North Mandan Subarea Transportation Study

Executive Summary

Prepared for:
Bismarck-Mandan Metropolitan Planning Organization
221 North 5th Street
Bismarck, ND 58701

August 13, 2013
Executive Summary

Introduction

The purpose of completing the North Mandan Subarea Transportation Study is to identify multimodal transportation improvements needed to support the current and proposed levels of development within and influencing the study area. Figure 1 displays the study area limits which encompass areas within and outside the city from north of I-94 to Square Butte Drive (north end of the Schlosser Addition) and from the Missouri River to approximately 47th Avenue NW.

Figure 1. Study Area Boundaries

Through the 2040 planning horizon, approximately 60 percent of the anticipated urban residential development and 65 percent of the commercial increment of development
anticipated to occur in Mandan and Morton County has been allocated to the North Mandan study area.

Development in the study area cannot continue at the current pace without additional investment into the transportation infrastructure. Looking again at developments over the last five years, the vast majority have come onboard with very little expansion of the transportation infrastructure. To this point in time, the reserve capacity drawdown has not resulted in a substantial increase in congestion across the study area, however, traffic volumes at a number of intersections adjacent to the interstate are approaching their acceptable capacity. Unless system/network expansion is coordinated with developments coming on line, the increasing congestion levels observed at intersections adjacent to the interstate will spread outward to other areas, reducing the quality of service for travelers.

**Corridor Study Process**

Analysis of the North Mandan subarea was divided into three inter-related phases/stages, displayed in Figure 2.

**Figure 2. Corridor Study Process**

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Document Need</td>
<td>• Identify and Evaluate Alternatives to Address Needs:</td>
<td>• Develop and Refine Cost Estimates</td>
</tr>
<tr>
<td>• Gather Background Data:</td>
<td>• Establish Corridor Performance Measures</td>
<td>• Prepare Recommendations</td>
</tr>
<tr>
<td>• Traffic/Travel</td>
<td>• Assess Each Alternative Relative to Performance Measures</td>
<td>• Reconcile Selection with Goals/Needs</td>
</tr>
<tr>
<td>• Pedestrians</td>
<td>• Document Evaluation</td>
<td>• Public Engagement</td>
</tr>
<tr>
<td>• Crashes</td>
<td>• Public Engagement</td>
<td></td>
</tr>
<tr>
<td>• Right-of-way</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Define Functional Elements Appropriate in by Corridor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Organize and Initiate Public Engagement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Purpose and Need for Action in the Study Area**

The purpose of conducting the North Mandan Subarea Study, and subsequently identifying multimodal improvements is to support the orderly investment into transportation infrastructure to meet the following goals:

- Provide a safe transportation system.
- Provide a transportation system that meets the demand.
- Support the forecasted level of development through the planning horizon (2040).
• Promote a multimodal transportation system.

• Balance maintaining the current system with expansion that supports new development in the study area.

Study area needs were identified through a combination of the outreach/engagement program (Figure 3) and technical analysis of a range of data collected. Meeting with and discussing travel in the North Mandan study area with local, state and federal agency staff, stakeholders with an interest in the study area and the public at large was an initial step in the overall study process. Technical assessment of traffic operations, roadway geometrics and crashes supplemented the information gathered from various local sources to provide a complete picture of the current conditions. The results of the current conditions technical assessments are displayed in Figure 4.

Household and Employment Growth (2010 to 2040)

Over the most recent three years, the level of new housing starts, new commercial business construction and expansion of the industrial sector has far outpaced the historical growth. The MPO Policy Board recognized in approving the 2040 population and employment projections that the next 20 to 25 years is more likely to reflect the recent trends than it is to reflect the longer term and pre-oil production forecasts. Table 1 provides documentation of the base year (2010), intermediate year (2025) and 2040 horizon estimates of growth for the region and the North Mandan Subarea Study limits.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Period</th>
<th>2010</th>
<th>2025</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Region</td>
<td>Study Area</td>
<td>Region</td>
<td>Study Area</td>
</tr>
<tr>
<td>Population</td>
<td>108,600</td>
<td>2,280</td>
<td>159,000</td>
<td>191,600</td>
</tr>
<tr>
<td>Households</td>
<td>41,800</td>
<td>1,080</td>
<td>64,400</td>
<td>2,670</td>
</tr>
<tr>
<td>Employment</td>
<td>64,300</td>
<td>2,270</td>
<td>99,900</td>
<td>5,440</td>
</tr>
</tbody>
</table>

Source: Bismarck-Mandan MPO

2040 Peak Hour Traffic and Traffic Operations

The projected increases in traffic along the arterial and collector corridors in the study area will change dramatically the relatively uncongested conditions observed today. Figure 5 displays the forecasted morning and afternoon peak hour intersection operations with 2040 forecasted volume on what is essentially the current roadway system.
Figure 3
Transportation System Needs and/or Issues Identified by Stakeholders Committee and/or Public
(Information from meetings held on November 27 and 28, 2012)

People attending the meetings were asked to:
- Identify issues/needs they see in the study area.
- Rank by importance to them resolution of the need/issue relative all identified.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Implement development - Not much Space Available</td>
</tr>
<tr>
<td>B</td>
<td>No Bike Lanes - Encourage bike riders more signs</td>
</tr>
<tr>
<td>C</td>
<td>Extend a traffic Island from School/Commercial</td>
</tr>
<tr>
<td>D</td>
<td>Need of pedestrian walkway across the street to the area</td>
</tr>
<tr>
<td>E</td>
<td>What are impacts of Northern Bridge improvement?</td>
</tr>
<tr>
<td>F</td>
<td>Consider west portion of Northern Bridge in separate project</td>
</tr>
<tr>
<td>G</td>
<td>Provide improved connection</td>
</tr>
<tr>
<td>H</td>
<td>Need to address additional unmet impacts of new school</td>
</tr>
<tr>
<td>I</td>
<td>Need more bike lanes for safety</td>
</tr>
<tr>
<td>J</td>
<td>Add 2nd Interchange at 56 Avenue</td>
</tr>
<tr>
<td>K</td>
<td>This was requested to provide access to future development area</td>
</tr>
<tr>
<td>L</td>
<td>Consider some interchange phasing out of interchange</td>
</tr>
<tr>
<td>M</td>
<td>Need a new interchange in 56th Avenue</td>
</tr>
<tr>
<td>N</td>
<td>Additional Access to North Bridge</td>
</tr>
<tr>
<td>O</td>
<td>Change this aligned at 94th Avenue in ND 1806</td>
</tr>
<tr>
<td>P</td>
<td>Need to connect this lane to park area</td>
</tr>
<tr>
<td>Q</td>
<td>Extend bike path 38th Street to ND 1806</td>
</tr>
<tr>
<td>R</td>
<td>Need better signage on the way connections</td>
</tr>
<tr>
<td>S</td>
<td>Improve/striped lanes/intersections</td>
</tr>
<tr>
<td>T</td>
<td>Eliminate high/extra/ladder signalized intersections</td>
</tr>
<tr>
<td>U</td>
<td>Extends divided Highway 94, but no added capacity/signals - Hand gating out of elimination</td>
</tr>
<tr>
<td>V</td>
<td>Vehicle Access/I-94 - improved</td>
</tr>
<tr>
<td>W</td>
<td>Old Red Trail improvement - Experience for safety and comfort</td>
</tr>
<tr>
<td>X</td>
<td>Need to consider land use between Middle School and commercial</td>
</tr>
<tr>
<td>Y</td>
<td>Improve street in an corridor to extended commercial on 94th Avenue</td>
</tr>
<tr>
<td>Z</td>
<td>Improve street alignment at 94th Avenue</td>
</tr>
<tr>
<td>AA</td>
<td>39th Street - West to East</td>
</tr>
<tr>
<td>BB</td>
<td>Improve/striped lanes/intersections</td>
</tr>
<tr>
<td>CC</td>
<td>Need access management along for 39th - All New development corridor</td>
</tr>
<tr>
<td>DD</td>
<td>ND 1806/2th Street Add a Signal</td>
</tr>
<tr>
<td>EE</td>
<td>39th Street - Need to address pedestrian access from Middle School in neighborhood</td>
</tr>
<tr>
<td>FF</td>
<td>Vehicle Access - Connects Middle School to I-94</td>
</tr>
<tr>
<td>GG</td>
<td>Old Red Trail Improvement - Commercial</td>
</tr>
<tr>
<td>HH</td>
<td>Improve alignment of Old Red Trail - Open for development and/or improved I-94 traffic</td>
</tr>
<tr>
<td>II</td>
<td>Need new interchange at 94th Avenue</td>
</tr>
<tr>
<td>JJ</td>
<td>Improve street alignment at 94th Avenue</td>
</tr>
<tr>
<td>KK</td>
<td>Safety Concerns - bike lane merging at Old Red Trail</td>
</tr>
<tr>
<td>LL</td>
<td>Safety Improvement - Intersection at 94th Avenue</td>
</tr>
<tr>
<td>MM</td>
<td>Improve street alignment at 94th Avenue</td>
</tr>
</tbody>
</table>

Input by Issue Type Legend:
- Congested Intersection
- Congested Corridor
- Need for New Vehicle Connection
- New Interchange/Connection Desired
- Safety Concerns in Corridor
- Intersection Safety Concern (No Capacity Issue)
- New Corridor Discussed in LRTP or Other Studies

Highest Priority/Most Important to Address
Second Most Important
Third Most Important
Fourth Most Important
Figure 4

Legend
- AM / PM Peak Hour Traffic Operations
- Level-of-Service Grade A/B
- Level-of-Service Grade C
- Level-of-Service Grade D
- Level-of-Service Grade E/F

Note: Level-of-service grade reported for intersections with Stop signs represents the cross routes with the Stop sign (where all vehicle must stop). Operations on the approaches without the Stop sign would be level-of-service A grade.
Legend
- AM / PM Peak Hour Traffic Operations
- Level-of-Service Grade A/B
- Level-of-Service Grade C
- Level-of-Service Grade D
- Level-of-Service Grade E/F

Note: Level-of-service grade reported for intersections with Stop signs represents the cross routes with the Stop sign (where all vehicle must stop). Operations on the approaches without the Stop sign would be level-of-service A grade.

Figure 5
Forecasted 2040 Conditions Morning and Afternoon Peak Traffic Intersection Operations (Existing Plus Committed Network)
Alternatives to Address Current and Future Issues/Needs

Alternatives developed as part of this study include the following range of concepts:

- **Transportation System Management (TSM) Alternatives:** These alternatives include intersection improvements such as additional turn lanes, traffic signal improvements, and corridor access management.

- **Transportation System Expansion:** These concepts are larger-scale improvements that increase capacity and/or address safety concerns in the study area by adding through lanes to an existing roadway corridor, adding a new interchange or crossing of the interstate or adding an entirely new corridor.

- **Non-Motorized Facilities:** These alternatives include new or improved pedestrian and bicycle facilities within and crossing the study area.

The alternatives retained at the conclusion of the screening assessment are displayed in the following figures:

- Roadway/highway improvements – Figure 6.
- Non-motorized system improvements – Figure 7.
- Transit system improvements – Figure 8.

Conclusions

The North Mandan Subarea Study is an initial stage of a multi-step process for identifying, designing, approving and implementing multimodal transportation system improvements that meet identified needs in the focus area. Two critical elements of next steps in the short and longer term planning process are:

- Develop a program for integrating a traffic impact study process into project development.

- Advance the list of technically feasible projects through the planning and funding process, whether it is a local/county/state funded or a federally funded project.

Traffic Impact Study Process

A traffic impact analysis is a study through which the effects of a particular development, or group of developments, have on the transportation network in the community. The primary goal of a traffic impact study is to identify what type of transportation improvements may be necessary to accommodate site generated traffic. Traffic impact studies should accompany developments which have the potential to impact the transportation network and should be considered an important tool in assisting the City in making land use decisions.
Develop 37th St Arterial

- New I-94 Underpass
- New Interchange
  - Both Include:
    - Extend Boundary Rd
    - Extend Lohstreter Rd.

Alternative
- Add Center Left Turn Lane – 3-Lane Section

Alternatives
- 3-Lane Section (Add Center Left Turn Lane)
- 4-Lane Divided/Center Turn Lane

Alternatives
- Include Signal and Turn Lanes
- Retain ND 1806 as Through Route
- Roundabout

New River Crossing and Arterial Alternative – If Re-align
- Coordinate timing with I-94 Ramps
- Implement Mandan Interchange Improvements

Alternatives (Walmart Access)
- Restripe to Add Left Turn Lanes
- Monitor for Signal Need

Alternatives
- Restripe as 3-Lane (from 4 lanes)
- 5-Lane Section (Add Center Turn Lane)

Alternatives
- Adjust Ramps to Reduce Skew
- Add Left Turn Lane under I-94
- Add Signals

If Retain Old Red Trail Alignment
- Add Turn Lanes at Intersections
  - Improve to Urban Section

Old Red Trail
- Coordinate timing with I-94 Ramps
- Implement Mandan Interchange Improvements

Alterantives (Mid-term)
- Reconfigure Interchange

Alterantives (Short-term)
- Restripe to 3-Lane
- Add Signals

Implementation Period Legend
- Short Term (<5 Years)
- Middle Term (5 to 15 Years)
- Longer Term (>15 Years)
- Beyond 20 Year Planning Horizon

- Add Signal (Color Represents Period)
- Add Turn Lanes to Approach

SRTS - Safe Routes to School Project

Figure 6
Technically Feasible Improvements and Implementation Plan

North Mandan Subarea Study
Bismarck-Mandan Metropolitan Planning Organization
Figure 7
Future Trail and Sidewalk Extension Concepts

Note: Sidewalks to be included with all future residential / local street development.
Legend

- Bismarck to Mandan (Via Memorial Avenue)
- Bismarck to Mandan (Via BSC/Gateway)
- On-request Deviated Route
- Commercial Use
- Hospital/Clinic Use
- School
- Industrial Use
- High Density Residential Use

Figure 8
2012 Transit Development Plan Recommended Routes/Transit-Friendly Development Sites
**Project Development Steps**

The path the city, county or NDDOT take to selecting and implementing the preferred alternative will depend on a number of factors, with “how is the project being funded” as one of the critical determinants to the path to implementation. Figure 9 highlights the alternate next step paths for projects identified as technically feasible in the North Mandan Subarea Study.

---

**Figure 9: Alternate Next Steps in Project Development Process**

- Detailed Location Analysis
- Conceptual/Preliminary Engineering
- Determine Funding
- Final Design
- Implementation Bid/Construction

- Incorporate into Long Range Plan (2014)
- Lower Cost Project: Update Transportation Improvement Program (A Possibility - Not a Given)
- Preliminary Design/ Environmental
- Determine Funding
- Final Design
- Implementation – Bid/Construction