gas for sure and maybe even the phone would pass under this driveway. It would also entail a culvert and pass over the water and gas going to my detached garage. The yards sprinkler system will also need to be revamped. I am also wondering with the walking trail how much of my tree rows will be affected. I have no problem with the outer wild plum trees but the pine trees I will have a problem with. And finally a complete address change will happen with the elimination of this approach. Any info you can provide back would be greatly appreciated.

Thanks,
Jim Miller
2901 71st Ave NE
Bismarck, ND 58503
701-250-7383