August 2001

# Bismarck-Mandan Metropolitan Area Long Range Transportation Plan


*Submitted by*

**ULTEIG Engineers, Inc.**

1701 South 12th Street

Bismarck, ND 58504

701-258-6507

*Also Located In: Fargo, ND • Minneapolis, MN • Sioux Falls, SD*

**Bismarck - Mandan**
**Metropolitan Area**

# Long Range Transportation Plan

Prepared by:

**Ulteig Engineers, Inc.**
**1701 South 12th Street**
**Bismarck, ND 58104**

**Phone: 701-258-6507**
**Fax: 701-224-1163**
**Web Site: http//www.ulteig.com**

**On Behalf of the**

**Bismarck-Mandan**
**Metropolitan Planning organization**

**August 2001**

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This document does not constitute a standard, specification, or regulation. The United States Government, the State of North Dakota, and the Metropolitan Planning Organization do not endorse products or manufacturers. Trade or manufacturers' names appear herein only because they are considered essential to the objective of this document.

The contents of this document reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the policies of the state and federal Departments of Transportation.

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# Bismarck - Mandan
# Metropolitan Planning Organization
# Project Participants

## Policy Board Members

Bill Sorenson, City of Bismarck
Claus Lembke, Burleigh County
Marlene Thurn, City of Lincoln
Ken LaMont, City of Mandan
Matt Erhart, Morton County

## Technical Advisory Committee Members

Paul Benning, NDDOT
Mel Bullinger, Bismarck City Engineer
Gregg Greenquist, Morton County Planner
Rob Griffith, Federal Highway Administration
Carl Hokenstad, Bismarck City Planner
Tom Little, Mandan City Engineer
Jon Mill, Burleigh County Engineer
Charles A. Morman, Morton County Road Super
Steve Saunders, Metropolitan Planning Organization
Marlene Thurn, City of Lincoln
Robin Werre, Bis–Man Transit Board

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the planning commissions of each jurisdiction have reviewed the 2001 Long Range Transportation Plan, and have approved it as a guide for their future planning and development policies; and

**WHEREAS**, all affected governing bodies (Bismarck, Lincoln, Mandan, Burleigh and Morton Counties) in turn have approved the 2001 Long Range Transportation Plan; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Bismarck-Mandan Metropolitan Planning Organization Policy Board that it adopts the 2001 Long Range Transportation Plan and directs staff to publish the final document and distribute copies to all appropriate local governments and interested parties; and

**BE IT FURTHER RESOLVED**, that all jurisdictions and their elected officials and staff covered by the document are encouraged to cooperatively implement the recommendations of the 2001 Long Range Transportation Plan.

## CERTIFICATE

The undersigned, duly qualified members of the Bismarck-Mandan Metropolitan Planning Organization Policy Board certify that the foregoing is a true and correct copy of a Resolution, adopted at a legally convened meeting of the Policy Board held on August 15, 2001.

Bill Sorenson — 8-15-01
Bill Sorenson
City of Bismarck Representative
Bismarck-Mandan MPO Policy Board
Date

Claus Lembke — 8-15-01
Claus Lembke
Burleigh County Representative
Bismarck-Mandan MPO Policy Board
Date

Marlene Thurn — 8-15-01
Marlene Thurn
City of Lincoln Representative
Bismarck-Mandan MPO Policy Board
Date

Ken LaMont
City of Mandan Representative
Bismarck-Mandan MPO Policy Board
Date

Matt Erhardt — 8-15-01
Matt Erhardt
Morton County Representative
Bismarck-Mandan MPO Policy Board
Date

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Bismarck Planning and Zoning Commission that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED**, that the City staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

David Blackstead

David Blackstead, Chairman
Bismarck Planning and Zoning Commission

7/12/2001

Date

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Bismarck Board of City Commissioners that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED**, that the City staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

Bill Sorensen, President
Bismarck Board of City Commissioners

8-14-01
Date

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Burleigh County Planning Commission that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED**, that the engineering and planning department staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

S/ Timothy R Atkinson

Tim Atkinson, Chairman
Burleigh County Planning Commission

7/2/01
Date

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# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Burleigh County Board of Commissioners that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED**, that the Burleigh County staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

Helen D Schatz — 7-6-01

Helen Schatz, Chair — Date
Burleigh County Board of Commissioners

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Lincoln Planning and Zoning Commission that it adopts the 2001 Long Range Transportation Plan.

Helen Magilke for Terry Fasteen July 10, 2001

Terry Fasteen, Chair Date
Lincoln Planning and Zoning Commission

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Lincoln City Council that it adopts the 2001 Long Range Transportation Plan.

Robert W. Johnston

Robert Johnston, Mayor
Lincoln City Council

12 July 2001

Date

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS,** the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS,** the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS,** the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan, which is in compliance with federal transportation planning standards; and

**WHEREAS,** the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS,** all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED,** by the Mandan Planning and Zoning Commission that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED,** that engineering and planning department staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

Dated this 16 day of July, 2001.

Keith Keidel, Chairman
Mandan Planning and Zoning Commission

Attest:

Thomas Little, City Engineer

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS,** the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS,** the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS,** the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan, which is in compliance with federal transportation planning standards; and

**WHEREAS,** the engineering and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS,** all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED,** by the Mandan Board of City Commissioners that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED,** that engineering and planning department staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

Dated this 27 day of July, 2001.

Ken LaMont, President, Board of City Commissioners

Attest:

James Neubauer, City Administrator

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the highway department and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Morton County Planning Commission that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED**, that the highway department and planning department staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

John A. Schafer

John Schafer, Chairman
Morton County Planning Commission

June 28- 01

Date

# RESOLUTION OF ADOPTION
## for the
## 2001 Bismarck-Mandan Metropolitan Area
## Long Range Transportation Plan

**WHEREAS**, the U.S. Department of Transportation requires the formulation, approval, and maintenance of a long range Metropolitan Transportation Plan for the urban area as a condition of federal transportation funding; and

**WHEREAS**, the Bismarck-Mandan Metropolitan Planning Organization (MPO) has been designated by the Governor of North Dakota as the Metropolitan Planning Organization responsible for preparing and maintaining the Metropolitan Transportation Plan; and

**WHEREAS**, the Bismarck-Mandan MPO after extensive public involvement and substantial consideration of technical, environmental, financial, and social factors has prepared the 2001 Long Range Transportation Plan which is in compliance with federal transportation planning standards; and

**WHEREAS**, the highway department and planning department staff have reviewed the 2001 Long Range Transportation Plan, and have unanimously indicated their support for it as a guide for their future planning and development policies; and

**WHEREAS**, all cognizant State and Federal agencies have reviewed the Plan and indicated their support for it; and

**NOW, THEREFORE BE IT RESOLVED**, by the Morton County Board of Commissioners that it adopts the 2001 Long Range Transportation Plan; and

**BE IT FURTHER RESOLVED**, that the highway department and planning department staff are directed to use the 2001 Long Range Transportation Plan as a tool in their everyday planning and engineering activities.

Tony Schirado

Tony Schirado, President
Morton County Board of Commissioners

7-10-01

Date

# Bismarck-Mandan Metropolitan
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# I. Introduction

The Bismarck-Mandan Metropolitan Planning Organization (MPO) has been charged with the responsibility to maintain continuous, comprehensive, and coordinated transportation planning for the Bismarck-Mandan metropolitan area.

The MPO's role in serving the Bismarck-Mandan area is accomplished through many means. Annually, the MPO undertakes preparation of the Transportation Improvement Program (TIP), as well as a number of transportation oriented planning studies initiated at the request of local jurisdictions. Once every five years, the MPO completes an update of the metropolitan area's Long Range Transportation Plan.

The previous Long Range Transportation Plan was adopted in August 1996. Similar to this plan, the 1996 Plan prepared household and employment growth projections which became the primary data elements for a traffic forecasting model. A number of projects were programmed in the short range element of the 1996 Plan and were subsequently constructed as a result. Examples include East Century Avenue and South 3rd Street in Bismarck and Main Street, First Street and Old Red Trail in Mandan. Additionally, the 1996 Plan led to further transportation planning efforts along Schafer Street, Highway 1804 and State Street in Bismarck and Division Street in Mandan.

## A. Purpose

The Long Range Transportation Plan has many functions. First, it provides a comprehensive look at the short and long range needs of the transportation system. The plan considers all modes of transportation, although it typically focuses on streets and highways.

By federal regulation, the MPO must maintain a Long Range Transportation Plan having at least a 20-year planning horizon. For the purpose of this plan, local staff have selected the year 2025 as the future long range projection year, and the year 2010 as the future short range projection year.

While the Long Range Transportation Plan considers transportation needs on a regional scale, it is not intended to address site specific details of individual transportation projects. Further, this plan identifies transportation projects which may become eligible for federal funding. In fact, all transportation projects programmed to receive federal funding are to be included in the Long Range Transportation Plan. Therefore, this plan only addresses street and highway project needs that are on existing or future federal aid systems. For practical purposes, this equates to projects on the functional classification systems. All local street system needs that are not on the functional classification system are addressed through local planning efforts and are not discussed in this plan.

For this plan to fulfill its greatest use, it is essential for local staff, planning commissions and governing officials to be familiar with the contents of the plan and to use the plan regularly as a resource and tool in their planning and decision making processes. Since the plan takes a "bigger picture" view of the transportation system and provides recommendations within that context, it is possible that the plan will enable local staff to take a more consistent approach in responding to such issues as land use compatibility, right-of-way preservation and access control. Consistency in policies and decision making among jurisdictions should also be enhanced in matters pertaining to transportation.

Finally, this plan documents and maps a positive direction for development of the urban area's transportation system. It establishes approved priorities within each jurisdiction that will enable the communities to be prepared for continued growth and expansion. As a financially constrained plan, the Long Range Transportation Plan assists each jurisdiction to effectively plan the most desirable use of limited resources and to make course corrections when merited by changing local conditions.

## B. Study Area

The metropolitan area is encompassed by the Bismarck-Mandan MPO study area shown in Figure 1-1. Five local jurisdictions are represented by the Bismarck-Mandan MPO. They are the Cities of Bismarck, Lincoln, and Mandan, and Counties of Burleigh and Morton.

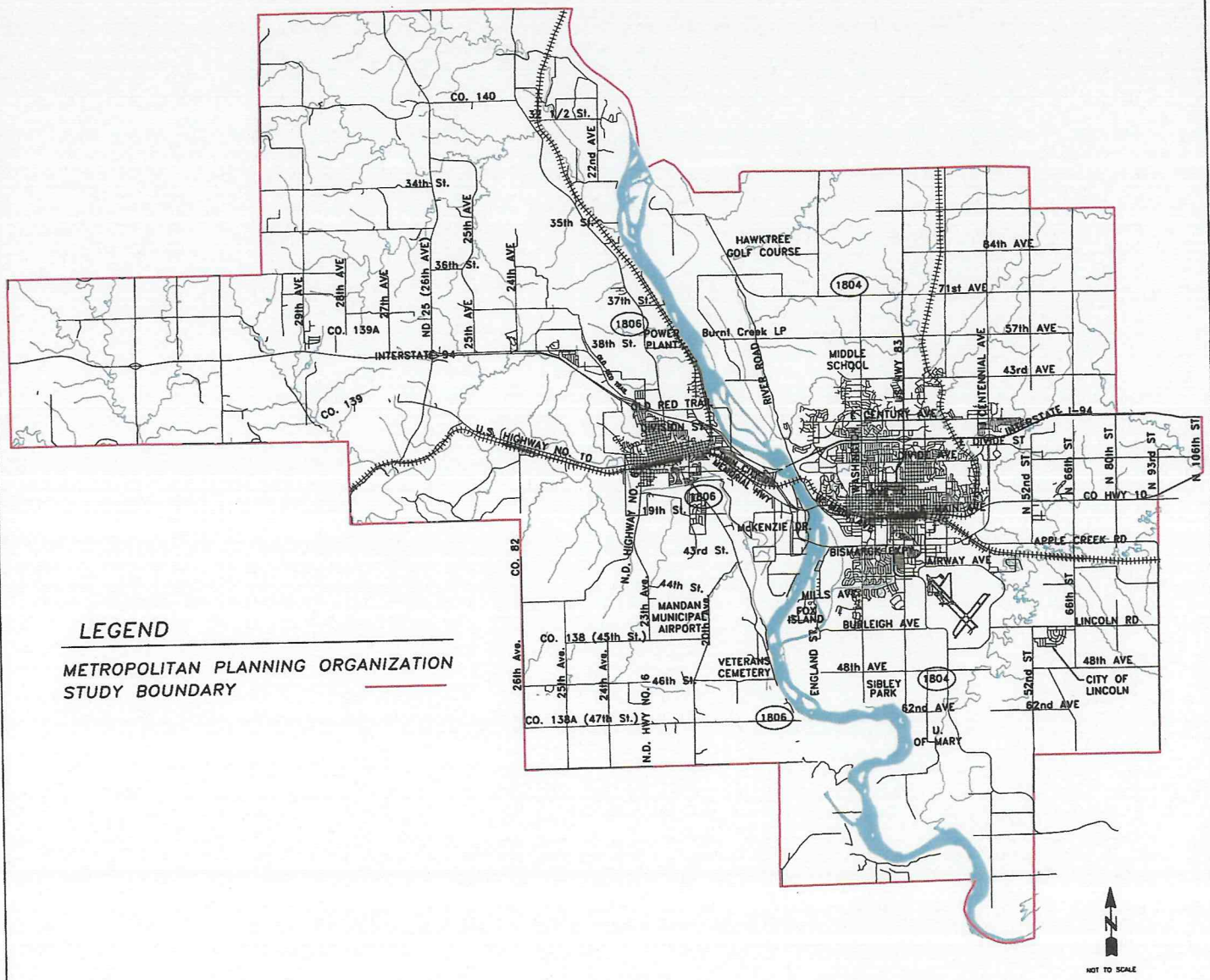
The MPO study area was established to identify the region where metropolitan planning should extend and MPO planning funds should be expended. An effort was made during the development of the Long Range Transportation Plan to review the MPO study area boundary for adequacy concerning the area's transportation planning needs. Future study area boundary recommendations are contained within the conclusion of this report.

## C. Methodology

The principal beneficiaries of the Long Range Transportation Plan are the MPO and the local jurisdictions responsible to implement the plan's recommendations. Therefore, in order to best meet the needs of the plan's primary users, meetings were held with staff from each jurisdiction to discuss their needs and concerns related to transportation in their respective jurisdiction. Throughout the planning process, a key to development of the Long Range Transportation Plan was ongoing involvement facilitated among all the study's participants (See Figure 1-2).

Figure 1-3 shows a flow chart of the planning process used to develop the long range plan. Major tasks completed throughout the planning process are shown in Figure 1-3.

# BISMARCK MANDAN METROPOLITAN PLANNING ORGANIZATION STUDY BOUNDARY




| | | |
|---|---|---|
| FIGURE 1-1<br>STUDY BOUNDARY | | |
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | |
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00-8007 |
| CHECKED BY: SSG | DATE: 5/4/2001 | |
| APPROVED BY: | | FIG1-1.DWG |

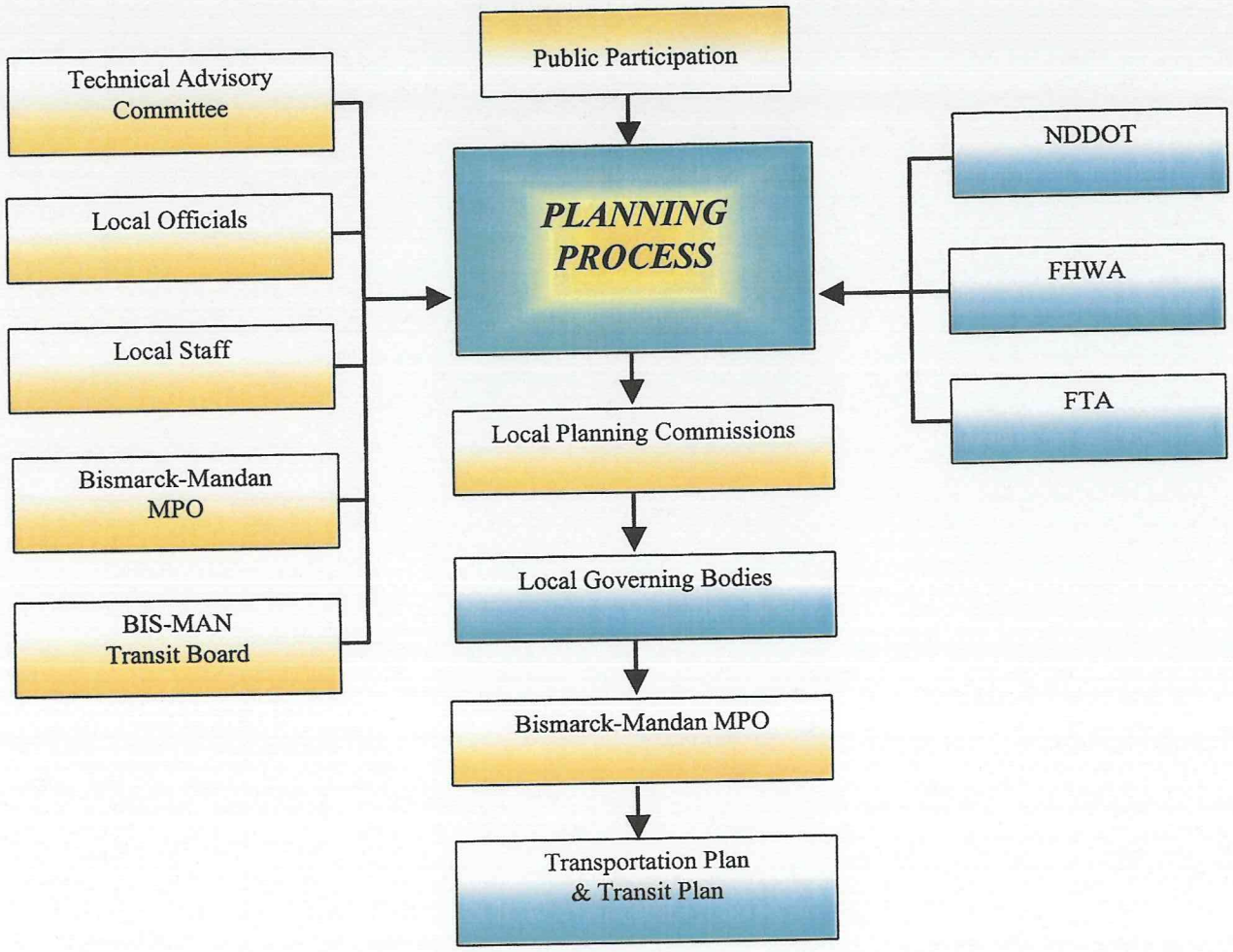



Figure 1 – 2

***Relationship of Study Participants***

Bismarck-Mandan
Long Range Transportation Plan

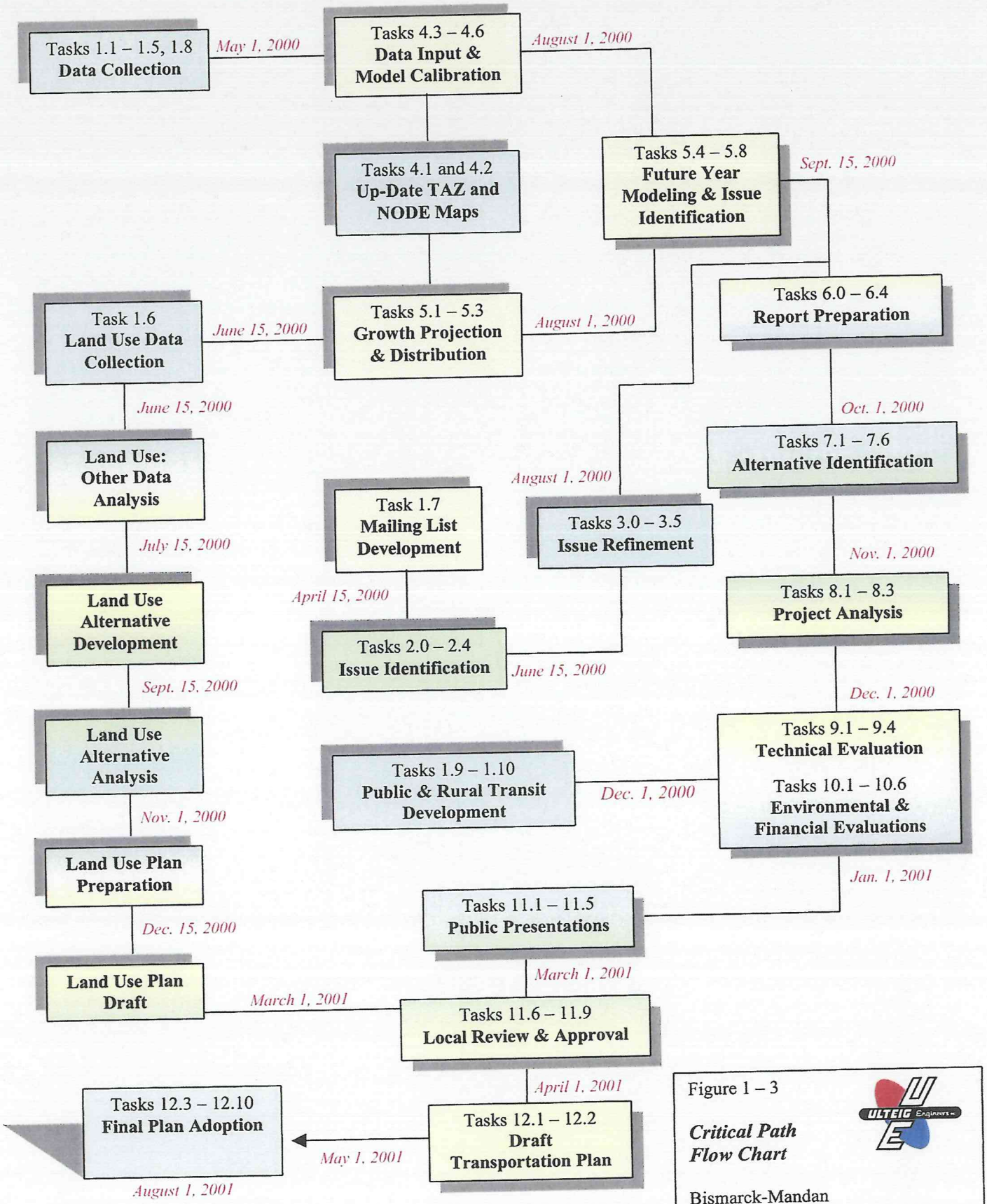



Figure 1 – 3

***Critical Path Flow Chart***

Bismarck-Mandan
Long Range Transportation Plan

## D. Issues, Goals and Objectives

It has been said that one should first identify the problem, then look for the cure. Most transportation needs can be placed into a small grouping of issue categories. Major issue categories were developed based on those called for by the Transportation Equity Act for the 21st Century (TEA-21) and further identified by the MPO Technical Advisory Committee (TAC). For each issue category a number of goals and objectives were further identified by which the success of this plan can be measured. The issues also served to provide a conceptual framework under which transportation need locations could be organized and evaluated. The issues, goals and objectives identified for the Long Range Transportation Plan are shown in Tables 1 and 2 in Appendix I.

# II. Existing Conditions

This chapter summarizes the existing conditions of the transportation system in the Bismarck-Mandan metropolitan area. A significant effort was made to collect data pertaining to the existing transportation system. Aerial photographs were developed from a June 2000 flyover and became a vital tool in the understanding of site conditions, particularly in the rural areas. Technical staff and comments received from citizens and special interest groups also expanded our understanding of existing conditions.

## A. Roadway System Conditions

The Bismarck-Mandan metropolitan area benefits from a system of roadways that is in generally good condition and meets many of the transportation needs of the traveling public. From the standpoint of roadway capacity, there are adequate roadways throughout the system to handle existing traffic peaks with a handful of exceptions, and few locations exist where traffic congestion would be categorized as moderate to severe. These locations are identified in the next chapter of this report.

While few roadway capacity problems exist, there are a number of significant issues pertaining to inadequate roadway access/continuity and undefined transportation facilities in developing and extraterritorial areas that stand out. On the Burleigh County side of the Missouri River, some system deficiencies include the following:

- Limited north-south cross town travel routes.
- Limited interstate access east of Bismarck Expressway.
- Few route options on Bismarck's northwest side.
- Indirect and poorly developed access between Lincoln and Bismarck.
- Compromised right-of-way along rural mile line corridors.

On the Morton County side of the Missouri River, current system deficiencies include the following:

- Insufficient east-west access through north central Mandan.
- Limited east-west routes and access south of Mandan.
- Limited interstate access west of Sunset Drive.
- Undefined facilities in Harmon Lake development area.
- Compromised right-of-way along rural mile line corridors.

From a regional perspective, the Missouri River and I-94 create major barriers to intra-city and cross town traffic. Only 3 Missouri River bridges exist within Bismarck-Mandan, whereas, 11 I-94 crossings also exist (5 of these are interchanges). It became evident from the review of existing conditions, that eventually additional Missouri River crossings

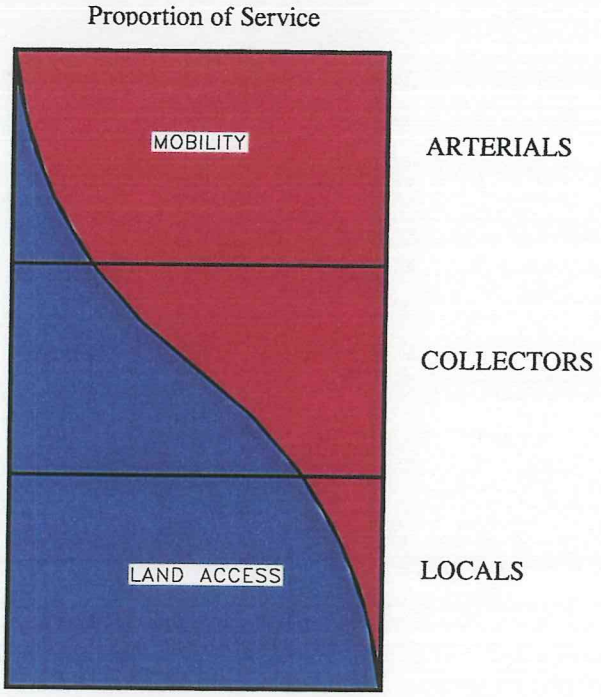
north and south of the urban area will become necessary. These bridges would serve multiple purposes, including acting as an urban bypass, and reducing traffic congestion on existing Missouri River bridges and north-south arterials.

## 1. Functional Classification

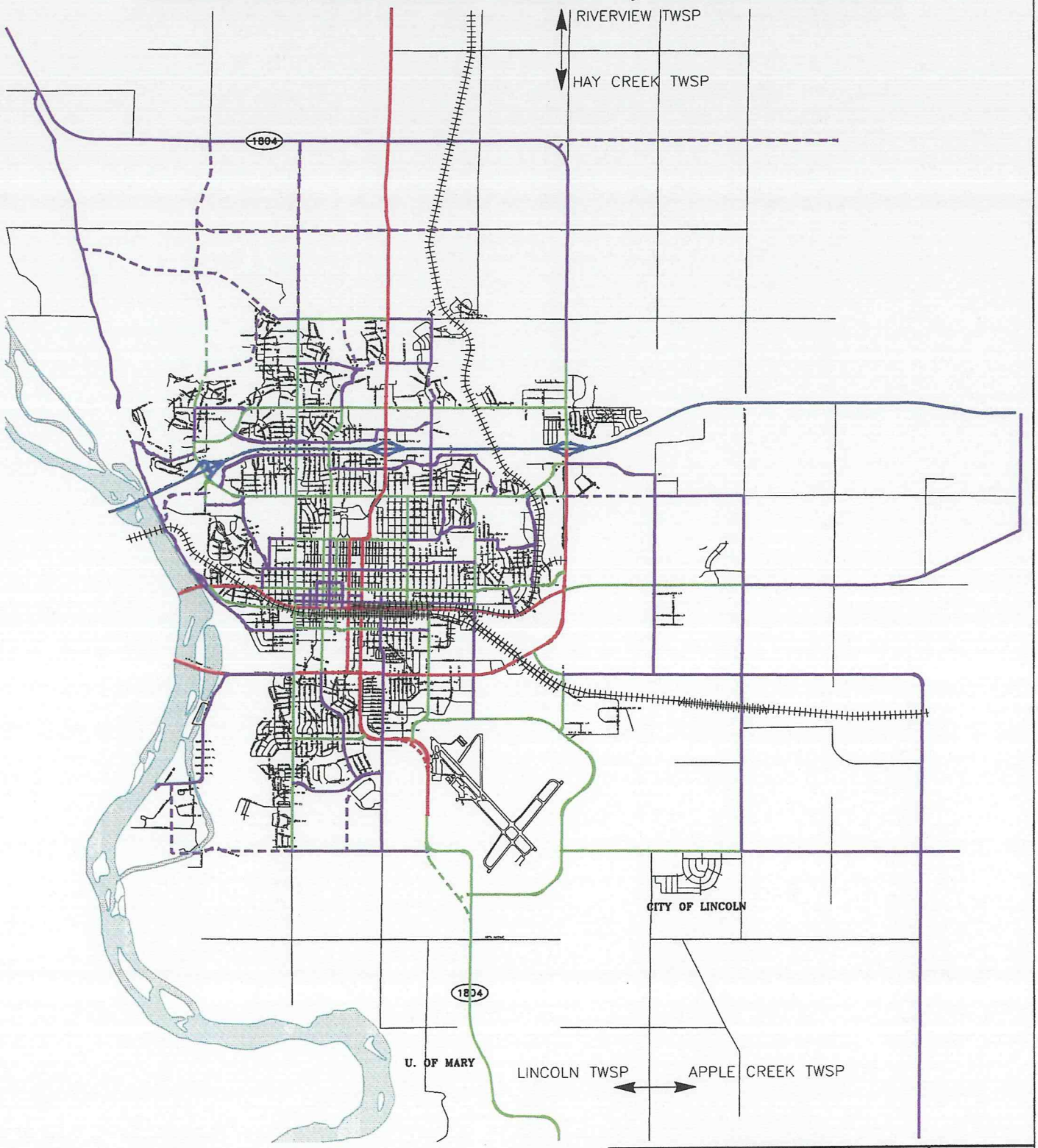
The Highway Functional Classification Concepts, Criteria and Procedures manual published by the United States Department of Transportation (USDOT) in 1989 serves as the primary guidance for preparation and planning related to roadway functional classification. Definitions and discussion related to functional classification are taken from that manual.

Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide. The relationships between the various functional classes and character of service are shown in Figure 2-1.

**Figure 2 – 1**
Relationship of Functionally Classified Systems in Serving Traffic Mobility and Land Access



# FUNCTIONAL CLASSIFICATION
# BISMARCK/BURLEIGH COUNTY, NORTH DAKOTA




| LEGEND | PROPOSED |
|---|---|
| INTERSTATE | |
| PRINCIPAL ARTERIALS | |
| MINOR ARTERIALS | |
| COLLECTORS | |

N

NOT TO SCALE

FIGURE 2-2
FUNCTIONAL CLASS MAP

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

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| | | |
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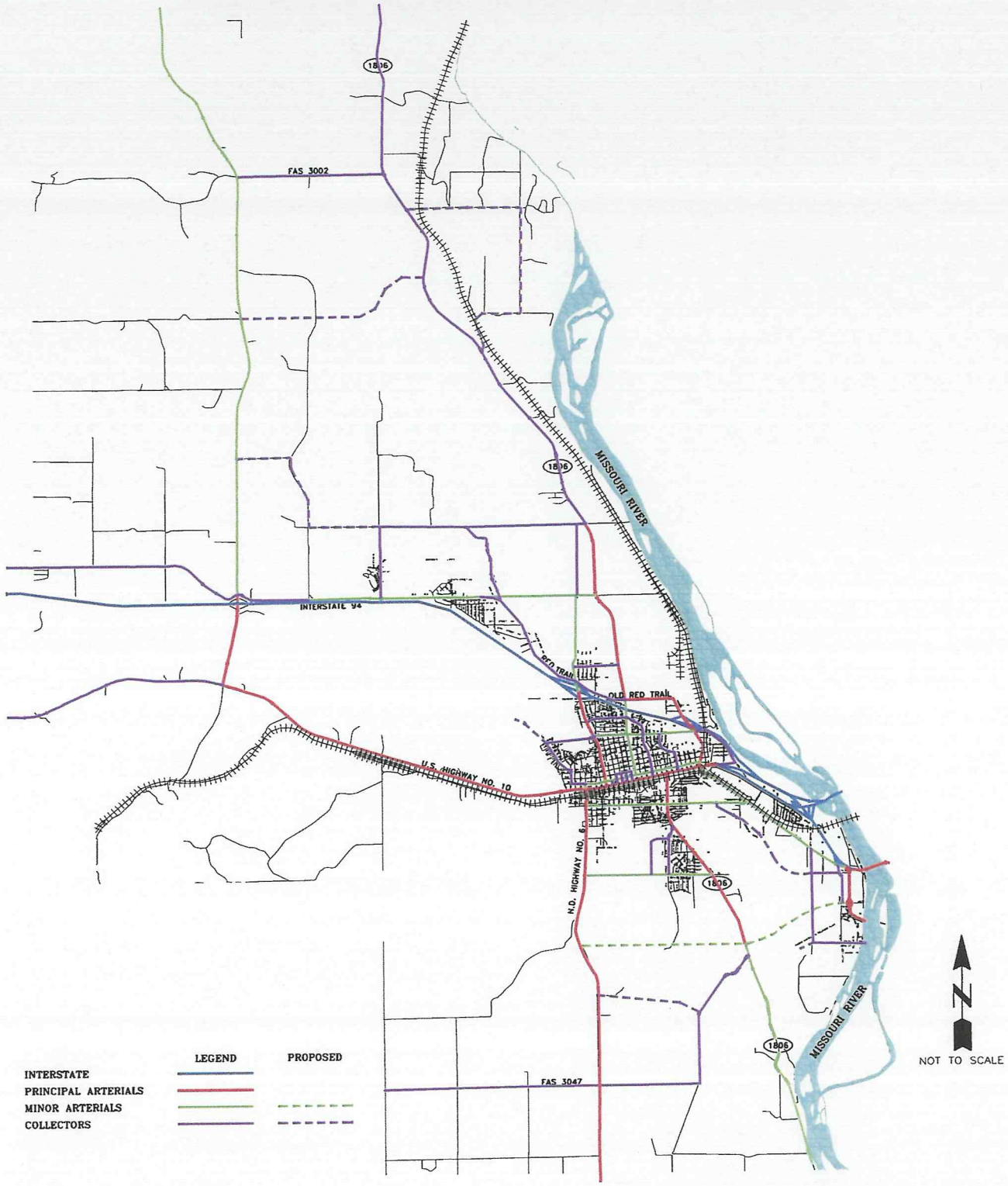
| APPROVED BY: | | |

FIG2-2.DWG

# FUNCTIONAL CLASSIFICATION
# MANDAN/MORTON COUNTY, NORTH DAKOTA




| | | |
|---|---|---|
| FIGURE 2-3<br>FUNCTIONAL CLASS MAP | | |
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | |
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00-8007 |
| CHECKED BY: | DATE: 5/4/2001 | |
| APPROVED BY: | | FIG2-3.DWG |

The existing functional classification systems within the MPO study area are shown in Figures 2-2 and 2-3.

The roadway functional classifications for the urban area are further defined as follows:

**a. Principal Arterials**

Principal arterials serve the major centers of activity of a metropolitan area, the highest traffic volume corridors, and the longest trip desires; and should carry a high proportion of the total urban area travel on a minimum of mileage. The system should be integrated, both internally and between major rural connections.

The principal arterial system should carry the major portion of trips entering and leaving the urban area, as well as the majority of through movements desiring to bypass the central city. In addition, significant intra-area travel, such as between central business districts and outlying residential areas, between major inner city communities, or between major suburban centers should be served by this system. Frequently the principal arterial system will carry important intra-urban as well as intercity bus routes. Finally, this system in small urban and urbanized areas should provide continuity for all rural arterials which intercept the urban boundary.

Because of the nature of the travel served by the principal arterial system, almost all fully and partially controlled access facilities will be part of this functional system. However, this system is not restricted to controlled access routes. In order to preserve the identification of controlled access facilities, the principal arterial system is stratified as follows: (1) interstate; (2) other freeways and expressways, and (3) other principal arterials (with no control of access).

The spacing of urban principal arterials will be closely related to the trip-end density characteristics of particular portions of the urban areas. While no firm spacing rule can be established which will apply in all, or even most circumstances, the spacing of principal arterials (in larger urban areas) may vary from less than one mile in the highly developed central business areas to five miles or more in the sparsely developed urban fringes.

For principal arterials, the concept of service to abutting land should be subordinate to the provision of travel service to major traffic movements. It should be noted that only facilities within the "other principal arterial" system are capable of providing any direct access to adjacent land, and such service should be purely incidental to the primary functional responsibility of this system.

### b. Minor Arterials

The minor arterial street system should interconnect with and augment the urban principal arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than principal arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system.

The minor arterial street system includes all arterials not classified as a principal and contains facilities that place more emphasis on land access than the higher system, and offer a lower level of traffic mobility. Such facilities may carry local bus routes and provide intra-community continuity, but ideally should not penetrate identifiable neighborhoods. This system should include urban connections to rural collector roads where such connections have not been classified as urban principal arterials.

The spacing of minor arterial streets may vary from 1/8 to ½ mile in the central business district to two to three miles in the suburban fringes, but should normally be not more than one mile in fully developed areas.

### c. Collector Streets

The collector street system provides both land access service and traffic circulation within residential neighborhoods, commercial and industrial areas. It differs from the arterial system in that facilities on the collector system may penetrate residential neighborhoods, distributing trips from the arterials through the area to the ultimate destination. Conversely, the collector street also collects traffic from local streets in residential neighborhoods and channels it into the arterial system. In the central business district, and in other areas of like development and traffic density, the collector system may include the street grid which forms a logical entity for traffic circulation.

### d. Local Streets

The local street system comprises all facilities not on one of the higher systems. It serves primarily to provide direct access to abutting land and access to the higher order systems. It offers the lowest level of mobility and usually contains no bus routes. Service to through traffic movement usually is deliberately discouraged.

## B. Bikeways and Pedestrian Facilities

Figure 2-4 shows the existing multi-use trails within the MPO planning area. The trails which exist are in good condition and are well maintained. Most of the trails are ten feet wide and have either been constructed or reworked within the last ten years.

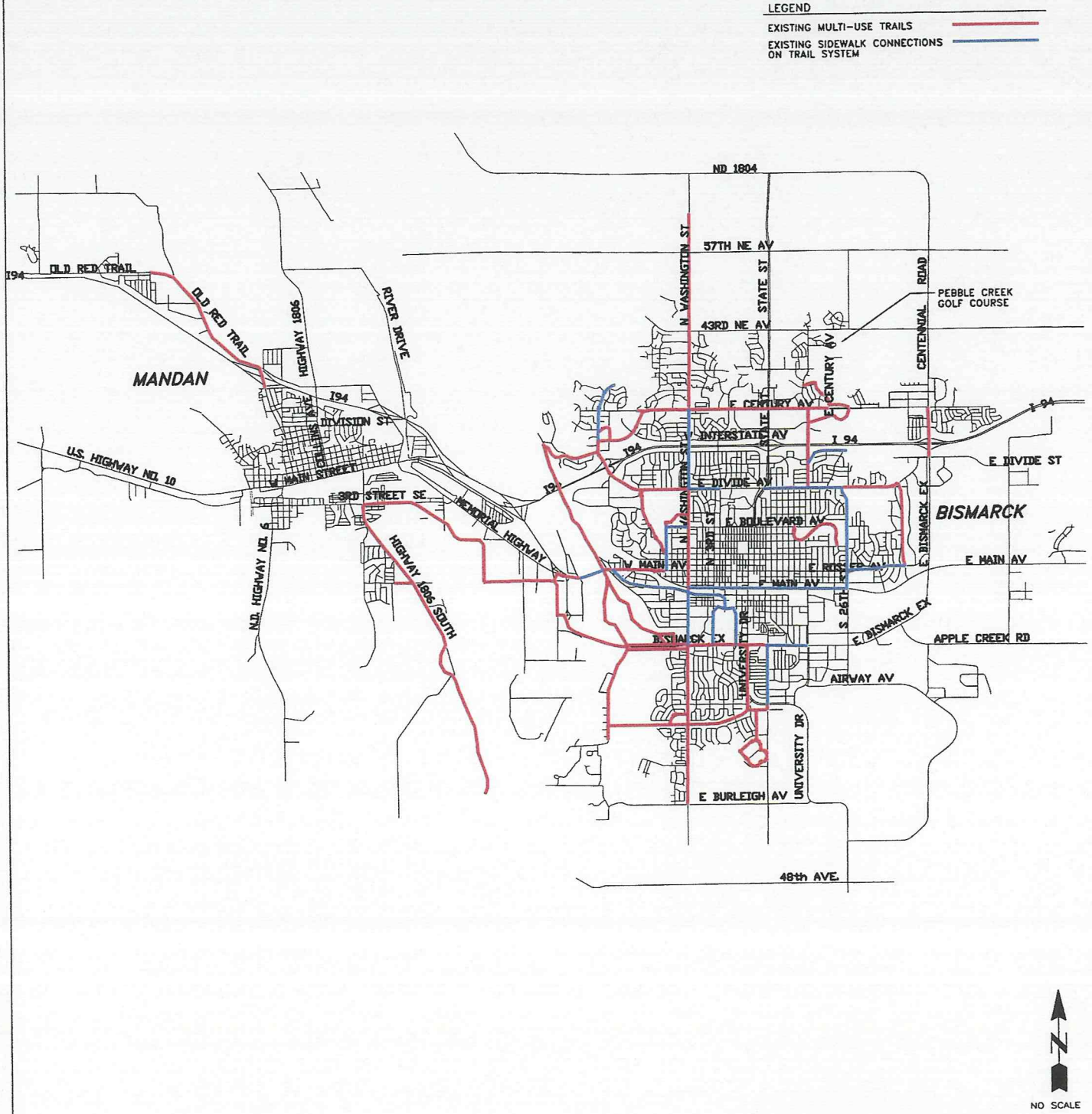



FIGURE 2-4
BISMARCK MANDAN MULTI-USE TRAILS
EXISTING TRAILS

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

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| APPROVED BY: | | |

FIG2-4.DWG

The City of Bismarck has an extensive and well-looped multi-use trail system in the western section of the city. A trail parallels the Missouri River from Fox Island on the south to Pioneer Park on the north. In addition, loops allow access to parks, golf courses, schools, the zoo, and the YMCA. Extensions from these loops provide access to the downtown area and the Kirkwood Mall. The trail system is easily accessible and convenient parking areas exist to make the trails user friendly.

The City of Lincoln is predominately neighborhood residential with relatively new streets. The city has shared bike trails and does have some off-road mountain bike trails.

The City of Mandan and Morton County have a relatively new trail along Highway 1806 from 3rd Street South to Fort Lincoln State Park. This is a scenic trail on the west side of the Missouri River. Within the past year a new trail has been developed along Old Red Trail from Boundary Road to 34th Avenue NW.

The City of Bismarck trail system and the City of Mandan trail to Fort Lincoln are tied by trails which cross the Missouri River at the Memorial Bridge and Expressway Avenue Bridge. This interconnection is of great benefit to the area.

In addition to the trail system, the citizens are provided with sidewalks on both sides of most streets for pedestrian movements and other shared uses. These sidewalks, particularly in the residential neighborhoods, allow for children to use their bicycles, skateboards and in-line skates without conflicting with vehicular traffic. Paralleling some of the major arterials, the sidewalk on one side of the street is widened to allow for development of the multi-use trail system.

Obviously, some deficiencies exist with the sidewalk and trail systems within the planning area. There are a number of gaps in the sidewalk system both in the inner cities and when leap-frog development has occurred. The City of Lincoln should be connected to the City of Bismarck by a multi-use trail or a shared bikeway. The City of Bismarck needs multi-use trails in the north and east, and continued movement toward looping. The City of Mandan needs more multi-use trails and shared bikeways to provide loops and access to schools, parks, and golf courses. Project proposals found later in this report address these documented needs.

## C. Transit Service

The public transit service operated in the Bismarck-Mandan area is known as Bis-Man Transit. Bis-Man Transit provides door-to-door, scheduled-ride service, seven days per week, 24 hours per day within the city limits and up to two miles beyond. The service is available to all residents, but eligible registered customers are offered the service at a reduced fare. Those eligible for the discounted fares are all those 60 years of age or older or those with a certified disability. Upon certification, eligible riders are issued rider

identification cards. There are currently about 8,000 certified riders. Bis-Man Transit also provides service for Access-to-Jobs clients on an as-needed basis.

All service must be pre-scheduled as single or recurring requests. Customers desiring service must call the transit schedulers between 8:00 a.m. and 5:00 p.m. at least one day in advance of the desired trip. All requirements of the trip are covered including name, pick-up and drop-off location, desired time of drop-off, wheelchair, escort or special-needs requirements, and time of return trip. Trips may be scheduled up to seven days in advance and permanent or recurring trips can be established. There are no restrictions on the types of trips that can be made. This is a door-to-door service which means drivers will assist riders into and out of buildings. Service is considered to be on-time if it arrives within 15 minutes of its scheduled time.

The discounted fare for eligible riders is $1.50 per ride within the Cities of Bismarck and Mandan. Rides between Bismarck and Mandan or to the City of Lincoln or University of Mary are $2.25. Service for Access-to-Jobs clients is provided under a separate aid program. Eligible clients pay no direct fare to and from work but extra fees are required for additional stops ($2.00) and extra children ($1.00). The full fare for other riders is currently $6.00 for service within the cities and $12.00 for service between the cities and beyond. Local funding comes from a $2 million property tax contribution from Bismarck and a $3 million property tax contribution from Mandan. Additional assistance from state and federal sources is also provided.

The Bis-Man Transit System was originally developed in 1989-1990. It was designed as a coordinated transportation system to replace several smaller individual programs. The service is managed by a non-profit agency, the Central NoDak Development Corporation and governed by a Board of Directors. The service is operated under contract by a for-profit firm, Taxi 9000. All administrative and service functions are housed in a relatively new, joint-use facility shared between Bis-Man Transit, Coach, Inc. (Taxi 9000), Greyhound, and West River Transit – a rural area transit provider.

## D. Aviation, Railroad Facilities and Freight Movement

### 1. Aviation

The Bismarck-Mandan MPO area is served by two airports: the Bismarck Municipal Airport and the Mandan Municipal Airport. Bismarck Municipal Airport is owned and operated by the City of Bismarck, and the City of Mandan owns and operates Mandan Municipal Airport. Bismarck Municipal Airport is on the southeast edge of Bismarck and the Mandan Municipal Airport is south of Mandan, adjacent to North Dakota Highway #6.

Bismarck Municipal Airport

Bismarck Municipal Airport was established in the 1920's and has grown to encompass approximately 2400 acres. The first airline operations at Bismarck commenced in June of 1931 with Northwest Airlines making its inaugural flight. The airport can handle the largest and most sophisticated aircraft in commercial, military or general aviation fleets. It lies close to a major interstate highway (I-94) and rail corridors, linking the airport to regional, national and international markets. The airport is at an elevation of 1677 feet above mean sea level.

Bismarck Municipal Airport has two runways:

- 13/31 with a grooved asphalt surface, has dimensions of 8794 feet long and 150 feet wide.

- 3/21 with a grooved asphalt surface, has dimensions of 6600 feet long and 100 feet wide.

Runway 13/31 is the primary commercial runway, while 3/21 is used when crosswinds dictate. General aviation aircraft use both runways. Both runways have lighting and navigation aids to continue operations at night. The runway surfaces are relatively new and in excellent condition.

Bismarck Municipal Airport provides a terminal building for airline operations, rental cars, baggage handling, restaurant and gift shop. Conventional and maintenance hangars exist for the North Dakota Army National Guard, area businesses, and fixed base operations.

The following table indicates the number of enplanements and aircraft movements at Bismarck Municipal Airport during 1997-2000. The airport also handles a significant amount of freight and mail, which is also shown in the table.

**Table 1**
**Freight and Air Mail**

| Year | Enplanements | Aircraft Movements | Freight (pounds) | | Airmail (pounds) | |
|---|---|---|---|---|---|---|
| | | | On | Off | On | Off |
| 1997 | 122,435 | 60,025 | 147,365 | 372,580 | 1,114,028 | 1,499,996 |
| 1998 | 122,058 | 56,064 | 357,419 | 463,010 | 635,858 | 1,312,631 |
| 1999 | 127,812 | 50,971 | 134,939 | 232,909 | 624,932 | 1,106,656 |
| 2000 | 134,483 | 55,077 | 171,222 | 219,335 | 236,627 | 1,127,393 |

Mandan Municipal Airport

Mandan Municipal Airport is a general aviation airport which serves Mandan and the surrounding area. Mandan Airport has one asphalt runway, 13/31, which has an asphalt surface with dimensions of 4400 feet long and 75 feet wide. The runway surface is in good condition. The airport also has a crosswind turf runway, 4/22, which is 2,900 feet long and 120 feet wide. The Mandan Municipal Airport currently has 32 based aircraft, and hangar space for maintenance and storage of its aircraft. Night operations are possible with pilot controlled lights on the runway. The airport is at an elevation of 1944 feet above mean sea level.

## 2. Railroad Facilities

The Bismarck-Mandan MPO area is traversed by a major east-west railroad facility and with minor routes branching into and out of the cities. The main east-west railroad is owned by Burlington Northern Santa Fe (BNSF) Railroad Company, as is the minor route from Mandan to Zap. The minor route from Bismarck to Washburn and onto Max is operated by Dakota, Missouri Valley and Western over trackage owned by Canadian Pacific Railway. A large railroad yard, where crew switches and railroad car transfers occur, is in Mandan.

Mandan-Beach

The Mandan-Beach line is part of the main line for Burlington Northern Santa Fe. This track allows for movement of farm products, freight, coal, chemicals, petroleum products, and other commodities. This line allows maximum speed of 50-60 miles per hour.

Jamestown-Mandan

The Jamestown-Mandan line is part of the main line for BNSF. This track allows for movement of farm products, freight, coal, chemical, petroleum products, and other commodities. This line allows maximum speed of 50-60 miles per hour.

Mandan-Zap

The Mandan-Zap line is part of the trackage owned and operated by BNSF. In addition to farm products, a significant amount of coal traffic moves over this line. This line allows a maximum speed of 30 miles per hour.

Bismarck-Washburn

The Bismarck-Washburn line connects with the BNSF at Bismarck and the Canadian Pacific Railway at Max. Well over 90 percent of this line is used for grain movement with the rest being chemical fertilizer. This line allows a maximum speed of 10 miles per hour.

The Bismarck-Mandan MPO area has no Amtrak services. The closest access point for passenger service is at Minot, North Dakota.

## 3. Freight Movement

Freight Commodities

The types of freight most commonly hauled into, out of, and through the Bismarck-Mandan MPO area consist of the following:

- Agricultural products, incoming (fertilizer, chemicals, seed, equipment, etc.)
- Agricultural products, outgoing (wheat, sunflowers, barley, oats, cattle, hogs, etc.)
- Processed Food
- Coal
- Vehicles
- Construction Materials
- Petroleum Products
- Miscellaneous

As with any metropolitan area, much of freight into and out of the area consists of general merchandise and products needed on a regular basis in the area, due to a large concentration of people. Since a major industry in the region is agricultural production, much of the

freight into and out of the area is directly related to agriculture and to food processing companies that use products grown in the area. These companies include Cloverdale Foods and Bridgeman Dairy.

In addition, a large amount of coal is hauled by rail through the Bismarck-Mandan MPO area. Some coal is used locally, such as at the MDU Heskett Power Plant, but the majority is hauled east into Minnesota for use by utility companies.

Origins and Destinations of Freight

Although there are numerous origins and destinations for freight within the metropolitan area, many sites generate a large amount of freight hauling. These sites consist of grain elevators, food processing companies, major retail concentrations, vehicle dealerships, airports, supermarkets, petroleum terminals, rail terminals and trucking terminals. Although businesses such as truck stops are not significant origins or destinations of the freight hauled by trucks, they do result in a significant amount of truck traffic in the immediate area.

Modes of Freight Movement

There are three main modes of freight movement in the Bismarck-Mandan MPO area. We have previously discussed aviation and rail, the third is trucking.

The hauling of freight via trucks has increased significantly nationwide in recent decades. From 1970 to 1995, the number of combination semi trucks in the United States increased from 905,000 to 1.7 million. The vehicle miles traveled by these trucks increased from 35.1 million to 115.4 million miles. This increase in truck traffic has also been experienced in the Bismarck-Mandan MPO area. According to data provided by the NDDOT, total daily vehicle miles traveled by trucks throughout the state have increased from approximately 1.19 million in 1990 to 1.54 million in 1997. The percentage of trucks in the Average Daily Traffic (ADT) volume has been consistently rising on all types of roads.

Almost everything consumed by the citizens within the Bismarck-Mandan MPO area arrives from outside, and the majority arrives by truck. Even freight moved into or out of the area by aviation or rail is delivered or picked up by truck. All building materials, construction material, retail items, petroleum products, processed foods, mail, etc. arrive in the area by truck, and are almost always handled by a truck.

The Bismarck-Mandan MPO area is serviced by UPS, FEDEX, and the US Postal Services for the delivery of mail and packages. The following motor freight carriers are the major ones to provide service to the areas:

- Midwest Motor Express
- Yellow Freight System, Inc.
- Lewis Truck Lines, Inc.
- J-Mar Enterprises, Inc.
- Cross Country Courier
- Conway
- Magnum
- Priority Transportation
- Consolidated Freight

The Bismarck-Mandan MPO area also has two truck brokerage firms. Truck brokers coordinate shipment by arranging for a hauler and taking responsibility for the transporting of the goods.

The City of Bismarck has established truck routes and one-dimensional vehicle policies. These policies specify that a permit must be acquired from the City for any non-divisible load that exceeds certain width, height, length, and weight restrictions. A non-divisible load is one that cannot be taken apart and/or split into smaller loads. This typically includes: mobile homes, large construction or farm equipment, elements of construction such as long beams, etc. Loads such as gravel, dirt, agricultural commodities, or other products that can be taken apart of divided up for the purpose of shipment, are required to be divided up in a manner that meets the City's height, length, width, and weight requirements. The existing truck routes are shown in Figure 2-5.

The City of Mandan does not have designated truck routes, but does have a one-dimensional vehicle policy with respect to width, height, and weight that require a permit. The City of Mandan can enforce weight restrictions, but does not do so at this time. Truck routes proposed for the City of Mandan are also shown in Figure 2-5.

The City of Bismarck, Burleigh County, Morton County and NDDOT have weight restrictions on some roads during the spring, limiting the weight per axle. These weight restrictions are intended to protect the roadways during the spring thaw, when varying temperature and moisture condition's cause roads to be susceptible to damage by heavy loads. All jurisdictions provide weight restriction maps for roadways within their jurisdiction and place signs on applicable roadways when weight restrictions are in effect.

FIGURE 2-5
BISMARCK MANDAN TRUCK ROUTE MAP

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

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| | | |
|---|---|---|
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| CHECKED BY: | DATE: 5/4/2001 | |
| APPROVED BY: | | |

FIG2-5.DWG

# III. Land Use

The land use development patterns of the Bismarck-Mandan area are in some respects typical of the development pattern of urban centers throughout the upper Midwest. There is an ongoing pattern of suburbanization with new residential areas opening up on the fringes, new schools being built to accommodate new growth areas, new commercial service areas being constructed near the new residential areas, and ongoing rural non-farm residential development on the fringes of the growing urban center. This pattern has been especially evident on the Burleigh County side of the Missouri River, but the rural non-farm residential growth is also occurring in significant amounts in Morton County. These existing land use patterns can be discussed under the headings of future land use alternatives, land use impact analysis, and projected growth impacts.

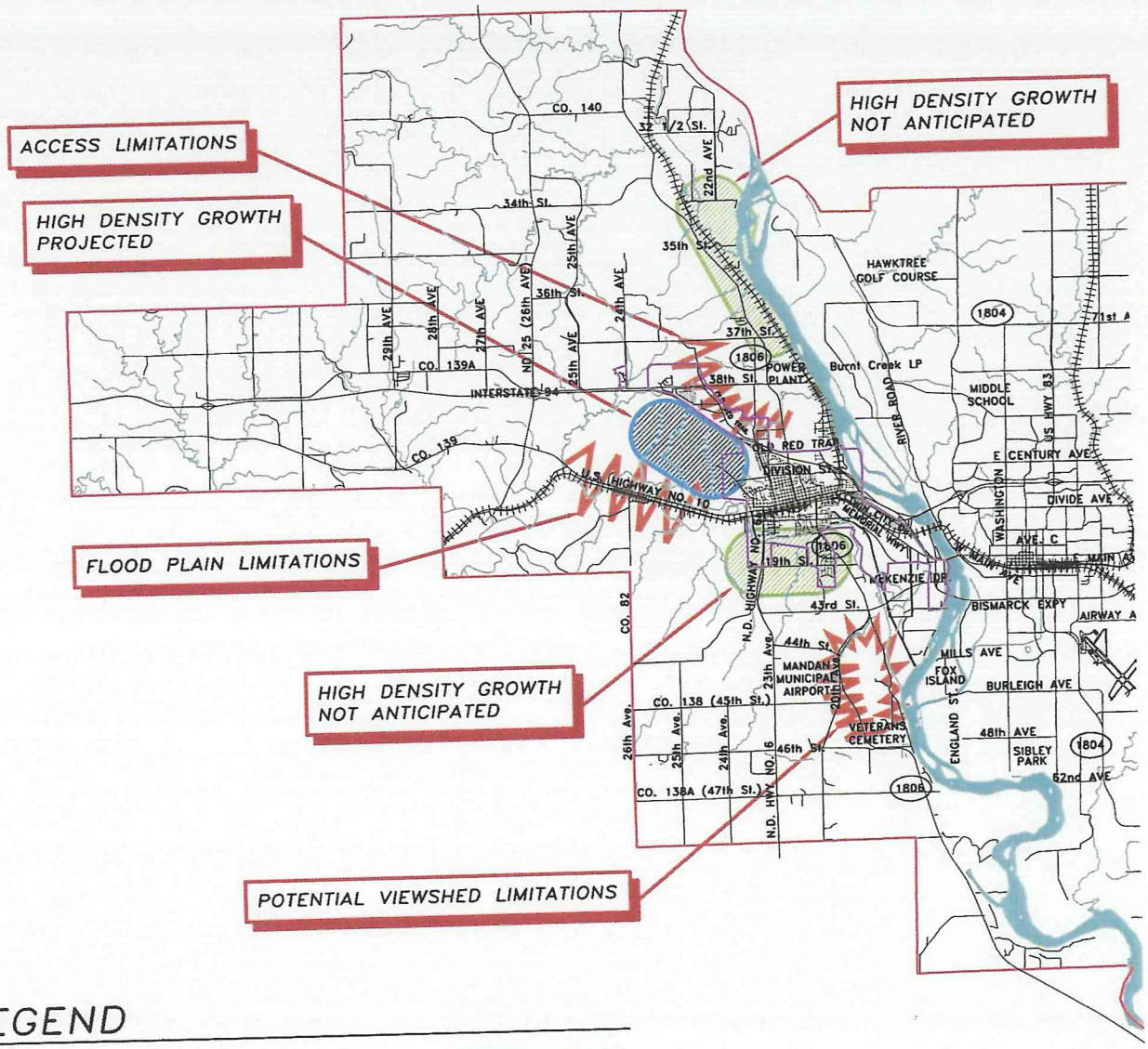
## A. Alternative Development Scenarios and Implications

The projected household and employment growth scenario detailed in Chapter IV is based on existing development trends and assumptions made cooperatively with local staff. There are other reasonable scenarios which could change the levels of growth within any given Traffic Analysis Zone (TAZ). Generally, these other scenarios can be described as:

- More compact development
- Growth prompted by specific development initiatives which open up areas currently unlikely to develop
- Increased growth in specific areas prompted by lack of land available for development in other areas

Changes from the projected growth patterns could occur due to changes in local governments' land use development policies, or due to significant decisions by private or public property owners or developers. For example, if the land managed by the ND State Land Department (located in Section 36, north of Burleigh Co. Highway 10 and east of Bismarck Expressway) continues to be used for primarily agricultural purposes, it will slow or stop any significant commercial, industrial, or residential development on the east side of the Bismarck Expressway. As another example, if local governments or private agencies preserve significant viewsheds by conservation easements or some other means, potential development patterns may change significantly to take advantage of a newly identified market for rural land. Figures 3-1 and 3-2 on the following pages identify future growth constraints and likely growth areas. Figures 3-3 and 3-4 identify potential alternative growth patterns based on significant policy changes or the resolution of significant growth constraints.

# CITY OF MANDAN
# FUTURE GROWTH CONSTRAINTS & LIKELY GROWTH AREAS




## LEGEND

HIGH DENSITY GROWTH PROJECTED

HIGH DENSITY GROWTH NOT ANTICIPATED

CONSTRAINTS

N

NOT TO SCALE

| | | |
|---|---|---|
| FIGURE 3-1<br>MANDAN GROWTH AREAS/CONSTRAINTS | | |
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | |
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00-8007 |
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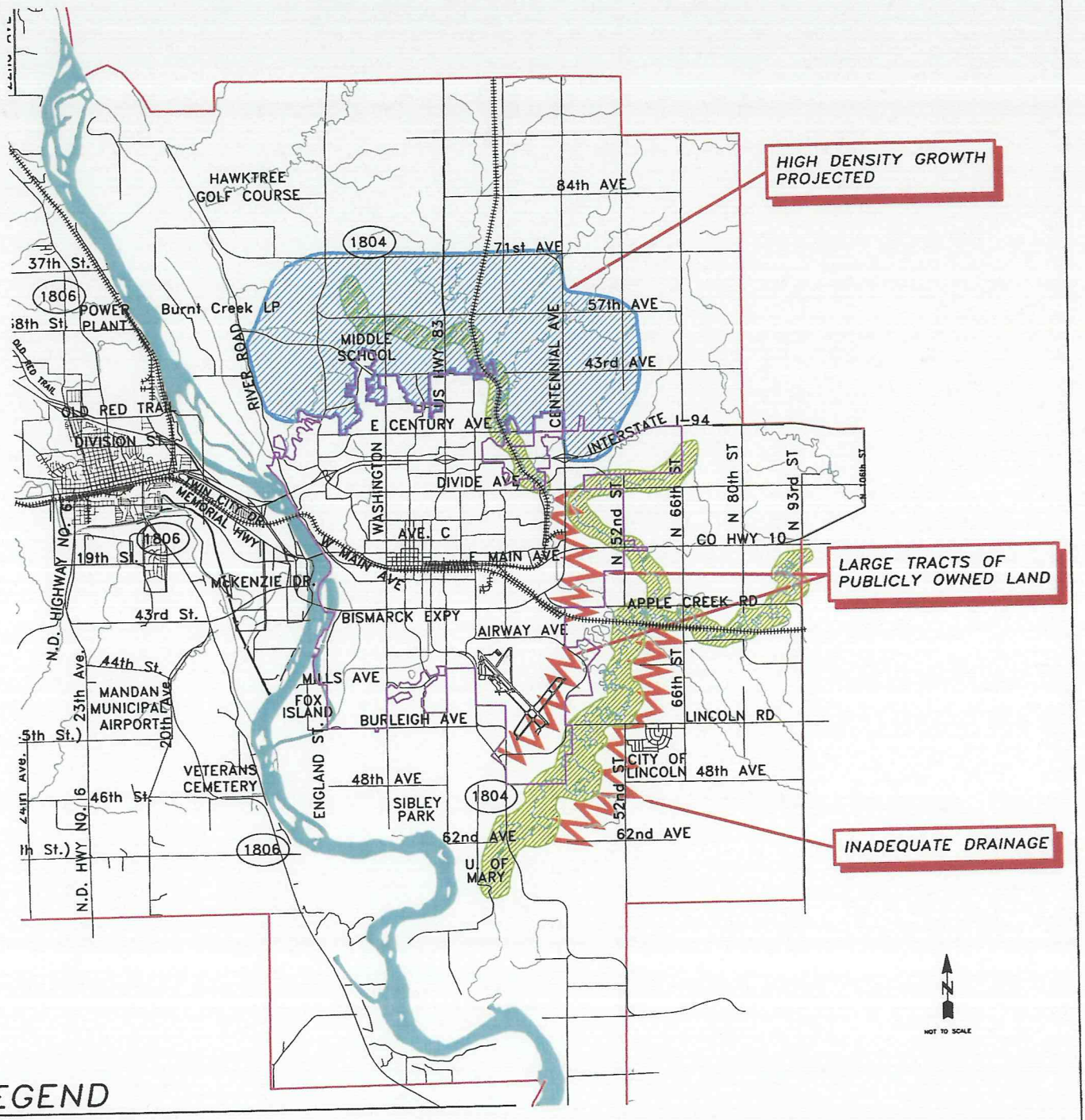
# CITY OF BISMARCK
# FUTURE GROWTH CONSTRAINTS
# & LIKELY GROWTH AREAS




## LEGEND

HIGH DENSITY GROWTH PROJECTED

POTENTIAL GREENWAY CORRIDORS

CONSTRAINTS

| | | |
|---|---|---|
| FIGURE 3-2<br>BISMARCK GROWTH AREAS/CONSTRAINTS | | |
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
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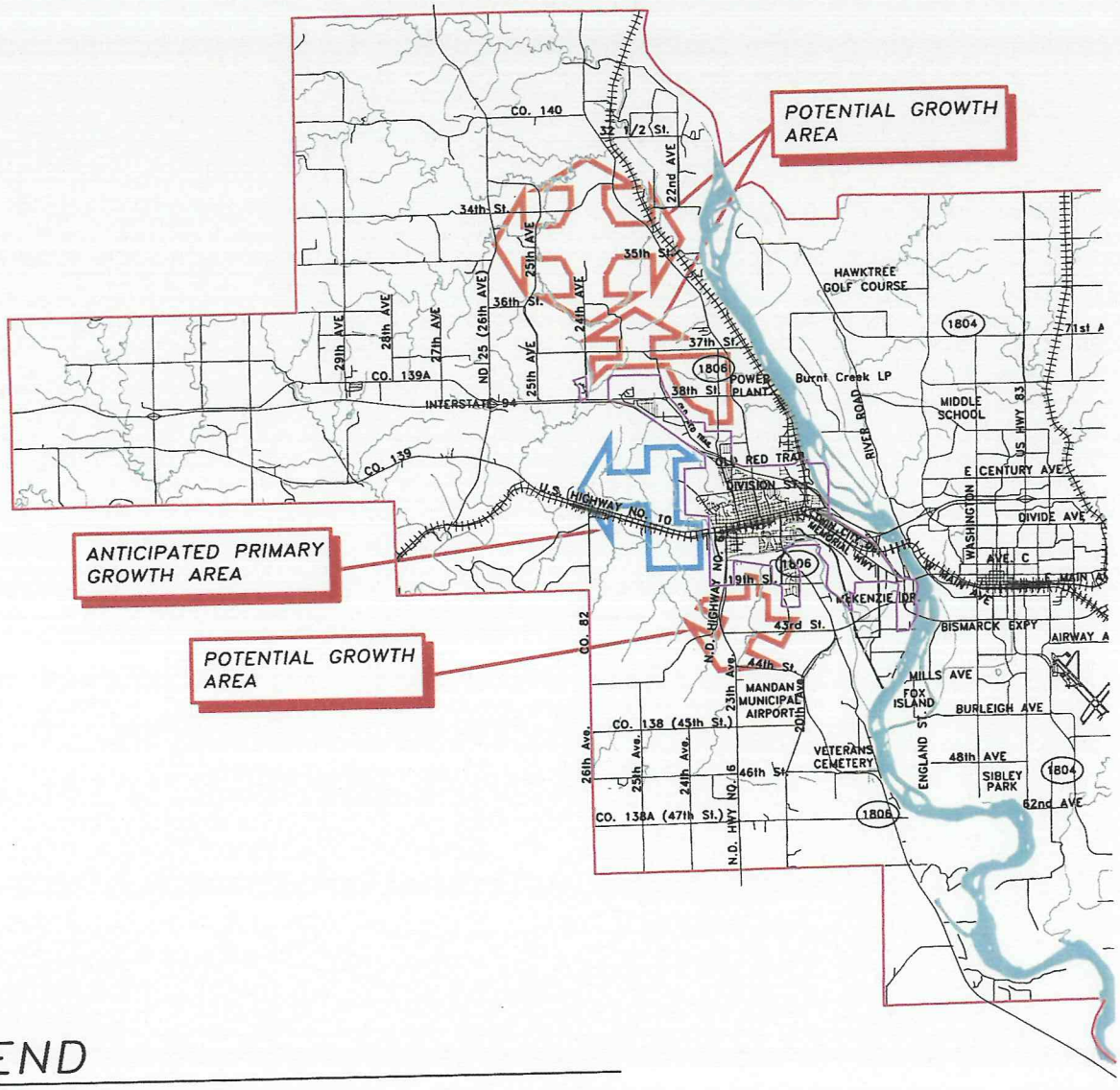
FIG3-2.DWG

# CITY OF MANDAN
# POTENTIAL ALTERNATIVE GROWTH PATTERNS




## LEGEND

ANTICIPATED PRIMARY GROWTH AREA

POTENTIAL GROWTH AREA

| | | |
|---|---|---|
| FIGURE 3-3<br>MANDAN GROWTH PATTERNS | | |
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
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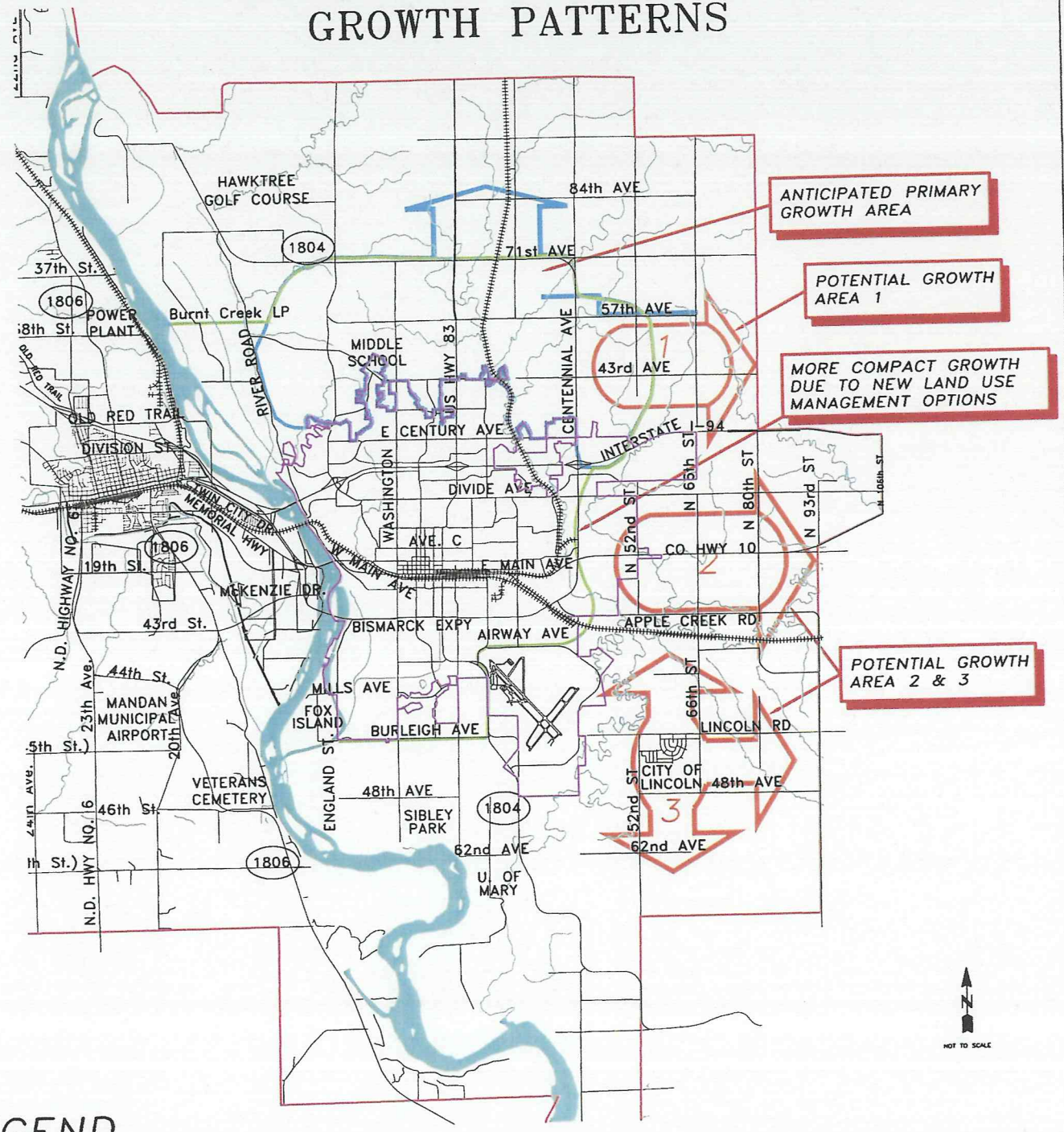
FIG3-3.DWG

# CITY OF BISMARCK POTENTIAL ALTERNATIVE GROWTH PATTERNS




## LEGEND

ANTICIPATED PRIMARY GROWTH AREA

POTENTIAL GROWTH AREA

COMPACT GROWTH AREA

| | | |
|---|---|---|
| FIGURE 3-4<br>BISMARCK GROWTH PATTERNS | | |
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
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FIG3-4.DWG

Some of the potential impacts of these alternative scenarios are summarized as:

- Slower growth of land use conflicts, reduced costs to taxpayers via lower special assessments and lower tax rates than would otherwise be necessary.
- Slower growth of land use conflicts, increased transportation system use at currently unanticipated locations.
- Higher growth of land use conflicts in growth areas, increased transportation system use prompting long term improvements to be required sooner.

## B. Land Use Impact Analysis

The most significant assumption to be made about the existing land use characteristics is that urban and rural development patterns are beginning and will continue to meet with increasing frequency. There are already places where rural development is adjacent to recent urban style development. For purposes of this report, rural development patterns are characterized by open ditch and raised roadbed street sections, residential lot sizes of one or more acres, and on-site septic systems. Urban development patterns are characterized by curb and gutter street sections, residential lot sizes averaging ¼ to ½ acre, and centralized sewage collection and disposal systems.

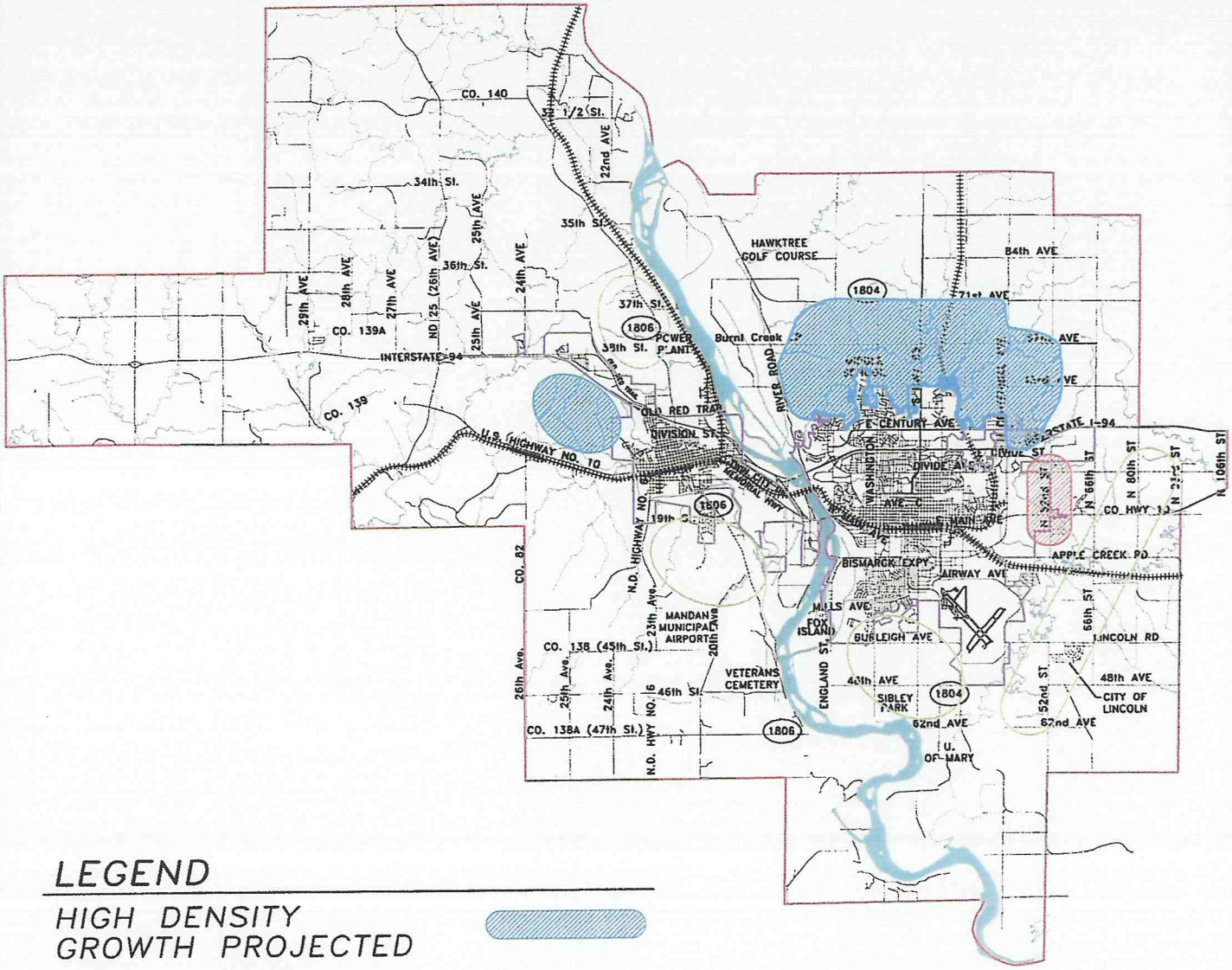
Figure 3-5 demonstrates the overall density of projected development based on the most likely growth scenario as discussed in Chapter IV. Additional maps identifying specific growth patterns by TAZ are provided in Appendix 2 – Household and Employment Data. These maps demonstrate the projected density of households on developable land within each TAZ.

An average of 35% of the total land in each TAZ was assumed to be developable. This assumption was based on an analysis completed be Ulteig Engineers, Inc. for the Bismarck Sewer Master Plan Update.

The map analysis indicates that a substantial amount of additional land within the study area will exceed 1 household per acre (43,560 square feet) by the Year 2025. It should be noted that rural development involving onsite septic systems with drainfields cannot be allowed on less than 40,000 square feet per household according to the North Dakota Plumbing Code. Actual level of development will vary depending on the actual percentage of land within each TAZ which is developable. The tables in Appendix 2 summarizes the estimated density level in each TAZ on the urban fringe of Bismarck and Mandan in Year 2010 and Year 2025 based on projected additional households.

Appendix 2 also contains maps which demonstrate the level of employment within the Study Boundaries projected to occur on the fringe of the Cities of Bismarck and Mandan. Although no density analysis based on lot size can demonstrate the same type of growth impacts as with residential development, what is apparent is that employment will reach

# BISMARCK–MANDAN PROJECTED PRIMARY GROWTH AREAS




## LEGEND

HIGH DENSITY GROWTH PROJECTED

MEDIUM DENSITY GROWTH PROJECTED

HIGH DENSITY GROWTH NOT ANTICIPATED

| | | |
|---|---|---|
| FIGURE 3–5<br>PROJECTED PRIMARY GROWTH AREAS | | |
| BISMARCK–MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | |
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00–8007 |
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sufficient levels in many TAZ's to warrant urban services. In fact, it is unlikely significant employment growth would take place without urban services.

## C. Projected Growth Pattern Impacts

There are a number of probable impacts or consequences of the projected growth patterns. First, there will be an increase in land use conflicts. This often happens when urban development begins to butt up against typical rural development. Urban householders are unhappy about the unsightly appearance of structures, discarded machinery, and unkempt open spaces of the large casually maintained rural residential property. The keeping of horses, or other animals that may be grandfathered in as a non-conforming use may pose another conflict with complaints about smells or flies. Additionally, the rural householder begins to feel cramped because the wide open spaces are no longer there.

Second, if the city grows around the rural development, the costs of extending municipal services will tend to be higher because the large rural lots mean longer distances need to be bridged or bypassed in order to serve the same number of residences.

Third, if the rural development is annexed into a city, special assessment costs related to providing urban services such as roadway improvements or storm and sanitary sewer may prove to be too high for the rural household because his lot size and front footage are so large. This is exasperated if the lot is developed in a manner which does not allow appropriate subdivision for sale and development.

Fourth, rural developments sometimes are plopped into a section or other large tract of land without regard for how future transportation corridors could best be established. Sometimes this means that the preferred location for a collector road would have been through the middle of a development. In other cases, the problem may simply be that insufficient right-of-way was provided for the long term needs of the transportation system. This poses the greatest problem when an arterial roadway is being pinched on both sides by incompatible terrain features or development built to close to the road centerline.

Fifth, rural developments sometimes are situated or designed in ways that prohibit appropriate vehicle or utility access to adjoining developable land especially interior to a section. This may cause additional development to leapfrog to more easily accessible land. It should be noted that both the fourth and fifth potential impacts can be minimized by preparing plans that address these issues when a development is first proposed within a section.

Sixth, the cost to the city of providing public services such as education and fire/police protection may be greater than where more compact development exists. The lower

densities mean that greater distances must be covered to provide the services at a resulting lower cost efficiency.

Seventh, the lower density development uses up developable land at a faster rate. It seems preferable to encourage development, whether rural or urban, that minimizes the loss of land while providing the public with the amenities which draw them to the locations they choose to develop.

# IV. Travel Demand Forecasting Model

The previous travel demand forecasting model developed for the Bismarck-Mandan MPO area was developed in 1995 during the update process for the Long Range Transportation Plan. That model, called TRANPLAN, applied 1990 census data to the 1995 street network for its base year calibration.

The model provided year 2020 projections based on the Simplified Land Use Allocation Model (SLAM). SLAM allocated the area's expected growth among traffic analysis zones (TAZ's) on the basis of performance measures, primarily land values.

The new travel demand forecasting model, TP+, and its graphical interface called VIPER, are essentially the Windows-based upgrade of TRANPLAN, with a number of features added to incorporate current technology and travel forecasting theory. The new model is constructed with a year 2000 base year calibration and provides projections for the years 2010 and 2025.

## A. Traffic Analysis Zones

The Bismarck-Mandan model area is subdivided into 187 traffic analysis zones (TAZ), which are geographical subdivisions of the model area by land use, transportation system and geographical characteristics. A significant effort was made to review the previous TAZ map and to modify it to more accurately follow the features specific to the Bismarck-Mandan MPO area. Aerial photographs served as an essential resource in this effort. Members of the MPO Technical Advisory Committee (TAC) provided additional insight into the development of the new TAZ map. The traffic analysis zone (TAZ) map approved by the MPO TAC and Policy Board is shown in Figures 4-1 and 4-2.

## B. Existing and Projected Household Data

Household data is one of two primary data inputs used by the travel demand forecasting model to develop existing and projected traffic on the street system network. This section of the report describes the sources, assumptions, methodology and results of the effort taken to generate accurate existing and projected household data.

### 1. Sources

The Bismarck-Mandan MPO household data for the model is compiled primarily from local building permit data and the 1995 Long Range Plan approved 1990 household data. Building permit information from 1990 through 1999 for the City of Bismarck was provided by the Bismarck Planning Department in the form of an ArcView project file containing the permits by location and type. Building permit information from 1990 through 1999 for the City of Mandan was provided by the Mandan Engineering Depart-

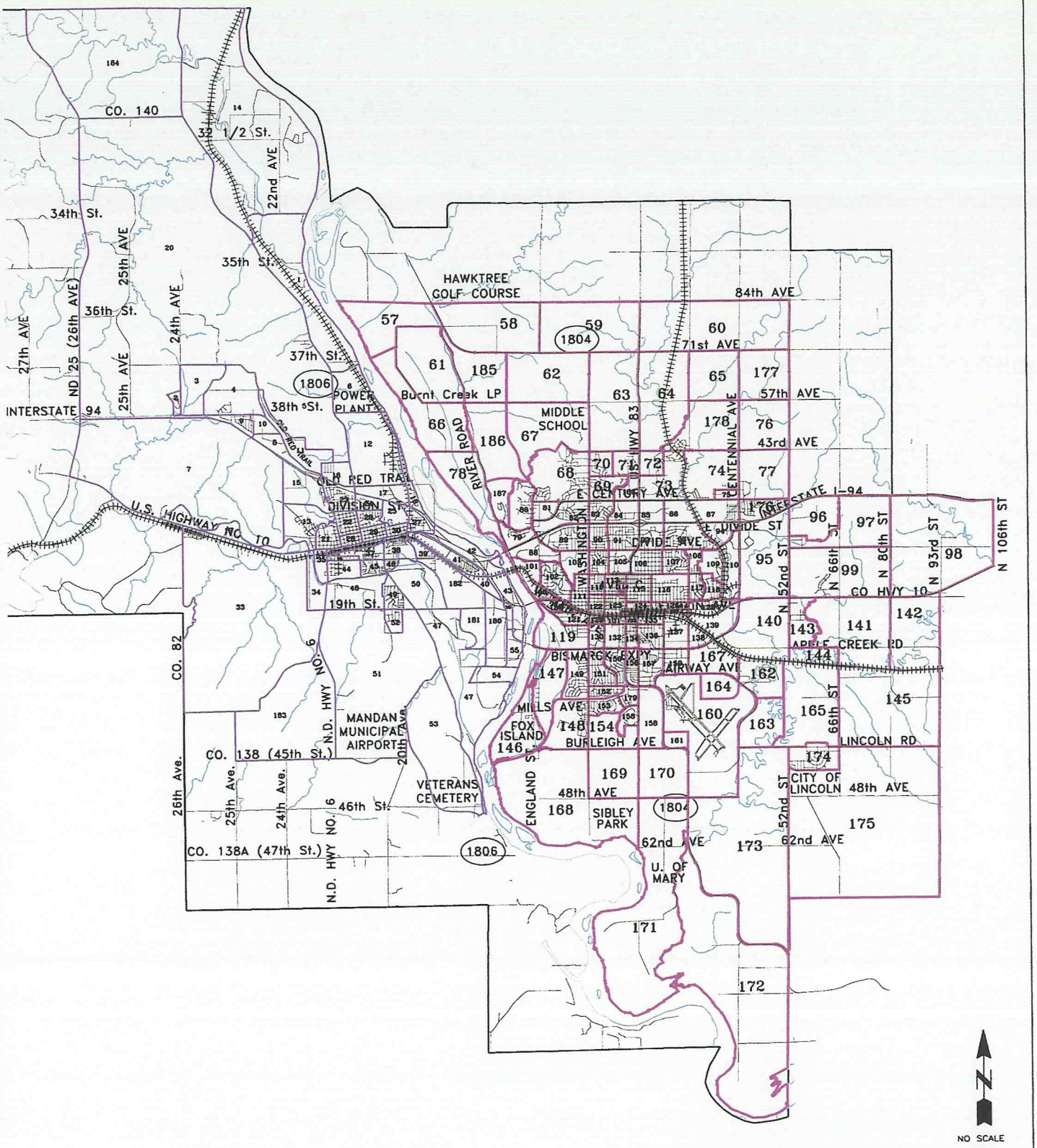


FIGURE 4-1
TRAFFIC ANALYSIS ZONES

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

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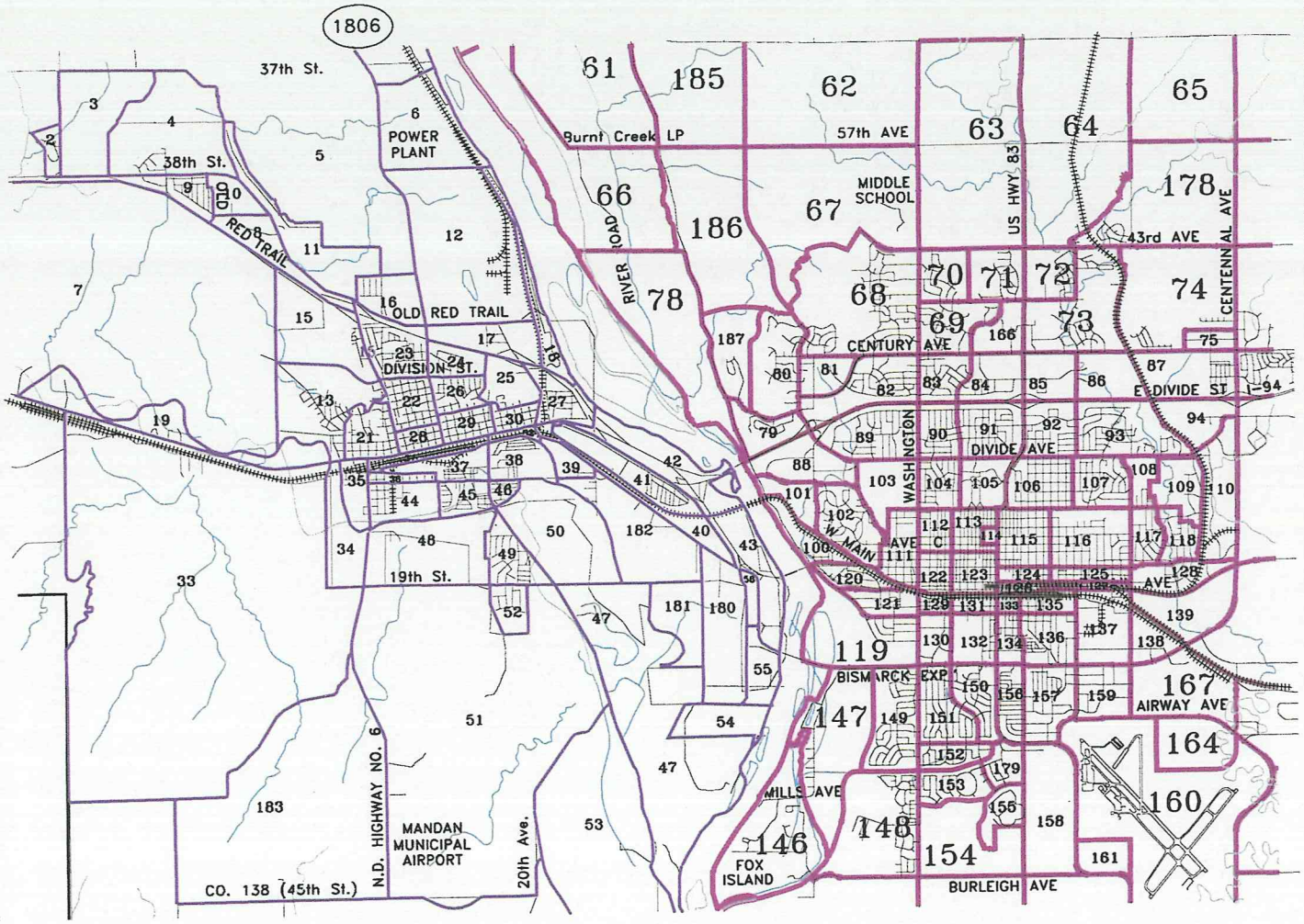


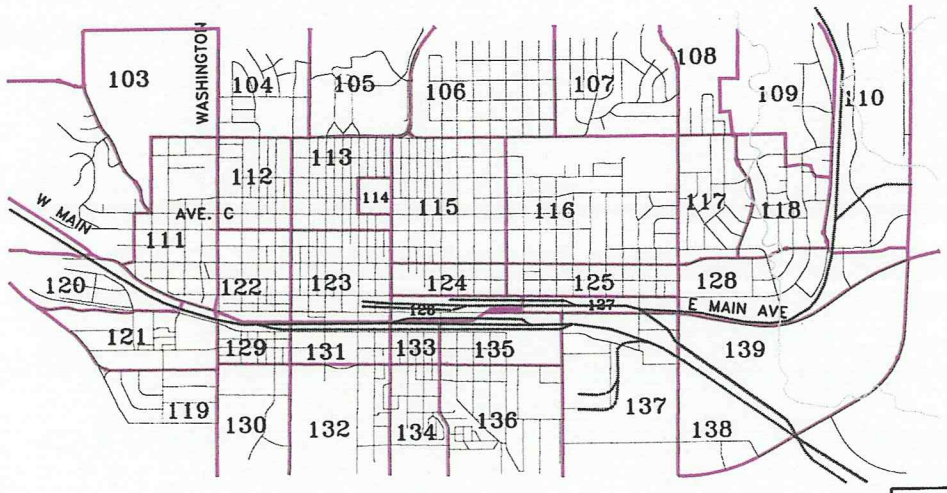


NO SCALE

FIGURE 4-2
TRAFFIC ANALYSIS ZONES

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS

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ment in the form of a series of computer printouts listing all permits issued by address and type of construction. Morton County building permit information from 1990 through 1999 for Morton County was provided by the Morton County Planning Office in the form of an Excel spreadsheet listing the building permits by location and type of construction. The City of Lincoln 2000 household information was based on reported households as identified in the City's water billing database. The Burleigh County household data was compiled from manual counts of houses from May, 2000 aerial photography of the Bismarck area.

## 2. Assumptions

The primary assumption for the 2000 household calculations was that the 1990 base year data was that approved by the MPO for the 1995 Long Range Transportation Plan. Additional assumptions were:

a. Building permit information represented the best available source of change in households from the 1990 data.

b. The vacancy rate of housing units was negligible for new construction and statistically insignificant, and therefore, household data was not modified to account for vacancy rates.

c. Finally, the housing units measured in from each of the data sources were assumed to equate to the number of households in each jurisdiction.

## 3. Methodology

Since different data sources were used to calculate 2000 household estimates for different jurisdictions, different methods were also used. For the City of Bismarck, an ArcView based analysis of the building permit data was performed. First, the permit information was queried to filter out any permits which did not represent new housing units. Second, the remaining records were assigned appropriate TAZ's by joining a TAZ polygon shape file with the building permit table. These data were exported to an Excel spreadsheet for compilation along with other jurisdiction's household data. For the City of Mandan, each building permit record was manually assigned a TAZ number on the basis of the site address associated with the record. The permits were then aggregated by TAZ, and tabulated in the same Excel spreadsheet noted above. Similarly, for Morton County, each building permit record was manually assigned a TAZ number on the basis of address or identified subdivision location. These permits were then aggregated by TAZ and tabulated in the Excel spreadsheet.

### 4. Results

The final data for households are provided in Appendix 2. Generally, the overall household growth averaged 2% per year. Appendix 2 shows the 10-year and 25-year projected household growth by jurisdiction.

## C. Existing and Projected Employment Data

Employment data is the second group of data used by the travel demand forecasting model to develop existing and projected traffic on the street system network. This section of the report describes the sources, assumptions, methodology and results of the effort taken to generate accurate existing and projected employment data.

### 1. Sources

The Bismarck-Mandan MPO household data for the model is compiled primarily from ND Job Service database records provided through the auspices of the ND Department of Transportation. Records were provided in a QuattroPro spreadsheet format at the Fargo District office of the NDDOT.

### 2. Assumptions

The primary assumption for 2000 employment data was that the Job Service database represented the distribution of jobs in the study area without significant error. There are three known types of errors which are systemic based on the database collection methods:

a. Employment from employers with multiple sites but a central office may be aggregated for and reported as if all employment was at the central office location. A primary example of this is local school districts.

b. Employment from small employers may be reported as occurring at a residential location because the employer uses his or her residence as the reporting address for Job Service reports. Examples of this are small service and construction businesses.

c. Not all employment could be distributed because the address information was too limited or apparently in error. Approximately 3% of the total employment from the database could not be distributed. This employment was not distributed and was dropped from the total employment figures because it was assumed to be primarily employment located in low employment areas and in the rural areas where the total jobs in these TAZ's were not going to result in a significant impact to the model.

### 3. Methodology

The data were sorted by address and manually distributed on the basis of address to individual TAZ's for each jurisdiction. Adjustments were made to the totals for each TAZ where comments from local jurisdiction staff suggested an anomaly. Additionally, estimated school district employment was distributed from the TAZ of the administrative office to other work sites on the basis of the following assumptions:

a. Administrative functions located at the administrative site represented 7% of the total employment.

b. Remaining employment (93%) was distributed evenly across job sites based on the assumption that there was a constant ratio of students to school district staff.

c. The number of students were evenly distributed by grade, and therefore the total remaining employment could be distributed on the basis of the number of grades located at a given employment site divided by the number of sites with that grade.

### 4. Results

The final data for employment are provided in Appendix 2. Generally, employment growth projections averaged 1.32% per year. Appendix 2 shows the 10-year and 25-year projected growth by jurisdiction.

## D. Model Calibration and Application

The purpose of this section is to document the application of the regional travel forecasting model of the Bismarck-Mandan Metropolitan Planning Organization (MPO) for various future year development scenarios.

The Bismarck-Mandan forecasting model was calibrated by using current socioeconomic data, traffic counts and network configuration data, documented in Appendix 3. The model was applied to develop traffic forecasts for future socioeconomic scenarios and road development alternatives, including:

Year 2010:

- No Build: no change relative to existing road network

- Build: planned and programmed road improvements

Year 2025:

- No Build: no change relative to existing road network
- Build: planned and programmed road improvements
- Build with Bridge at 71st Avenue North: planned and programmed improvements plus new bridge and ring road system north of Bismarck and Mandan
- Build with Bridge at 57th Avenue North: planned and programmed improvements plus new bridge and ring road system north of Bismarck and Mandan
- Build with Bridge at 48th Avenue South: planned and programmed improvements plus new bridge and ring road system south of Bismarck and Mandan

## 1. Existing Socioeconomic Pattern and Roadway System

The socioeconomic data of the Bismarck-Mandan area was provided by the Bismarck-Mandan MPO (November 2000). Total population, households and employment data are summarized below by planning-years.

**Table 2**
**Existing and Future Demographics of the Bismarck-Mandan Area**

| Year | 2000 | 2010 | 2025 | Growth (2000-2010) | Growth (2000-2025) |
|---|---|---|---|---|---|
| Population | 82,727 | 91,909 | 108,438 | 11% | 31% |
| Households | 34,144 | 41,142 | 51,637 | 20% | 51% |
| Retail Employment | 9,788 | 11,544 | 14,179 | 18% | 45% |
| Non-retail Employment | 37,689 | 42,291 | 49,198 | 12% | 31% |
| **Total Employment** | **47,477** | **53,835** | **63,377** | **13%** | **33%** |

The historical socioeconomic pattern of the Bismarck-Mandan area reflects slowly but steadily increasing population and employment. This trend is expected to continue in the future with slight increase in the rate of growth. The land use pattern of Bismarck consists of a relatively small downtown area, industrial areas in the east part of the city, shopping areas in two major concentrations in the north and south part of the city and ex-

tensive low-medium density residential housing areas. The fringe of the city has some residential and scattered industrial land uses, but it is primarily agricultural. In the future, the fringe area will experience significant residential and light industrial growth.
The roadway system of the Bismarck-Mandan area is characterized by Interstate 94, which passes through the area in an east-west direction. The region is divided by the Missouri River, through which three bridges maintain the connection between Bismarck and Mandan.

## 2. Existing Traffic Volumes and Capacity Deficiencies

The most recent traffic counts available in the Bismarck-Mandan area were collected in 1997 (city streets) and 1999 (freeways). Existing traffic volumes are shown in Figures 4-3 and 4-4. Traffic counts and existing road capacity information were used to identify the capacity deficiencies of the existing roadway system. Based on the existing traffic volumes and roadway capacities, the roadways have been classified into groups based on the level of congestion in the peak hour. For the purpose of this analysis, the following volume-per-capacity ratios were used as Level Of Service (LOS) indicators.

**Table 3**
**Relationship between Volume/Capacity and Level of Service**

| Volume/Capacity | Level of Service |
|---|---|
| 0-0.70 | A or B |
| 0.71-0.85 | C |
| 0.86-1.00 | D or E |
| >1.00 | F |

Roadways are considered slightly congested at LOS "C," congested at LOS "D" or "E" and very congested at LOS "F". In this project, roadways were considered congested if their LOS was D or worse. Roadway segments that currently (2000) perform at LOS "D" or worse are:

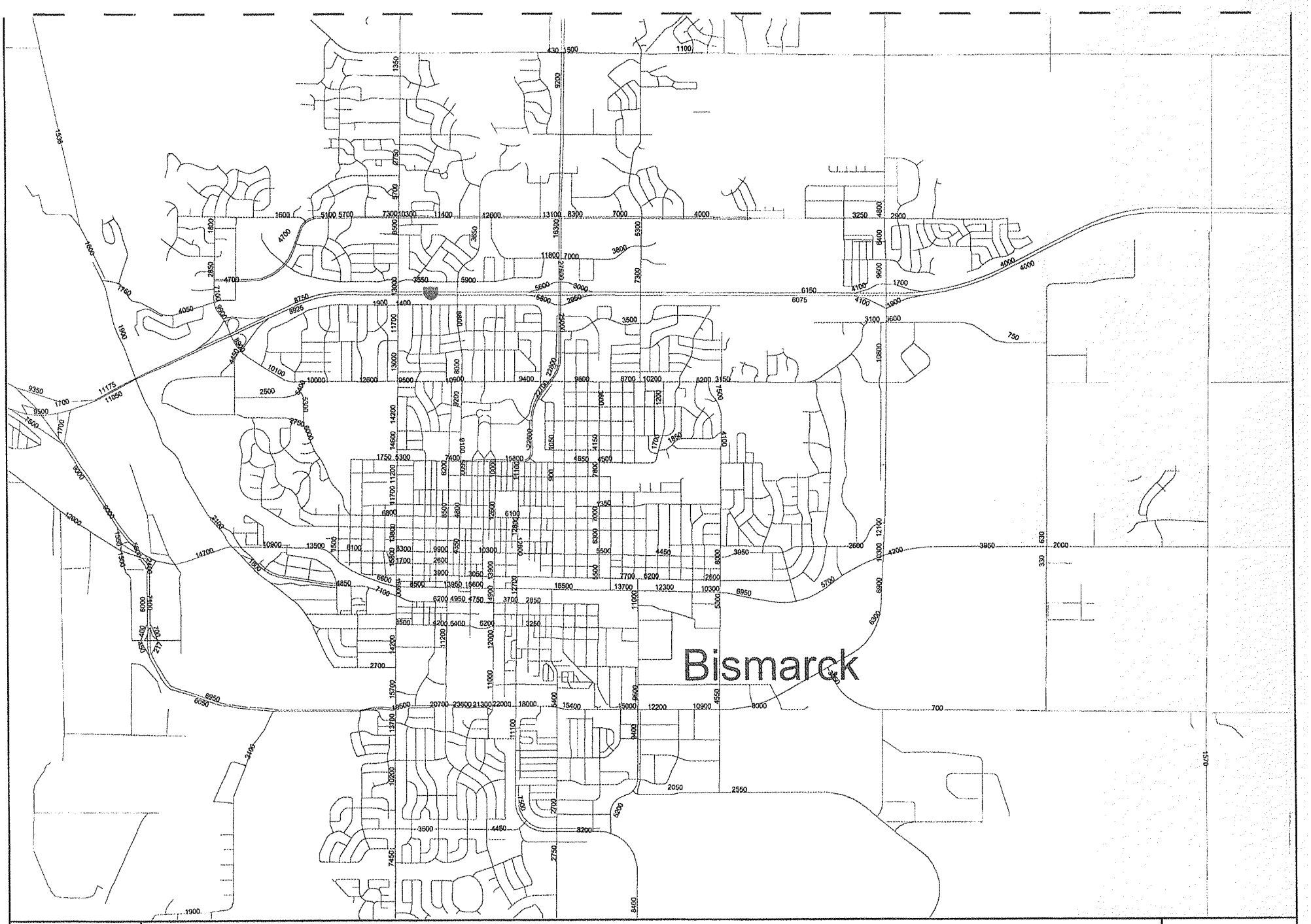
- Washington Street (Rosser Avenue - Interstate Avenue)
- Bismarck Expressway (Washington Street - South 12th Street)
- 7th Street (Rosser Avenue - Boulevard Avenue)
- 9th Street (Rosser Avenue - Boulevard Avenue)
- US Hwy 83 (Interstate Avenue - Interchange Avenue
- Main Street (Collins Avenue - ND Highway 6)

The capacity deficiencies of the existing roadway system can be seen in Figure 4-5.

## 3. Socioeconomic Pattern and Roadway Improvements by 2010

The Bismarck-Mandan area is expected to grow in terms of population, households and employment in the future. By 2010, the population, households and employment will

increase by 11 percent, 20 percent and 13 percent, respectively (see Table 2). The number of households will grow faster than population, which results in higher rate of growth in the number of trips relative in population. Also, retail employment is expected

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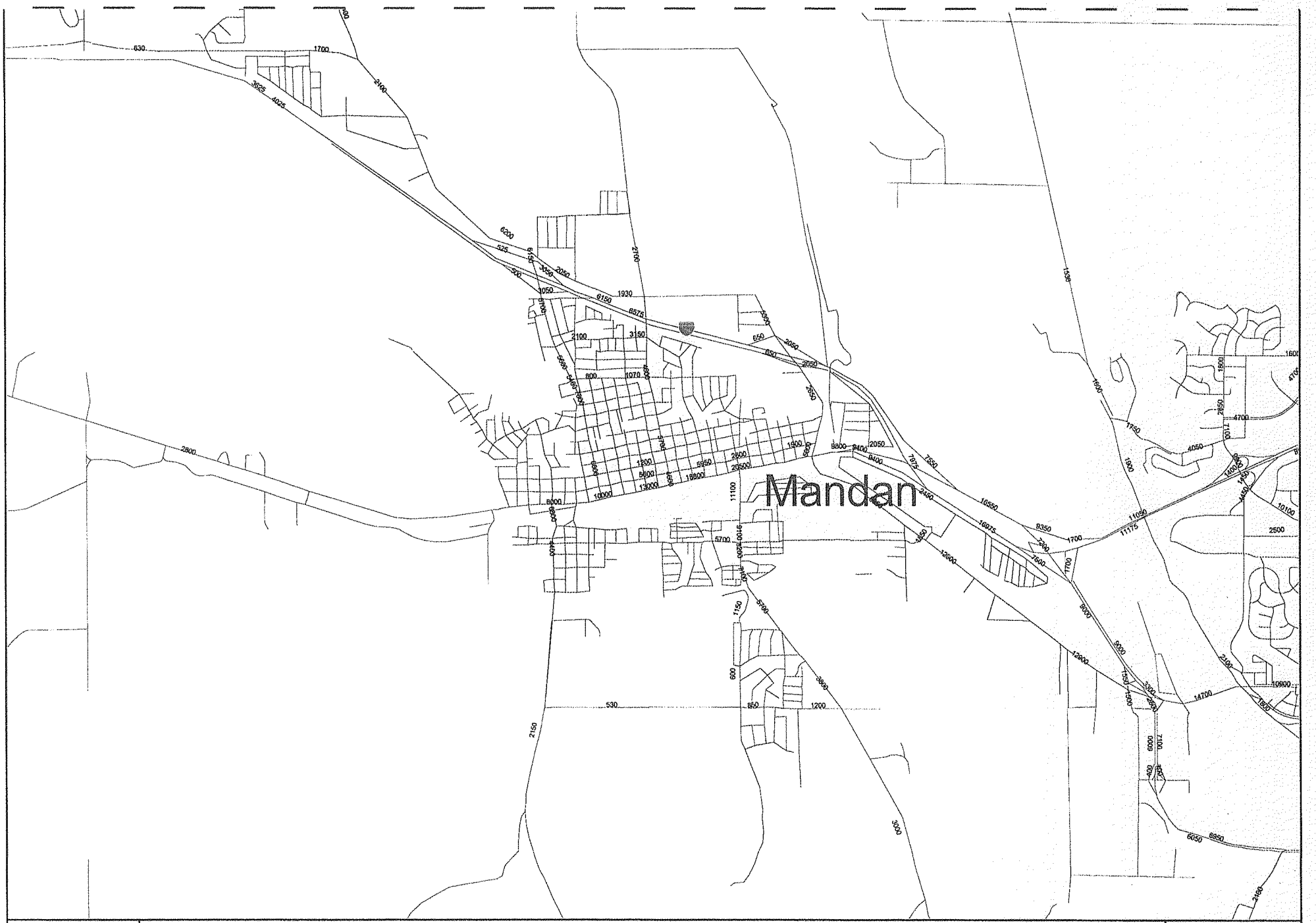
# Bismarck - Mandan Transportation Plan

Existing Daily Traffic Volumes

Figure 4.3

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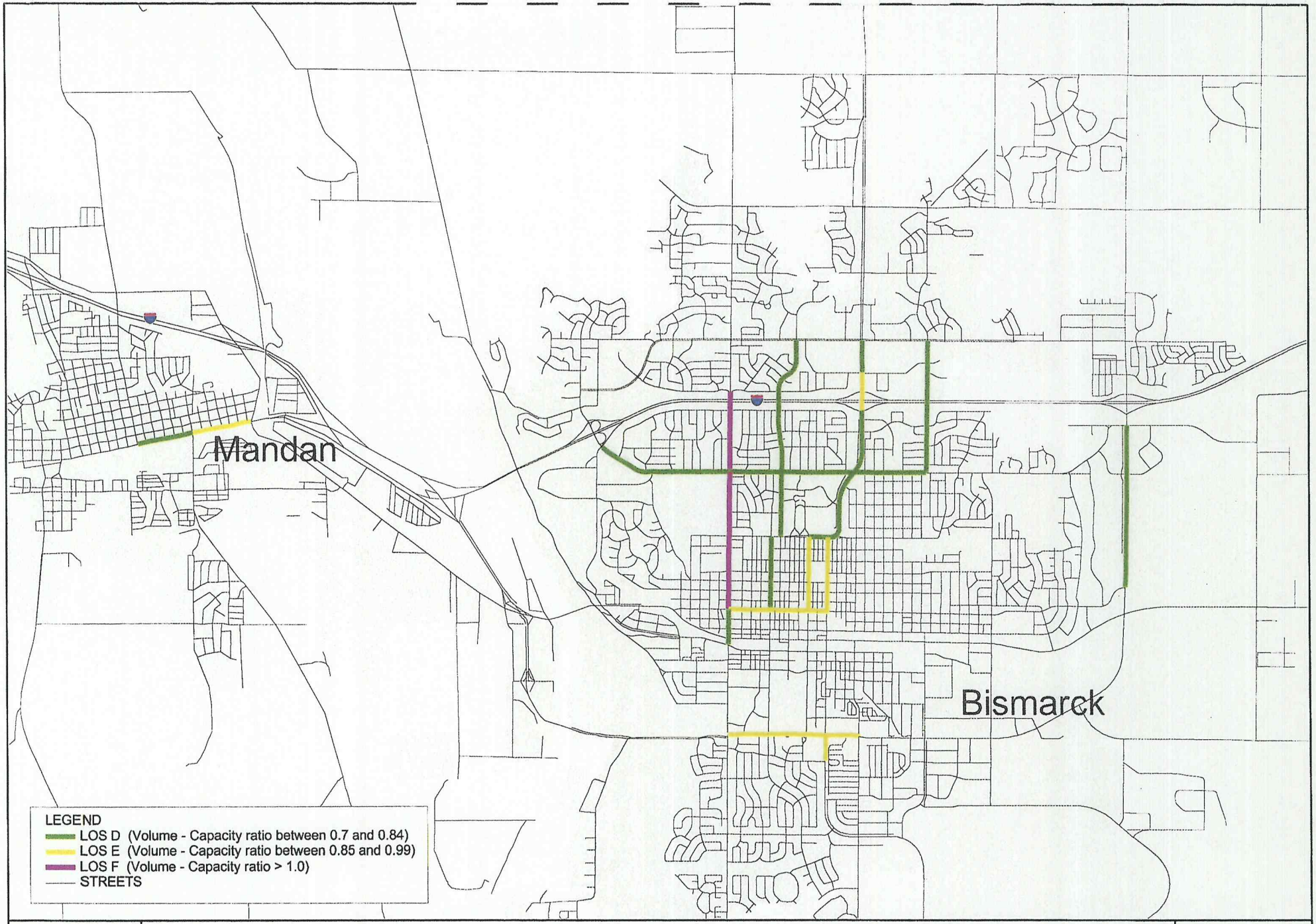
# Bismarck - Mandan Transportation Plan

Existing Daily Traffic Volumes

**Figure 4.4**




SRF Consulting Group, Inc.

# Bismarck - Mandan Transportation Plan

Existing Congested Roadway Segments

Figure 4.5

to increase at a higher rate than non-retail employment, which also contributes to a relative growth in the number of trips.

In order to reduce the potential deterioration of traffic conditions in the region, the Bismarck-Mandan MPO made recommendations to improve the current roadway system. The planned and programmed roadway improvements for 2010 can be found in Table 4.

**Table 4**
**Planned and Programmed Road Improvements in 2010 (For Model Purposes)**

| Roadway | Improvement | Location |
|---|---|---|
| US Hwy 83 (Boulevard Avenue - Calgary Ave) | Construct 6-lane roadway with turn lanes | Bismarck |
| Washington Street (Rosser Avenue - Avenue D) | Widen to 3-lane roadway with turn lanes | Bismarck |
| Bismarck Expressway (Divide Ave-Rosser Ave) | Widen to 4-lane roadway with turn lanes | Bismarck |
| Schafer Street (Edwards Avenue - Main Ave) | Construct 2-lane roadway with turn lanes | Bismarck |
| ND Hwy 1804 (Bismarck Expressway-48th Ave) | Widen to 4-lane roadway with turn lanes | Bismarck |
| Divide Ave (26th Street - Bismarck Expressway) | Construct 2-lane roadway with turn lanes | Bismarck |
| Divide Ave (Bismarck Expressway - 66th Street) | Construct 2-lane roadway with turn lanes | Bismarck |
| 3rd Street (Main Avenue - Arbor Avenue) | Reconstruct as a 5-lane roadway | Bismarck |
| Centennial Road (Century Ave - ND Hwy 1804) | Add turn lanes at key intersections | Burleigh Co. |
| ND Hwy 1804 (48th Avenue - RP 67.5) | Construct 2-lane roadway with turn lanes | Burleigh Co. |
| Lincoln Road (Airway Avenue - 66th Street) | Add left turn lanes | Burleigh Co. |
| Division Street (Lohstreter Rd - Missouri Drive) | Construct 2-lane roadway with turn lanes | Mandan |
| Old Red Trail (Sunset Drive - Mandan Avenue) | Reconstruct as 4-lane roadway w/turn lanes | Mandan |
| 46th Avenue SE (Memorial Hwy - McKenzie Dr) | Construct 2-lane roadway with turn lanes | Mandan |
| ND Hwy 1806 (Old Red Trail - 37th Street) | Construct 2-lane roadway w/turn lanes connecting to Sunset Drive interchange | Morton Co. |

## 4. Traffic Volumes and Capacity Deficiencies in 2010

In this chapter, 2010 traffic conditions are analyzed based on the socioeconomic and road network development assumptions presented earlier. Based on the Bismarck-Mandan regional traffic forecast model, 2010 traffic volumes are presented in Figures 4-6 and 4-7.

The forecasted traffic volumes and the future roadway capacity assumptions were used to identify roadway capacity deficiencies in 2010. The results are shown in Figure 4-8.

The roadway improvements planned and programmed by 2010 will help to alleviate some of the congestion that exists in the Bismarck-Mandan area today. Specifically, the additional lanes planned on Highway 83 and the Bismarck Expressway will reduce traffic congestion at these roadways and some of the alternative routes as well. In areas where no road development is planned by 2010, congestion levels will get worse. Based on the traffic forecast, roadway segments that will likely perform at LOS "D" or worse in the year 2010 are as follows:

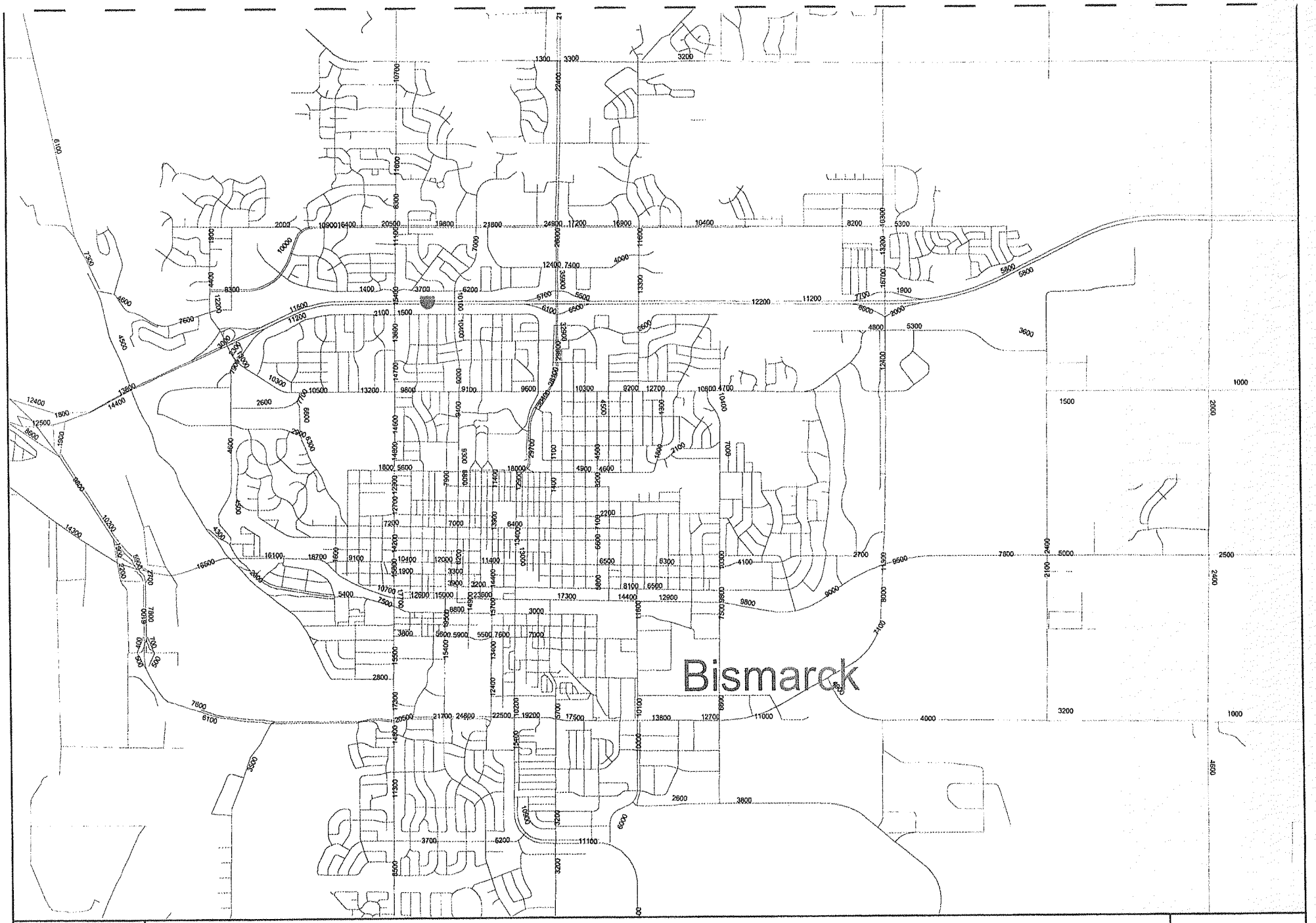
- Washington Street (Rosser Avenue - Interstate Ave)
- Bismarck Expressway (Washington Street - South 26th Street)
- 7th Street (Rosser Avenue - Boulevard Avenue)
- 9th Street (Rosser Avenue - Boulevard Avenue)
- Main Street (Collins Avenue - ND Highway 6)
- ND Highway 1806 (Main Street - 3rd Street SE)

Road segments that are congested by 2010 are shown in Figure 4-8.

Capacity deficiencies occurring in the Bismarck-Mandan area in 2010 point to the need for additional roadway improvements relative to what is planned and programmed. Recommendations are made in order to maintain a LOS "C" or better on the roadways of Bismarck and Mandan. Based on the capacity deficiencies identified above, the following additional roadway improvements are recommended for 2010:

**Table 5**
**Recommended Roadway Improvements for 2010**

| Roadway | Improvement | Location |
|---|---|---|
| Bismarck Expressway (Washington Avenue - 26th Street) | Widen to 4-lane divided roadway with turn lanes | Bismarck |

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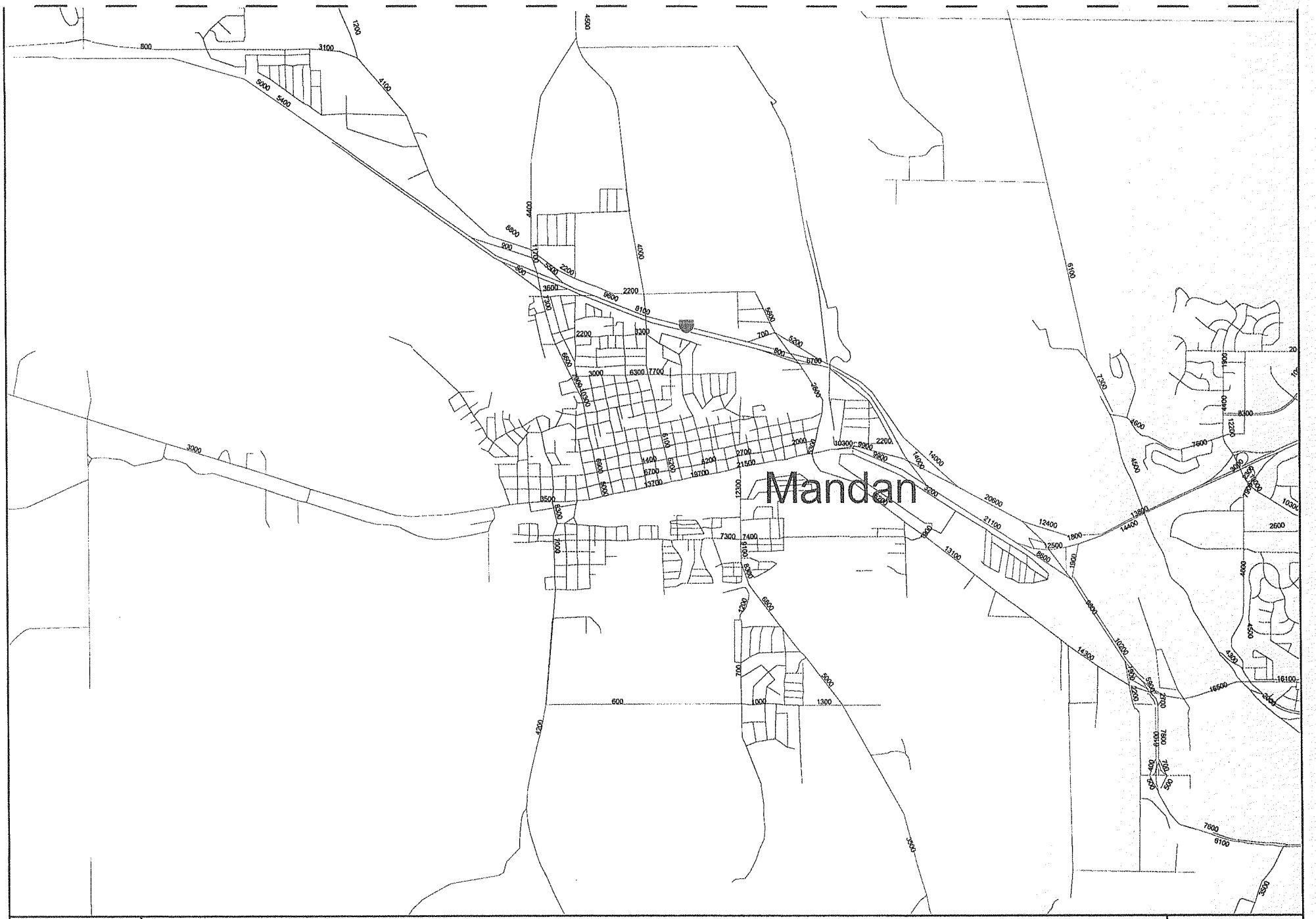
# Bismarck - Mandan Transportation Plan

## 2010 Build Alternative - Daily Traffic Volumes

Figure
4.6

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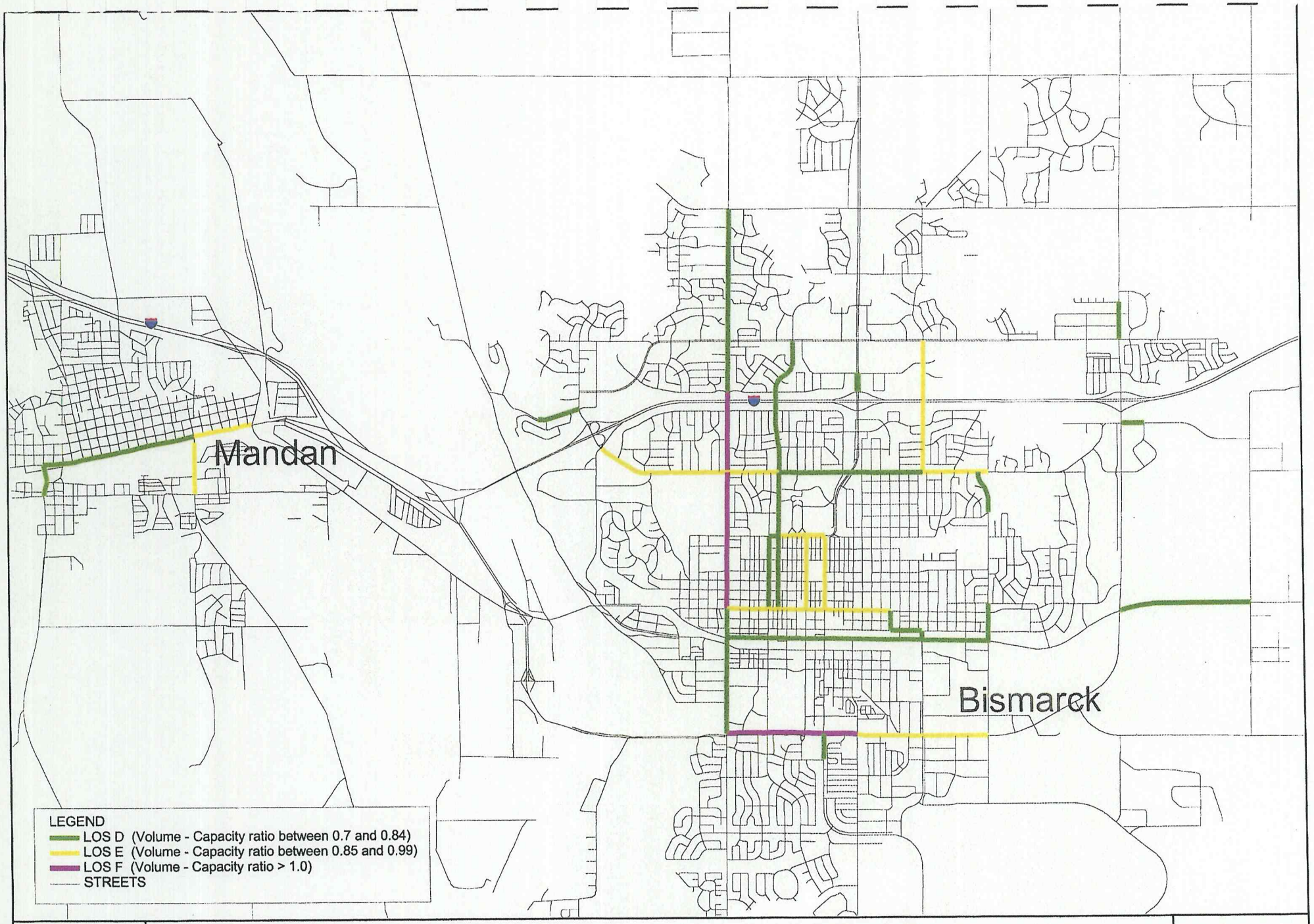
# Bismarck - Mandan Transportation Plan

2010 Build Alternative - Daily Traffic Volumes

Figure 4.7

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# Bismarck - Mandan Transportation Plan

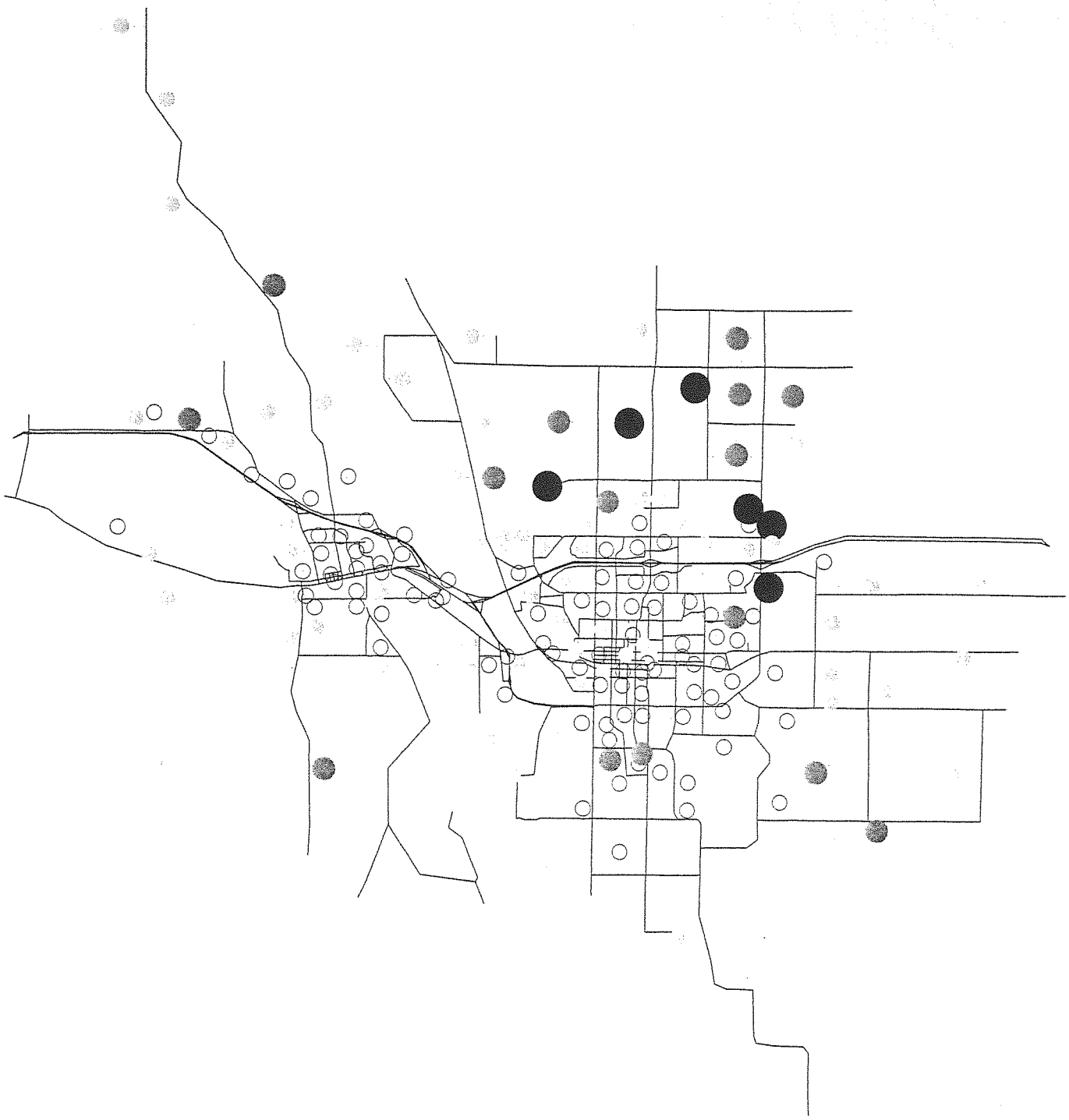
2010 Build Alternative - Congested Roadway Segments

Figure 4.8

## 5. Socioeconomic Pattern and Roadway Improvements by 2025

By 2025, population, households and employment will increase by 31 percent, 51 percent and 33 percent over existing figures in the Bismarck-Mandan area, respectively (see Table 2). The growth pattern described earlier will continue. Most of the new residential development will occur in the urban fringe outside the Cities of Bismarck and Mandan, although the cities will also experience moderate growth in the number of households. Industrial and commercial development is expected to take place in the cities as well as outside of them. The rate and geographic distribution of households and employment growth by 2025 can be seen in Figure 4-9 and Figure 4-10.

In order to reduce the potential deterioration of traffic conditions in the region, the Bismarck-Mandan MPO made recommendations to improve the current roadway system. The planned and programmed roadway improvements for 2025 (which are assumed to occur after the 2010 improvements have been completed, can be found in the following table).



| | |
|---|---|
| ○ | NO GROWTH |
| | GROWTH: 1-250 HH |
| ● | GROWTH: 251-500 HH |
| ● | GROWTH > 500 HH |

FIGURE 4-9
BISMARCK-MANDAN TRANSPORTATION MODEL
HOUSEHOLD GROWTH (2000-2025)

Viper Software by The Urban Analysis Group

Licensed to ULTEIG Engineering Inc.

- NO GROWTH
- GROWTH: 1-250 EMPLOYEES
- GROWTH: 251-500 EMPLOYEES
- GROWTH > 500 EMPLOYEES

FIGURE 4-10
BISMARCK-MANDAN TRANSPORTATION MODEL
EMPLOYMENT GROWTH (2000-2025)

'iper Software by The Urban Analysis Group

Licensed to ULTEIG Engineering Inc.

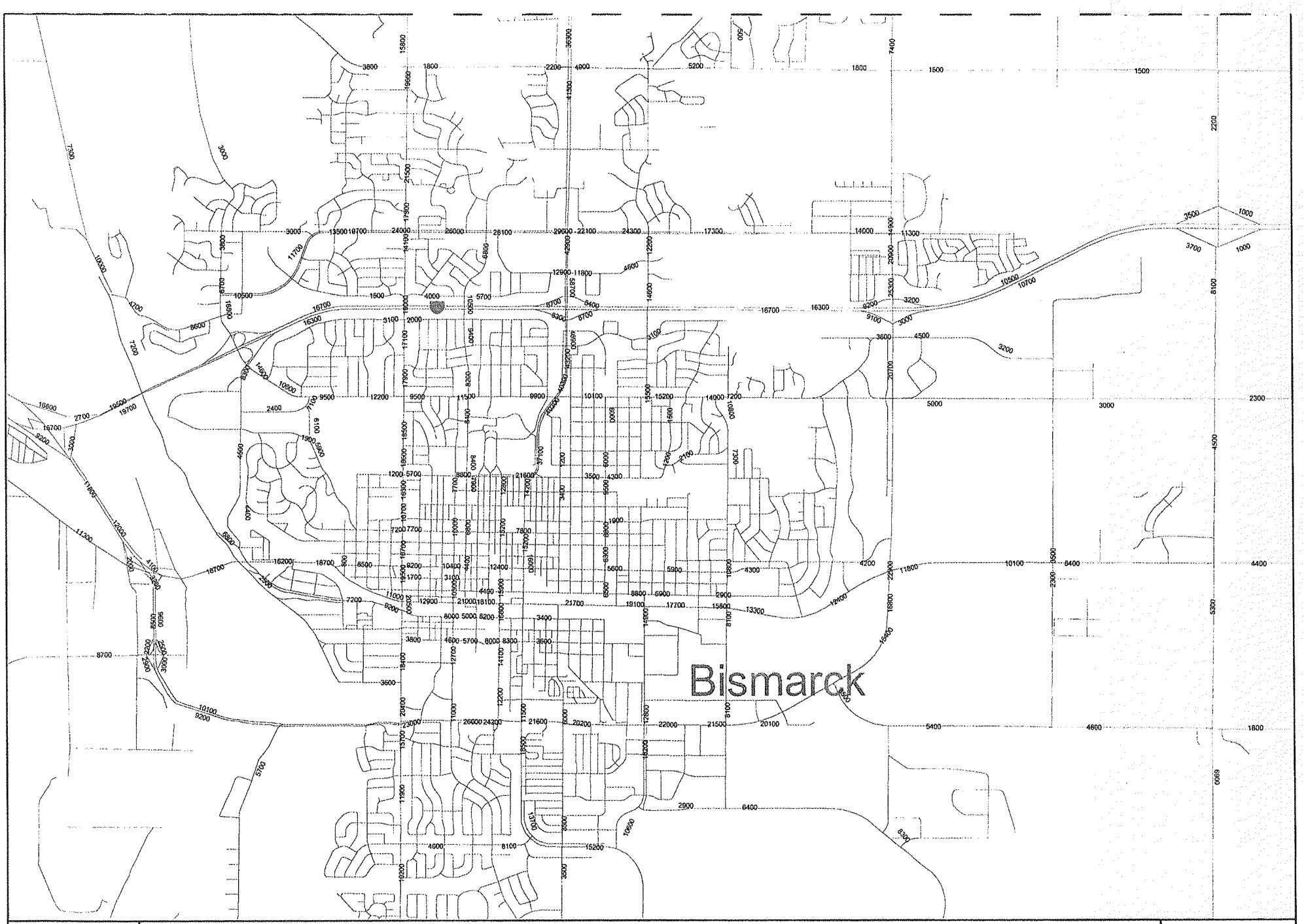
**Table 6**
**Planned and Programmed Road Improvements in 2025 (For Model Purposes)**

| Roadway | Improvement | Location |
|---|---|---|
| Tyler Parkway (Century Avenue - ND Highway 1804) | Construct 2-lane roadway with turn lanes | Bismarck |
| 12th Street (Main Ave - University Drive) | Construct 2-lane roadway with turn lanes | Bismarck |
| East Century Avenue (19th Street - Centennial) | Construct 4-lane roadway with turn lanes | Bismarck |
| River Road (Burnt Boat Drive - ND Highway 1804) | Reconstruct as 2-lane roadway with turn lanes | Burleigh Co. |
| I-94 at 66th Street | Construct interchange | Burleigh Co. |
| Washington Street (Century Avenue - 43rd Avenue) | Widen to 4-lane roadway with turn lanes | Burleigh Co. |
| McKenzie Drive (46th Avenue SE - ND Highway 1806) | Construct 2-lane roadway with turn lanes | Mandan |
| I-94 at CR 82 & CR 82 (US Highway 10 - Old Red Trail) | Construct interchange and 2-lane roadway with turn lanes | Morton Co. |

## 6. Traffic Volumes and Capacity Deficiencies in 2025

In this chapter, 2025 traffic conditions are analyzed based on the socioeconomic and road network development assumptions presented earlier. Based on the Bismarck-Mandan regional traffic forecast model, 2025 traffic volumes are presented in Figures 4-11 and 4-12.

The forecasted traffic volumes and the future roadway capacity assumptions were used to identify roadway capacity deficiencies in 2025. The results are shown in Figure 4-13.

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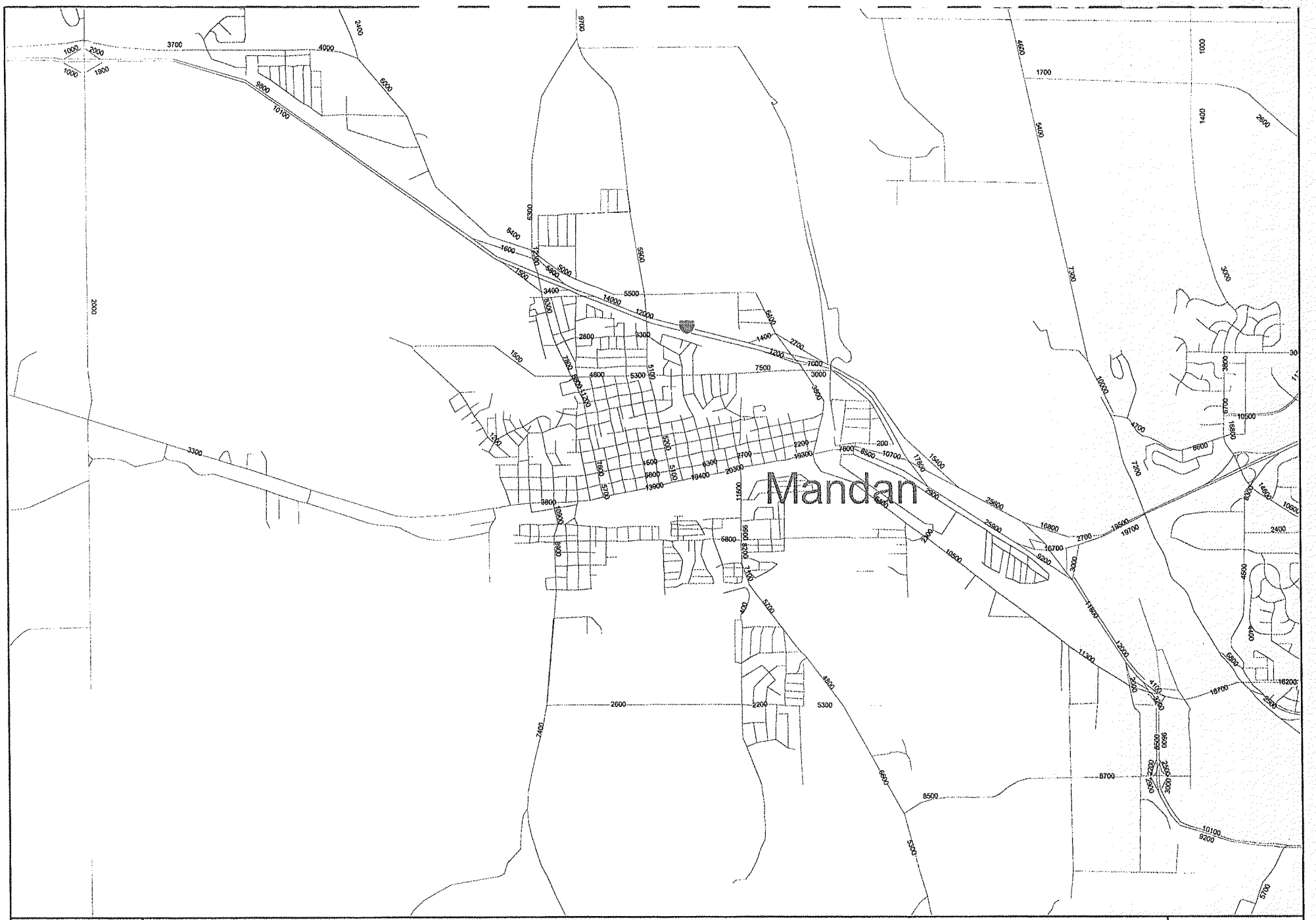
# Bismarck - Mandan Transportation Plan

## 2025 Build Alternative - Daily Traffic Volumes

**Figure 4.11**

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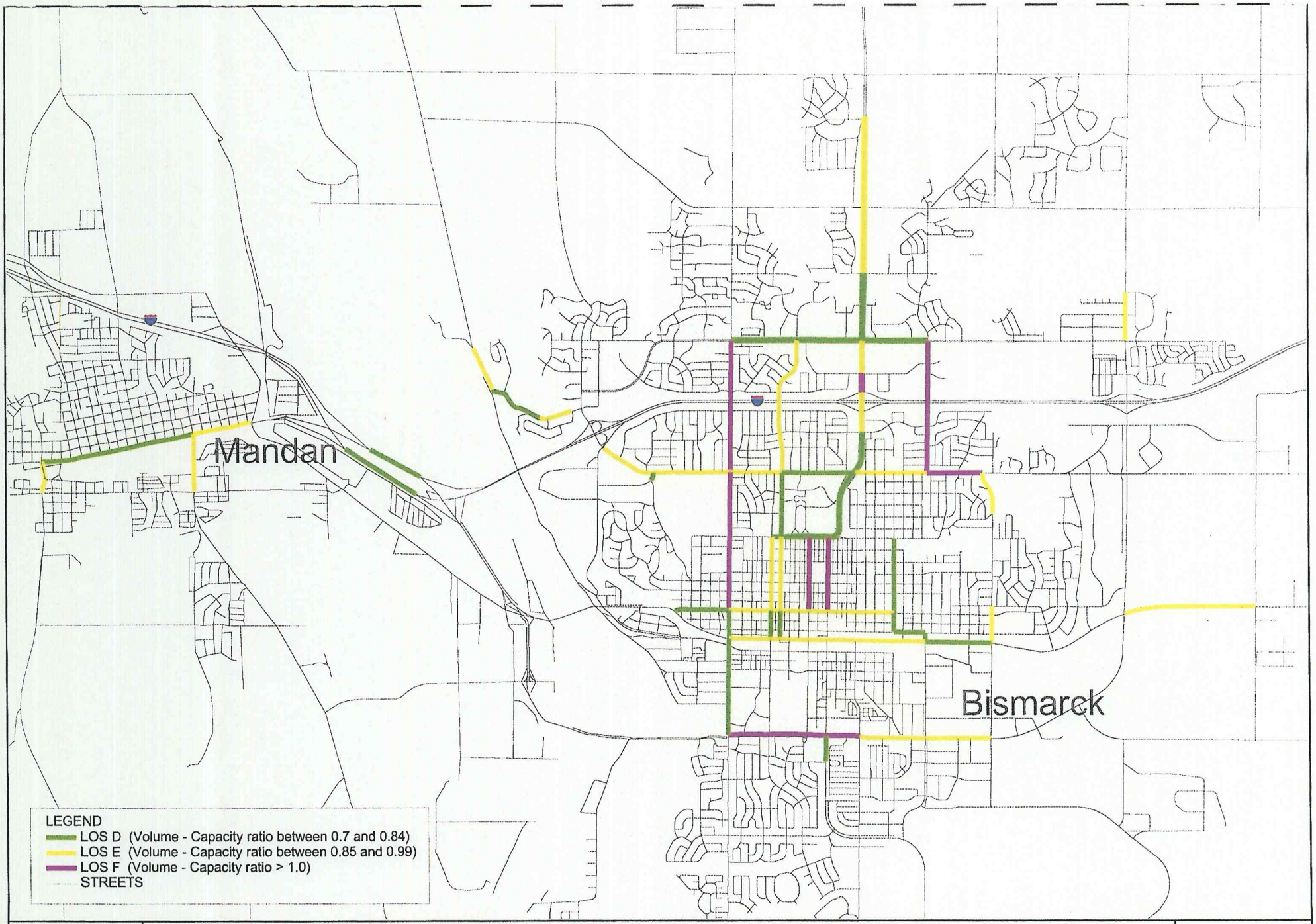
# Bismarck - Mandan Transportation Plan

2025 Build Alternative - Daily Traffic Volumes

**Figure 4.12**

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# Bismarck - Mandan Transportation Plan

2025 Build Alternative - Congested Roadway Segments

Figure 4.13

By the year 2025, congestion levels are expected to grow beyond 2010 levels. In addition to the roadways that will be congested by 2010, the following roadways are likely to experience congestion:

- Main Avenue (Washington Street - 19th Street and east of Bismarck Expressway)
- US Hwy 83 (Calgary Avenue - 57th Avenue)
- Burnt Boat Drive (Broadview Drive - Tyler Parkway)
- River Road (near Burnt Boat Drive)
- Centennial Road (north of Century Avenue)
- Divide Avenue (Highway 83 - 19th Street in addition to the previous segments)

Capacity deficiencies occurring in the Bismarck-Mandan area in 2025 point to the need for additional roadway improvements relative to what is planned and programmed. Recommendations are made in order to maintain a LOS "C" or better on the roadways of Bismarck and Mandan. Based on the capacity deficiencies identified above, the following additional roadway improvements are recommended for 2025:

**Table 7**
**Recommended Roadway Improvements for 2025**

| Roadway | Improvement | Location |
|---|---|---|
| Main Avenue (Rosser - Bismarck Expressway) | Widen to 4-lane roadway w/turn lanes | Bismarck |
| Burnt Boat Drive (River Road - Tyler Pkwy) | Widen to 4-lane roadway w/turn lanes | Bismarck |
| Main Avenue (Bismarck Expressway - 66th Street) | Add turn lanes | Burleigh Co. |
| Main Street (Collins Avenue - ND Highway 6) | Widen to 4-lane roadway w/turn lanes | Mandan |
| ND Highway 1806 (Main Street - 3rd Street SE) | Widen to 4-lane roadway w/turn lanes | Mandan |

# V. Issue Locations and Alternative Development

A number of sources were examined to identify locations where transportation system issues exist. Prior to conducting any analysis of the transportation system, a series of public meetings was held in conjunction with local Planning Commissions to receive input concerning deficiencies or issue locations within the existing system.

In addition to the Public and Planning Commission meetings, members of each local engineering and planning department, as well as the MPO Technical Advisory Committee, Policy Board, the Bismarck-Mandan Chamber of Commerce and each elected body were asked for input on issue locations.

Additional technical analysis was undertaken to identify locations where issues exist. Technical analysis techniques used to identify locations where specific issues exist or are projected, are described as follows:

**Insufficient Roadway Capacity**
- TP +/ Viper Model
- Area Traffic Maps and Traffic Counts

**Inadequate Roadway Access/Continuity**
- Street Plan and Area Plan Reviews
- Aerial Photography/Field Observation

**Unsafe Traffic Conditions**
- High Crash Location Identification (See Figure 5-1)
- Field Observations

**Uncertain Transportation Project Funding**
- NDDOT Federal Funding Projections by Jurisdiction
- Local Input

**Undefined Transportation Facilities in Developing and Extraterritorial Areas**
- Street Plan and Area Plan Reviews
- Aerial Photographs/Field Observations

**Frequent Auto/Train Conflicts**
- Railroad Master Plans
- Urban Traffic Maps

**Deteriorated Roadway Pavement**
- Local Input
- Field Observations

**Deficient Intersection Design and Signalization**

- Local Input
- Field Observations

**Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes**

- Park District Input
- Past Planning Documents
- Field Observations

**Inadequate Freight Routes**

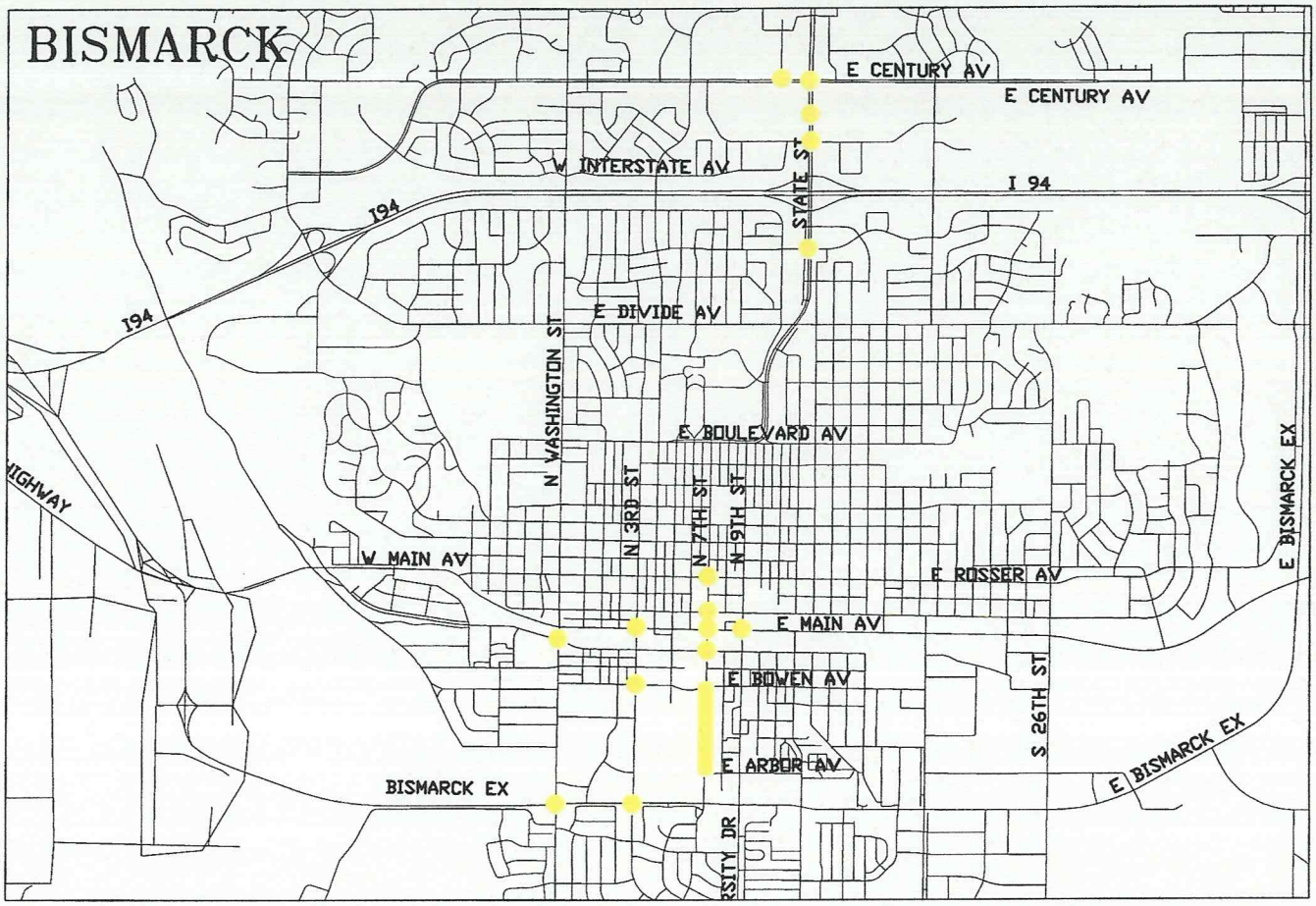
- Local Trucking Company contacts
- Freight Origin/Destination Reviews

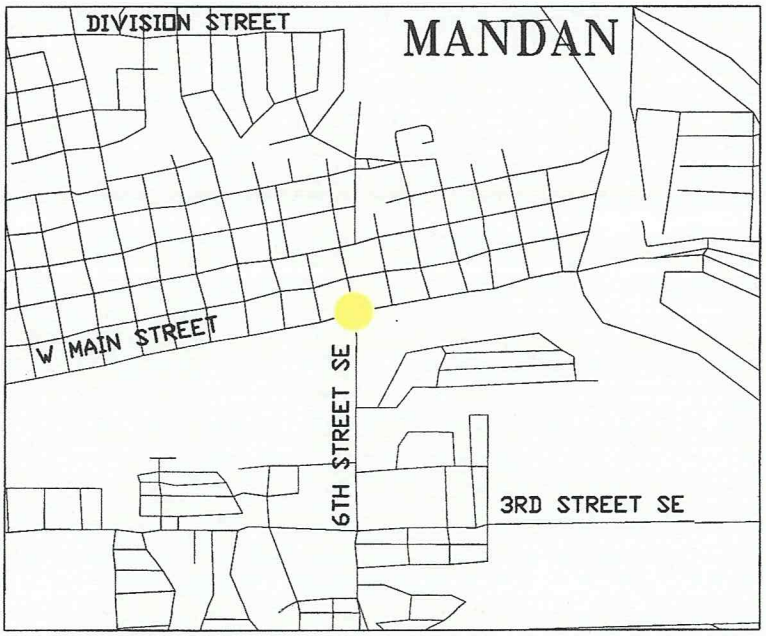
Based on this process of input meetings and technical analysis, a number of issue locations were identified. These issue locations were mapped and placed in the first of two newsletters that were distributed to local staff and policy makers within each jurisdiction, as well as those placed on the mailing list. The identified transportation issue locations are shown in Figure 5-2.

Through this process of identifying locations where transportation related issues exist, a number of project alternatives were derived to address each issue location. These alternatives ranged from a "No Action" alternative to other possible solutions aimed at resolving the identified issue.

Policy level alternatives were prepared to respond to non-project transportation system needs in the Bismarck-Mandan area. It was observed that mobility and safety has been compromised along many transportation corridors, both inside and outside the urban area, due to limitations on right-of-way and the provision of too much access. Alternatives were therefore prepared to strengthen local ordinances pertaining to these issues.

# BISMARCK MANDAN METROPOLITAN PLANNING AREA 1997–1999 URBAN HIGH CRASH LOCATIONS




BISMARCK

BISMARCK EXPRESSWAY and WASHINGTON STREET
9th STREET and MAIN AVENUE
CENTURY AVENUE and 11th STREET
7th STREET and MAIN AVENUE
7tH STREET between BOWEN and ARBOR AVENUE
3rd STREET and MAIN AVENUE
7th STREET and FRONT AVENUE
STATE STREET and CAPITOL AVENUE
STATE STREET and K–MART/GATEWAY MALL APPROACH
STATE STREET and CENTURY AVENUE
3rd STREET and BOWEN AVENUE
7th STREET and BROADWAY AVENUE
WASHINGTON STREET and FRONT AVENUE
STATE STREET and INTERSTATE AVENUE
7th STREET and ROSSER AVENUE
BISMARCK EXPRESSWAY AND 3rd STREET

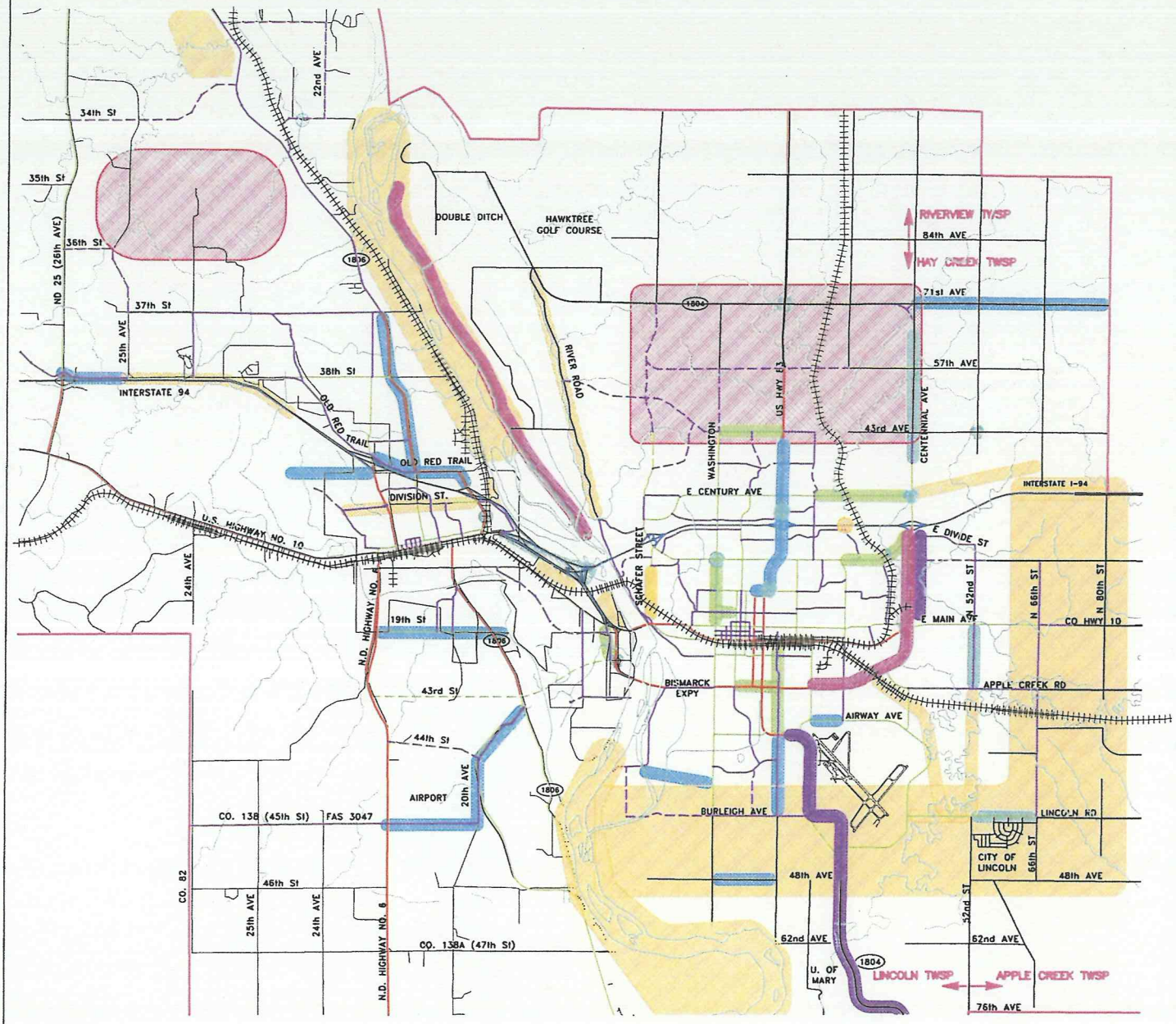
MANDAN

MAIN STREET and 6th AVENUE EAST

N

NOT TO SCALE

| | | | |
|---|---|---|---|
| FIGURE 5–1<br>URBAN HIGH CRASH LOCATIONS | | | |
| BISMARCK–MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | | |
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00–8007 | |
| CHECKED BY: | DATE: 6/18/2001 | | |
| APPROVED BY: | | | FIG5–1.DWG |




## LEGEND

**FUNCTIONAL CLASSIFICATIONS**

| | EXISTING | PROPOSED |
|---|---|---|
| INTERSTATE | | |
| PRINCIPAL ARTERIALS | | |
| MINOR ARTERIALS | | |
| COLLECTORS | | |
| STUDY AREA BOUNDARY | | |

**SITE SPECIFIC ISSUES**

- INSUFFICIENT ROADWAY CAPACITY
- INADEQUATE ROADWAY ACCESS / CONTINUITY
- UNDEFINED TRANSPORTATION FACILITIES IN DEVELOPING AND EXTRATERRITORIAL AREAS
- UNSAFE TRAFFIC CONDITIONS
- DETERIORATED ROADWAY PAVEMENT
- DEFICIENT INTERSECTION DESIGN AND SIGNALIZATION
- UNSAFE PEDESTRIAN CROSSING CONDITIONS AND LIMITED BICYCLE ROUTES

N

NO SCALE

FIGURE 5-2
LONG RANGE TRANSPORTATION PLAN
SITE SPECIFIC ISSUES/FUNCTION CLASS

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

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| CHECKED BY: | DATE: 8/18/2001 | |
| APPROVED BY: | | |

# VI. Project Level Alternatives

This section describes the various project level alternatives that were derived from the issue identification process and from analysis of the Bismarck-Mandan area transportation system. The intent of this effort was to provide enough information about each alternative so that the alternatives could be understood from a conceptual context, and so project costs could be estimated. It is understood that further project development and environmental analysis will be necessary in the future prior to implementation of any project alternatives.

## A. Roadway Project Alternatives

A number of roadway improvement alternatives were prepared to address the many system needs described in Chapter V of this report. Beyond the analysis conducted to develop these alternatives, input received from the local engineering and planning departments played a major role in identifying and eventually selecting alternative improvements.

Figure 6-1 and the spreadsheets found in Appendix 4 describe the various project alternatives considered for each corridor location. The spreadsheets also served as a brief for local staff and policy level individuals to examine each alternative within the context of the evaluation criteria and the other projects being considered.

## B. Transit Alternatives

Based on the input and discussion of the Technical Advisory Committee and the Policy Board, transit service options were identified and evaluated for the Bismarck-Mandan area. The three basic options are described as follows.

Option 1: Continuation of Existing Rider Markets

Under this option, current service will continue without significant change. The primary customer base would continue to be the elderly (60 or older) and the disabled populations and the service would be door-to-door, demand response. This service would operate 24-hours per day, seven days a week, and require at least 24-hours advance reservation. Subscription, or standing order service, would also be available. Service is available within an area up to 2 miles outside the Bismarck and Mandan city limits as well as to the City of Lincoln. All riders need to be certified before they can use the service. The general public may also ride the service if space and time permit, but they are required to pay full fare for the service (around $6.00 to $12.00 per trip vs. $1.50 to $2.25 for certified riders).

Option 2: Limited Expansion of Rider Markets

Under this option, the rider markets would be expanded slightly to include persons dependent on transit. The definition of transit dependents may vary by local standards but

would typically include low-income individuals and children. In this case, it is expected that transit dependents would need to be certified before using the service. The service would remain as demand-response, door-to-door, operating 24-hours per day, seven days per week. The service would continue to operate within the Bismarck and Mandan city limits and up to 2 miles beyond those limits as well as to the City of Lincoln.

The advanced reservation requirement would be reduced to about 4 to 6 hours instead of 24 hours in advance. The hours for trip reservations would expand to 8 a.m. to 7 p.m. instead of 8 a.m. to 5 p.m., as is currently the case.

In addition, five fixed routes and schedules would be established to serve different parts of the city. Operating this service would require three mid-size, accessible vehicles. This service would operate at least from 8 a.m. to 5 p.m. Monday through Friday, and from 9 a.m. to 3 p.m. Saturday and Sunday.

Other enhancements under this option include several advanced technology elements. These would be used to enhance overall services and increase service efficiency. The primary components would be a computer-aided dispatch (CAD), mobile data computer (MDC) and automatic vehicle location (AVL) system for improved trip reservations, scheduling and dispatching. Other possible enhancements might be an electronic payment system using Smart Cards.

Option 3: Moderate Expansion of Rider Markets

Under this option, the transit service would be transformed from a core demand-response service to a core fixed-route service with supplementary demand-response service. The intent would be to open the service to all rider markets with the demand-response service limited to registered user groups only, such as the disabled. The demand-response service could also service other markets such as the elderly and transit dependents, as defined locally.

The core fixed-route service would operate in the highest density areas of Bismarck and Mandan only. Ten to twelve routes would provide most of this area with reasonable access to transit. The routes were selected to maximize coverage of key travel generators. The main fixed-route service would operate 7 a.m. to 7 p.m. Monday through Friday with more limited service hours and frequencies on weekends. Service frequencies would typically be between 45 and 60 minutes on most routes, depending on exact route length, orientation and operating speeds. The primary service hub would be around the Kirkwood Mall area. The fixed-route service would require a standardized fleet of 12 to 13 medium-sized, accessible buses. Users would access the service at curbside bus stops or by hailing the driver along the routes. Typically, loading should take place no more than once per block in order to maximize operating speeds. Fares for the fixed-route service would be priced in

the $0.75 to $1.00 per trip range and free transfers would be provided for connecting route service.

The demand-response service would be structured to provide door-to-door service to only a limited customer market. If so desired, 7 days a week, 24-hours per day operations could be maintained. Ideally, only registered customers, such as the disabled, would qualify for this service at standard fares. Other user groups, if so allowed on the service, should be expected to pay premium fares for this premium service. In this way, many of the existing, non-disabled users would be encouraged to use the fixed-route service as a result of a substantial fare reduction. Advanced reservation time should be in the 4 to 6 hour range. The extent of the demand-response service, whether it would continue to operate up to and perhaps beyond the city limits, would need to be resolved. Ideally, the service would operate in the city limits only with rural service provided by other available rural service providers in the area. Also, transitioning from the existing 7 days a week, 24-hours per day operations for non-disabled riders may require innovative arrangements with other local providers in order to continue to meet local travel needs.

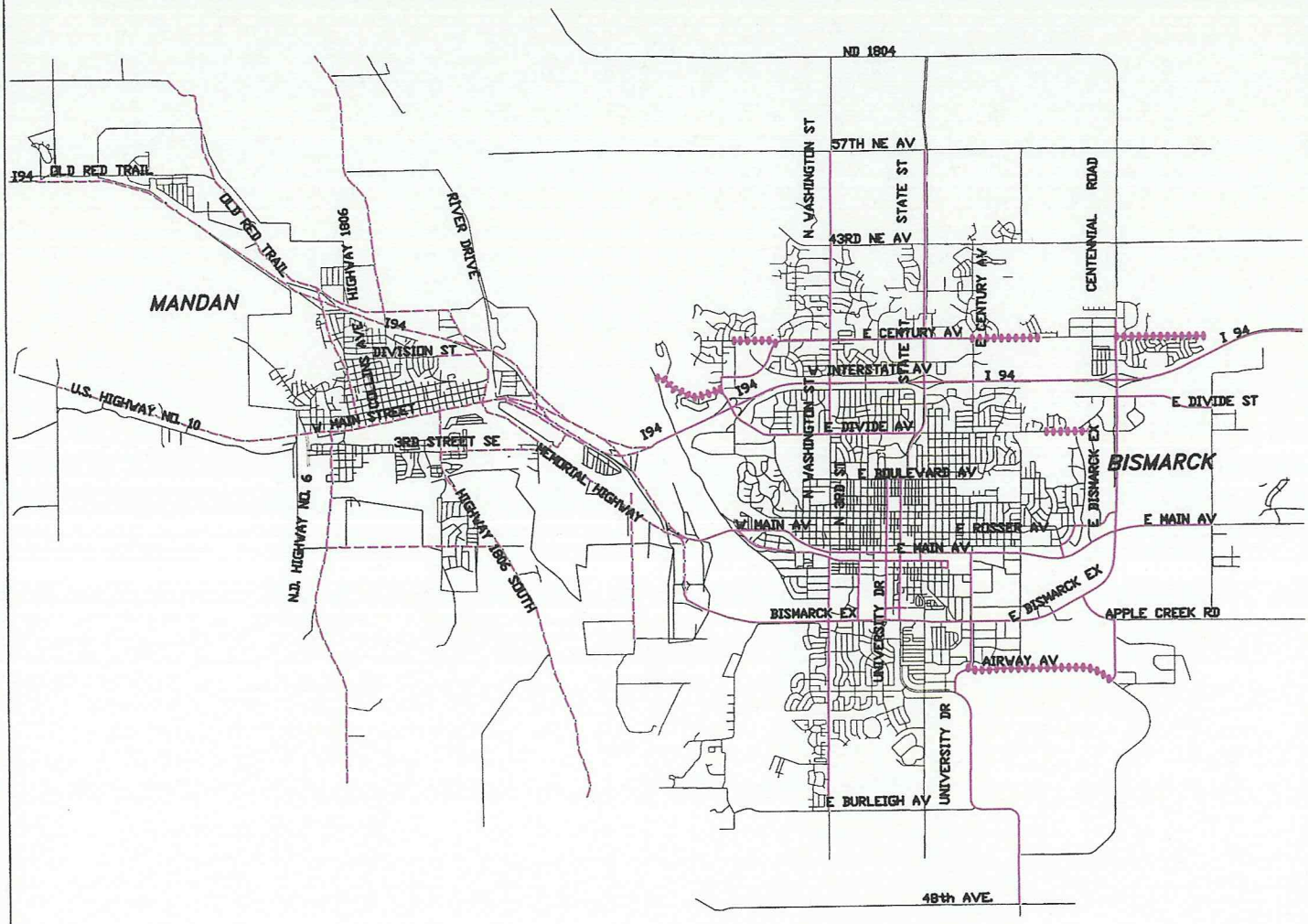
## C. Freight Movement Alternatives

Three alternatives were developed to promote movement of freight along certain routes. They are described as follows:

- Adopt City of Mandan Truck Route Map. It is very desirable to promote truck activity on certain routes and to limit truck activity on others. This is a cost-effective policy that will enable the City of Mandan to maintain lower design pavement thickness on roads that carry minimal truck traffic. Further, many City streets will be maintained in good condition for longer periods of time if they are subjected to fewer trucks. Figure 6-2 incorporates proposed City of Mandan truck routes onto the current area truck route map.

- Develop a Metropolitan Beltway. Development of a Metropolitan Beltway will address many transportation system needs. In addition to future roadway capacity and access/system continuity needs, a metropolitan beltway would be ideal as a truck route which keeps significant truck traffic out of the urban area.

- Study Metropolitan Rail Relocation Options. The possibility of relocating the Bismarck-Washburn line for a connection on Bismarck's east side was briefly evaluated. While the impacts to such a relocation are significant, the potential benefits related to relocation are also significant. The end result of the evaluation was the determination that possible railroad relocation should be studied in more depth and within the context of regional railroad operations. Therefore, this alternative suggests that no relocation take place at this time, and that opportunities for rail relocation be studied at some future date.




| FIGURE 6-2<br>BISMARCK MANDAN TRUCK ROUTE MAP | | |
|---|---|---|
| BISMARCK-MANDAN<br>LONG RANGE TRANSPORTATION PLAN | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | |
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| CHECKED BY: | DATE: 6/18/2001 | |
| APPROVED BY: | | |

## D. Non-Motorized Transportation Alternatives

Bicycling and walking are important elements of an integrated transportation system. These modes of travel must be integrated into policies and practices of governmental agencies at all levels. The Transportation Equity Act for the 21st Century (TEA-21), signed into law on June 9, 1998, carries forward the same programs for bicycling and walking established in Intermodal Surface Transportation and Efficiency Act of 1991, and also included several new and stronger directives. Important and relevant policies and statements included in TEA-21 are as follows:

A. *State and MPO long range plans are to "provide consideration of strategies that will increase the safety and security of the transportation system for motorized and non-motorized users."*

B. *Bicyclists and pedestrians shall be given "due consideration" in State and MPO plans.*

C. *Bicycle and pedestrian facilities are to "be considered, where appropriate, with all new construction and reconstruction of transportation facilities."*

In February 1999, the Federal Highway Administration (FHWA) issued a Guidance Memorandum regarding bicycle and pedestrian provisions of TEA-21. The memorandum is extremely supportive of bicycling and walking and establishes that these modes are an important component of the transportation system, stating that:

A. *"To varying extent, bicyclists and pedestrians will be present on all highways where they are permitted and it is clear the intent of TEA-21 is that all new and improved transportation facilities be planned, designed, and constructed with this fact in mind,"*

B. *"We expect every transportation agency to make accommodation for bicycling and walking a routine part of their planning, design, construction, operations and maintenance activities,"*

C. *"Bicycling and walking ought to be accommodated as an element of good planning, design, and operation."*

The recognition of non-motorized travel by TEA-21 had two specific goals: to double the percentage of trips made by foot and bicycle, and to reduce the number of crashes involving bicyclists and pedestrians by ten percent. To accomplish these goals, the planning must allow for connecting people to places they wish to visit and to reduce the points of conflict with motorized vehicles. In order to further encourage the facilities for non-motorized

travel, TEA-21 includes a ten percent set-aside of the funding for transportation enhancements, including facilities for bicycling and walking.

The Bismarck Parks and Recreation District recently completed a Strategic Plan. As part of their planning process, a public opinion survey was conducted in August and September, 1999. The following is one of the major findings of this survey:

> "Trails are in high demand. Biking and walking are the most popular activities. People are very satisfied with the current trail network, but want continued improvement AND expansion of the trail system. Nearly all respondents to the community survey listed a running/walking track as a high priority for indoor recreation (97%), and over one-third of those surveyed listed outdoor bicycle/walking trails as desired recreation additions."

The following is one of the common desires and recommendations the focus group and interview participants put forth in the Strategic Plan:

> "Trail additions and improvements – Trails were a top priority of all groups. There was strong support for completing the city loop trail, adding new paved and mountain bike trails, adding trail routes or designated lanes to/from the central city, and adding more water fountains and bathrooms along trails. The need to plan and budget for trail maintenance was mentioned. The District was encouraged to consider separate trails for pedestrians and bike/skate in heavy use areas and to evaluate adding centerline striping on heavy use trails."

It is obvious that non-motorized transportation is important to the citizens of the Bismarck-Mandan area and consideration must be included in the long range plan. All recommended new construction and reconstruction will need to address bicycling and walking. The intent of the long range plan with regard to non-motorized transportation will be to prioritize routes and evaluate various funding sources. The detailed planning of the facilities would need to be accomplished as each transportation project moves forward.

The Bismarck-Mandan MPO area has a good network of multi-use trails and the public appears to be very satisfied. Figure 6-3 shows the location of existing multi-use trails and possible location of future multi-use trails. The future trails are an extension of the existing system. As used in this document, multi-use trails shall mean bicycle and pedestrian paths which are constructed or developed separately from the roadway or shoulder. Multi-use trails or shared paths should be used to serve corridors along streets and highways, as well as areas not served by streets or highways. Multi-use trails should also offer opportunities not provided by the road system, i.e., recreation, direct commute routes, etc.

FIGURE 6-3
BISMARCK MANDAN MULTI-USE TRAILS
EXISTING AND PROPOSED TRAILS

BISMARCK-MANDAN
LONG RANGE TRANSPORTATION PLAN

ULTEIG ENGINEERS, INC.

| | | |
|---|---|---|
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00-8007 |
| CHECKED BY: | DATE: 6/18/2001 | |
| APPROVED BY: | | |

Multi-use trails also can be planned to parallel a street or highway and be constructed in the right-of-way. These are particularly applicable to connecting other multi-use paths. Multi-use trails should be planned with the bicyclist's safety in mind, but other users such as pedestrians, runners, skateboarders, in-line skaters, persons in wheelchairs, and others must be considered.

Along other planned transportation routes, either signed or unsigned, shared roadways may be used for bicycles. These routes may need parallel sidewalks for pedestrians. When planning the type of facility needed along a particular route, many factors will need to be considered. One very important factor is the skill level of the bicyclist. Advanced riders ride for convenience and speed and are comfortable riding with motor vehicle traffic. Basic riders are comfortable on neighborhood streets, but tend to avoid fast and busy motor vehicle traffic. Children prefer multi-use paths and residential streets. Therefore, if planning adjacent to schools, parks, etc., which will naturally attract children, multi-use trails should be considered. Other factors which need consideration during planning include: conflict reduction, maintenance, ADA requirements, direct access, aesthetics, pavement surface quality, and funding.

In addition to looping the existing trail system within the MPO area, there are four readily apparent needs which should be considered when accomplishing a long range transportation plan. These are:

- Bikeway parallel to Highway 1806 to Harmon Lake Park.
- Multi-use trail along Burnt Creek Trail corridor to Hoge Island.
- Shared roadway or multi-use trail from City of Bismarck trail system to City of Lincoln.
- Multi-use trail along Highway 1804 to the University of Mary.

Morton County is already applying for grants to work toward completion of a multi-use trail to Harmon Lake Park. The planning for a multi-use trail along Highway 1804 to the University of Mary is being accomplished as part of an environmental document funded by the NDDOT. If the road to Lincoln is relocated or reconstructed, eight-foot shoulders may be considered to allow for a shared roadway. The abandoned railroad that extends southeast out of Bismarck also may be used for a multi-use trail in the future. Finally, planning should commence for the multi-use trail along Burnt Creek trail when funding is available.

All transportation improvements are dependent on funding. When planning for the future, the following funding sources could be considered: Transportation Enhancement (TE) Funds, Urban Funds, County Funds and State Funds. Based on recent history and antici-

pated future transportation enhancement funding levels, Bismarck, Lincoln and Burleigh County could be expected to receive and dedicate approximately $200,000 to multi-use trail projects per year and Mandan and Morton County approximately $100,000. These funds will be used to develop bike paths or multi-use trails in addition to those which may be funded by other funding sources such as grants, Park District funds, etc.

Using the possible future location of multi-use trails shown on Figure 6-3, an estimated cost of each project was developed. The projects were also prioritized and programmed to be accomplished in the short-range 2001-2010 or to be completed in the future. These projects, their estimated costs, possible funding sources and programmed timing are shown in Tables 8 and 9.

## Table 8
## Bismarck / Burleigh County Bikepath Projects

| No | Bikepath Project Description | Length (Miles) | Estimated Cost | Funding Source | Program-ming |
|---|---|---|---|---|---|
| 1 | I-94 / 26th Street Structure and Connections | 1.2 | $160,000 | TE | 2001-2010 |
| 2 | Horizon Middle School Loop | 1.4 | $185,000 | TE | 2001-2010 |
| 3 | Tyler Parkway Connection to Horizon Middle School | 1.7 | $225,000 | TE | 2001-2010 |
| 4 | East Calgary Avenue Loop to 43rd Avenue | 1.1 | $145,000 | TE | 2001-2010 |
| 5 | 4th Street (Century Avenue to Calgary Avenue) | 0.7 | $100,000 | TE | 2001-2010 |
| 6 | West Calgary Avenue Loop to 43rd Avenue | 0.9 | $120,000 | TE | 2001-2010 |
| 7 | Burnt Creek Trail (Pioneer Park to Hwy 1804) | 3.8 | $513,000 | TE | 2001-2010 |
| 8 | Main Avenue (26th Street to Bismarck Expressway) | 1.1 | $145,000 | TE | 2001-2010 |
| 9 | East Hay Creek (Century Avenue to 43rd Avenue) | 1.2 | $160,000 | TE | 2001-2010 |
| 10 | River Road Connection to Horizon Middle School | 2.5 | $330,000 | TE | 2001-2010 |
| 11 | Airport Road (Main Avenue to University Drive) | 1.5 | $200,000 | TE | 2011-2025 |
| 12 | Burnt Creek Trail (1804 to Hoge Island) | 1.7 | $225,000 | TE | 2011-2025 |
| 13 | East Divide Avenue (4th Street to State Street) | 0.6 | $80,000 | TE | 2011-2025 |
| 14 | 43rd Avenue North (Horizon Middle School to Centennial Road) | 3.2 | $425,000 | Urban | 2011-2025 |

| No | Bikepath Project Description | Length (Miles) | Estimated Cost | Funding Source | Program-ming |
|---|---|---|---|---|---|
| 15 | Centennial Road (43rd Avenue North to East Divide Avenue) | 1.7 | $225,000 | Urban | 2011-2025 |
| 16 | 19th Street (Century Avenue to 43rd Avenue) | 0.7 | $100,000 | Urban | 2011-2025 |
| 17 | East Century Avenue (Arizona Drive to Centennial Road) | 1.2 | $160,000 | Urban | 2011-2025 |
| 18 | East Divide Avenue (Hay Creek to Bismarck Express-way) | 0.3 | $40,000 | Urban | 2011-2025 |
| 19 | East Divide Avenue (Bismarck Expressway to 66th Street) | 2.1 | $280,000 | TE/Urban | 2011-2025 |
| 20 | Main Avenue (Bismarck Ex-pressway to 66th Street) | 2.0 | $265,000 | TE/Urban | 2011-2025 |
| 21 | Burleigh Avenue (Washington Street to University Drive) | 1.6 | $215,000 | TE/Urban | 2011-2025 |
| 22 | 12th Street (Cottonwood Park to Prairie Elementary School) | 1.7 | $225,000 | TE/Urban | 2011-2025 |
| 23 | Washington Street (Burleigh Avenue to Sibley Park) | 1.3 | $175,000 | TE/Urban | 2011-2025 |
| 24 | Mills Avenue (Riverwood Drive to Fox Island) | 0.5 | $70,000 | TE/Urban | 2011-2025 |
| 25 | Riverwood Drive (Tavis Road to Mills Avenue) | 0.9 | $120,000 | TE/Urban | 2011-2025 |
| 26 | Burleigh Avenue (Washington Street – Riverwood Drive) | 1.0 | $135,000 | TE/Urban | 2011-2025 |
| 27 | State Street (Boulevard Ave-nue to 43rd Avenue) | 2.9 | $385,000 | State | 2001-2010 |
| 28 | University Drive / 1804 (12th Street to 48th Avenue) | 3.3 | $435,000 | State | 2001-2010 |
| 29 | Highway 1804 (48th Avenue to University of Mary) | 2.0 | $265,000 | State | 2001-2010 |

## Table 9
## Mandan / Morton County Bikeway Projects

| No | Bikepath Project Description | Length (Miles) | Estimated Cost | Funding Source | Pro-gramming |
|---|---|---|---|---|---|
| 1 | Highway 1806 (Old Red Trail to Harmon Lake Park) | 6.0 | $800,000 | County TE Urban | 2001-2010 |
| 2 | Old Red Trail (Sunset Drive to Collins Avenue), Collins Avenue (Old Red Trail to Division Street) | 1.25 | $170,000 | City TE Urban | 2001-2010 |
| 3 | Old Red Trail (Collins Ave. to Mandan Ave)<br>Mandan Ave. (Old Red Trail to Main St.) | 1.8 | $243,000 | City TE Urban | 2001-2010 |
| 4 | Mandan Avenue (Main Street to 3rd Street South) | 0.6 | $80,000 | City TE Urban | 2001-2010 |
| 5 | Division St./Boundary St. Loop | 2.1 | $284,000 | City TE Urban | 2001-2010 |
| 6 | 19th Street South (Highway 6 to 14th Avenue Southeast) | 1.6 | $215,000 | City TE Urban | 2001-2010 |
| 7 | Highway 6 (Main Street to 19th Street South) | 1.25 | $170,000 | City TE Urban | 2011-2025 |
| 8 | 3rd Street South (Highway 6 to Highway 1806) | 1.2 | $160,000 | City TE Urban | 2011-2025 |
| 9 | Hwy 10 Loop to Lohstreter Road | 2.5 | $338,000 | City TE Urban | 2011-2025 |
| 10 | Marina Road Southeast / McKenzie Drive | 0.7 | $100,000 | City TE Urban | 2011-2025 |

# VII. Policy Level Alternatives

Perhaps there is no greater determinant in the quality of the future transportation system than local policy, for it is through local policy that area growth and the layout of future subdivisions are managed.

Each of the five local jurisdictions possesses regulations or ordinances which place various requirements on future subdivisions or plats. When these are uniformly applied, they become the primary resource toward preventing area growth from having an adverse impact on the transportation system. Moreover, subdivision regulations and local ordinances can and should be used to help preserve your transportation system.

## A. Current Policies

While there are many local policies that have an impact on transportation either directly or indirectly, two policies play a pivotal role in how well the transportation system is able to function. They are policies that establish access control and right-of-way preservation.

Local jurisdictions have established their right-of-way preservation and access control policies through subdivision regulations, ordinances and comprehensive plans. Applicable documents within each jurisdiction were reviewed to determine current standards:

**Table 10. City of Bismarck Right-of-Way / Access Control Standards**

| Functional Classification | Within Corporate Limits | | Outside Corporate Limits | |
|---|---|---|---|---|
| | Minimum Right-of-Way (in feet) | Typical Roadway Width (in feet) | Minimum Right-of-Way (in feet) | Typical Roadway Width (in feet) |
| Principal Arterial | 150 | 63 | 150 | 40 |
| Minor Arterial | 120 | 51 | 150 | 36 |
| Collector | 80 | 44 | 120 | 30 |
| Local | 66 | 40 | 80 | 26 |
| Local (mountable curb only) | 60 | 37 | | |
| ***Note: Access control allows a maximum of 2 approaches per ¼ mile.*** | | | | |

**Table 11. Burleigh County Right-of-Way / Access Control Standards**

| Street Class | Minimum Right-of-Way | Typical Roadway Width |
|---|---|---|
| Primary Highway | 150 feet | 36 feet |
| Secondary Highway | 150 feet | 32 feet |
| Collector Road | 120 feet | 30 feet |
| Local Road | 80 feet | 26 feet |
| ***Note: Access control allows a maximum of 2 approaches per ¼ mile.*** | | |

**Table 12. City of Mandan Right-of-Way / Access Control Standards**

| Functional Classification | Right-of-Way Width |
|---|---|
| Arterials | 100 feet |
| Collectors | 80 – 100 feet |
| Local Road | 66 – 80 feet |
| ***Note: No access control requirements were identified.*** | |

**Table 13. Morton County Right-of-Way / Access Control Standards**

| Class of Street (Urban) | Right-of-Way | Roadway |
|---|---|---|
| Major | 80 feet | 32 feet |
| Minor | 66 feet | 28 feet |
| Class of Street (Rural) | Right-of-Way | Roadway |
| Major | 100 feet | 32 feet |
| Minor | 80 feet | 28 feet |
| ***Note: No access control requirements were identified.*** | | |

## B. Corridor Preservation

Corridor preservation policies should strive to assure that adequate right-of-way will be available to meet the existing and future needs along a corridor. In order to identify these needs, it is important to consider the type of roadway section that may eventually be desired. In an urban setting, 80 feet of right-of-way is often adequate to meet the needs for a collector street, while 100-120 feet of right-of-way is desired for an arterial roadway.

Along the urban fringe and in rural areas, a greater amount of right-of-way is often needed since ditch roadway sections are significantly wider than curb and gutter roadway sections. Thus, right-of-way preservation policies should hold different width standards for rural roadway sections than for urban roadway sections.

Upon review of current city and county right-of-way standards, it appears that local standards are generally adequate to fulfill the needs for roadways in an urban setting. An exception to this statement may exist in the case of Morton County, whose urban right-of-way width standards should be reviewed in light of the standards held elsewhere within the metropolitan area.

For locations where a rural roadway section is anticipated, current right-of-way width standards throughout the metropolitan area may not provide adequate space for the roadway section that will eventually need to be constructed. Figure 7-1 shows three types of roadway sections that could be accommodated under 175-foot, 200-foot and 250-foot right-of-way width scenarios. The 175-foot section represents a possible typical section for a rural half-mile line collector road. The 200-foot section represents a possible typical section for a rural mile line arterial road. The 250-foot section represents a possible ultimate typical section for the proposed rural beltline arterial road. Each jurisdiction should review their current standards to consider appropriate changes in right-of-way width and building setback requirements.

Another valuable policy that can improve corridor preservation is a policy to place informational signs along a corridor indicating its long range function as a major traffic carrier. This technique is useful to educate developers, prospective land buyers, residents and business owners of the possibility that roadway improvements may some day become necessary to improve the traffic carrying capacity of a roadway. It is also useful to educate individuals of the possibility that a future interchange, overpass, through street, or river bridge is planned for a given location. Examples of these signs are shown in Figure 7-2.

## C. Access Control

For functionally classified roadways, fewer access points means increased mobility. This is discussed in detail in Chapter II.A.1. By definition, arterial roadways should possess the highest level of access control, followed by collector roadways, then local roadways.

Currently, the City of Bismarck and Burleigh County allow a maximum of 2 approaches per ¼ mile along developing arterial roadways. No access control provisions were identified in the City of Mandan or Morton County ordinances.

The current policy in the City of Bismarck and Burleigh County is adequate for arterial roadways, but may be too restrictive for development along collector roadways. It may be desirable to adopt a less restrictive policy for the collector roadways, possibly 3 or 4 approaches per ¼ mile. The City of Mandan and Morton County should consider adopting similar access control policies.

## D. Land Use Alternatives

The preferred alternatives to the most likely land use growth scenario mentioned in Chapter III and detailed in Chapter IV are essentially the result of policy changes from those currently in place.

### 1. Potential Responses to Development Scenarios

A variety of actions may be warranted in response to the projected growth pattern impacts noted above. These include general responses to the anticipated continued development within the Study Area, and more site specific responses. Responses pertaining to access control, collector roadway roles, and corridor preservation have been discussed in other sections of this Chapter. Additional responses include:

a. Decide if urban growth boundaries serve jurisdictional objectives. Urban growth boundaries are typically found in larger metropolitan areas with some mechanism for uniform control across municipal boundary lines. However, their objective to encourage compact development and lower urban service costs may serve smaller urban centers also. An urban growth boundary can provide a unilateral method to control the level and type of growth occurring within a given jurisdiction. However, if that jurisdiction does not extend beyond the urban growth boundary it is less likely to succeed because it will require coordination with other jurisdictions to address the tendency for leapfrog development. The usefulness of urban growth boundaries in Bismarck-Mandan area may be to ensure appropriate urban style development at the fringe of the municipal boundaries and

reduce land use conflicts occurring at annexation rather than actual significantly lowering urban service costs.

b. Consider official mapping. Official mapping provides the opportunity to ensure a roadway will be developed where it will function best instead of having to settle for second best due to pre-existing development.

c. Consider establishing a fund for purchasing rural right-of-way. There will inevitably be cases where development proposals will occur before all the necessary controls or mechanisms are in place to preserve sufficient right-of-way throughout the MPO study area. Setting aside funds to purchase right-of-way which cannot be preserved through some other means allows local jurisdictions to provide the appropriate roadway at the preferred location without compromise. This kind of a fund will be especially important if official mapping is done. One approach to establishing this fund may be to create a revolving loan pool with all local jurisdictions contributing. This could provide the temporary funding source while allowing the replenishment of funds to be a line item in the following year's budget for jurisdictions utilizing the fund.

d. Adopt density limitations in zoning and subdivision controls. Density limitations have been used in several states to limit sprawl or inappropriate land uses. It provides a limitation on growth in agriculture preservation districts without requiring all development to be on large parcels and minimizes the land taken out of agricultural production. An example is to limit the number of non-farm residences to one per quarter section, or one per forty, but allowing such residences to be clustered or located anywhere within a section.

e. Consider the benefits of Transfer of Development Rights(TDR). While this tool is not currently addressed in State enabling legislation, it can enhance the effectiveness of other sprawl control mechanisms by creating an incentive for more compact development and directing such development to more appropriate locations. If added to the local government toolbox, TDR could significantly enhance the ability to manage sprawl in all North Dakota's urban centers.

f. Decide locations of significant greenspace or viewsheds now. Just as a single development can encroach on a preferred roadway corridor and damage its effectiveness, a single development in the wrong spot can damage a viewshed or disrupt the continuity of greenspace. It would be wise for local jurisdictions to inventory these features and determine which ones can or should be protected.

g. Consider establishing a fund to procure greenspace or viewsheds. One of the most effective ways to protect these features is through conservation easements or lease agreements. It is likely that non-profit partners can be found to supplement local jurisdictional funds set aside to protect these features from encroachment. It is often preferable to share costs with na

h. tional and regional organizations who share common objectives. The Farmland Preservation Trust and the Nature Conservancy are two leading organizations who have objectives consistent with greenspace preservation for urban sprawl management. However, local funding participation is preferable and may sometimes be the only option. Three potential local funding sources are a cash in lieu of land dedication requirement for all plats which allows cash to be used for highest priority locations, a transfer of development rights program that allows a bank to be established where higher densities are allowed if a cash contribution to the fund are made, and a dedication of local tax dollars (either park district or city/county) to purchase key sites.

i. Develop a comprehensive plan that integrates school district and park plans. Coordinating school district and park planning with local government comprehensive plans makes sense fiscally and geographically. Shared facilities, joint land purchases, and synergistic land use development are all benefits to be realized if school, park, and land use plans can be integrated by each public entity.

j. Set aside land for commercial development at key locations outside the Cities of Bismarck and Mandan. Primary locations include the intersections of the proposed new bridge corridors and beltway with existing arterials. These locations are most appropriate for commercial purposes, but may be encroached by residential development if not set aside. Future land use plan maps should be adopted that show these locations as commercial even though they may not be developed for ten or twenty years.

k. Plan a slow change from residential to commercial land use along Tyler Parkway. As traffic along this corridor increases, it will become less desirable for single family residential uses. At the same time, the increased traffic makes the location more viable for commercial activities. Develop a plan that will allow the gradual transition from one type of use to the other. It is essential that such a plan clearly define the limits of the future commercial area to ease concerns by local residents will result in ongoing commercial encroachment into the neighborhood. This transition may happen naturally over the course of the next forty years, but planning for it will reduce the land use conflicts, and reduce the frustration of local property owners.

l. Complete a greenway development plan to enhance the growth potential and resolve land use conflicts along the Apple Creek area east of Bismarck. This wetlands area acts as a significant development barrier along much of the southeast side of Bismarck. The City can either ignore it or work with it. It will serve the City well to incorporate the wetlands into a long range growth plan that treats the wetlands as an asset and incorporates open space and cluster development concepts into the urban fabric.

m. Use cluster development concepts to encourage compact development while preserving land for open space or future development. Two approaches to cluster development include creating rural villages around common open space, and siting residences on small tracts while holding surrounding open space in common. Morton County has already seen this concept put into use. The objective of these concepts is increasing local density while preserving open space either permanently for greenspace or temporarily for traditional urban development.

n. Due to the varying land use administration procedures, some local jurisdictions may find that one approach to implementing the growth management actions noted above will work better than others. Implement these recommendations via (1) Coordination between Cities, Counties, and Townships in development of zoning and subdivision regulations; (2) Development of joint powers agreements for management of fringe areas; (3) Development of service agreements and orderly annexation agreements; and/or (4) Extraterritorial zoning and subdivision authority.

## E. Functional Classification

A review of the current (1992) functional classification maps and mileages of functionally classified roadways found that the current mileages of functionally classified roadways are within the guidelines established by the Federal Highway Administration in their publication entitled, *"Highway Functional Classification Concepts, Criteria and Procedures."* The accuracy of these maps should be monitored regularly by the MPO and the system should be updated when necessary.

Additionally, all mile line roadways within the MPO study area should be recognized as potential future arterial roadways when policies pertaining to right-of-way preservation, access control and land use are implemented. It is also important that further planning be conducted to establish desirable locations for future half-mile collector roadways. This could be accomplished by preparing area plans for each section surrounding the Cities of Bismarck and Mandan, starting first in the developing extraterritorial areas and where development activity is likely to occur within Burleigh and Morton Counties.

# VIII. Alternative Analysis

This section of the report describes the analysis efforts undertaken once the various alternatives were developed. In reality, the primary analysis effort was made during the tasks of issue identification and alternative development. Once the alternatives were defined, sufficient analysis was completed to allow selection of a preferred alternative. A discussion of revenue sources and financial considerations relative to alternative selection is provided in the next chapter of this report. Spreadsheets which show the studied project alternatives and their financial, environmental and social evaluations are found in Appendix 5. Other analysis efforts are described within the following sections of this chapter.

## A. Technical Considerations

The TP+/Viper Travel Demand Model was a key factor used in selecting preferred alternatives. Alternatives that address the need for increased roadway capacity were divided between short and long range on the basis of projected traffic volumes compared to existing roadway capacity.

Beyond this, local staffs prioritized and selected alternatives on the basis of anticipated need, cost and other factors.

## B. Environmental Considerations

Alternatives were reviewed and any obvious or probable environmental issues relative to the alternatives were documented on the alternative spreadsheets. Projects which stood out as having significant probable environmental issues included those projects in Morton County and the City of Mandan which called for new roadway alignments, the Washington Street corridor project in the City of Bismarck, and the regional bridge and beltway corridor projects. It is anticipated that specific environmental issues related to all proposed improvements contained within this plan will be identified and addressed during each project's own development phase.

## C. Public Considerations

The overall public process used in this Plan's development is described in Chapter X of this Report. Once the alternatives were defined, each jurisdiction's planning commission and elected body were given an opportunity to comment on the alternatives selected cooperatively with local staff.

There was general concurrence from all entities that the alternatives being recommended were acceptable. One exception to this occurred with the City of Lincoln, who requested the plan find an alternative for improved access between the Cities of Lincoln and Bismarck. As a result, an alternative was added to preserve a new corridor extending from the easternmost tip of the airport property straight south to 66th Avenue South.

# IX. Revenue Sources and Financial Evaluations

Pursuant to the Federal requirements for long range transportation plans, estimates of local, state and federal funding capabilities were made for each member jurisdiction. Projects were programmed within the short range element of the plan only if available funding was anticipated by the end of the year 2010. In this way, the programming of short range projects was constrained by the projected funding available.

Projection of federal funding is an extremely inexact science. The current Highway Bill expires in 2004, well prior to the end of the plan's short range element. For the purposes of this plan, the projection of available federal funding was made by making the conservative assumption that current funding levels will continue. Current federal funding balances for each jurisdiction were added to the funding projections.

In some cases, the desired projects to be completed prior to the year 2010 exceeded the availability of federal funds. In those cases, the local jurisdictions indicated that the project funding would be supplemented with additional local dollars. It was also understood that the federal funding estimated within each jurisdiction may be underestimated, and that supplemental local funding may not be necessary.

The City of Lincoln does not receive an allocation of federal or state transportation dollars. In the past, they have requested that a road such as 66th Street be placed on the State highway system. Given this plan's proposal that 66th Street be part of the Metropolitan Beltway, it is probable that federal dollars will be expended to improve this roadway in the future.

The City of Lincoln also desires to see improvements to Lincoln Road and 52nd Street federally funded. They are pursuing these projects through the Burleigh County Highway Department. While it appears that Burleigh County is willing to sponsor the projects using the County's federal aid, significant coordination remains. These roadways will need to be placed on the County's federal aid system, and agreements covering right-of-way acquisition and local funding responsibilities will have to be completed.

## A. Street and Highway Project Funding

Federal urban and county funding is the primary resource for projects initiated by local jurisdictions. These funds require a minimum of 20% local match on eligible project elements. Based upon current fund balances and projected annual funding, federal urban and county funding for 2002 through 2010 is summarized in Table 14.

| Table 14 | | | |
|---|---|---|---|
| **Federal Urban and County Funding** | | | |
| **2002-2010** | | | |
| | Federal | Minimum Local Match | Total |
| Bismarck | $ 21,266,000 | $ 5,316,000 | $ 26,582,000 |
| Burleigh County | $ 2,920,000 | $ 730,000 | $ 3,650,000 |
| Mandan | $ 7,170,000 | $ 1,792,000 | $ 8,962,000 |
| Morton County | $ 3,650,000 | $ 912,000 | $ 4,562,000 |

The short range projects for each jurisdiction were selected within the financial constraints listed above. Projects for which there was no funding available (through 2010) were placed in the long range element of the plan or were listed as corridor preservation projects. Funding for each jurisdiction is provided in Table 15.

# Table 15

## City of Bismarck
## Federal, State and Local Funding

| Short Range Urban Projects | Long Range Urban Projects | Regional Projects* |
|---|---|---|
| $ 2,790,000 | $14,870,000 | $ 5,300,000 |
| $ 2,040,000 | $ 1,020,000 | $ 3,000,000 |
| $ 4,000,000 | $ 7,080,000 | $ 9,250,000 |
| $ 2,500,000 | $ 1,235,000 | $17,740,000 |
| $ 1,480,000 | $10,500,000 | $15,000,000 |
| $ 4,000,000 | $34,705,000 | $50,290,000 |
| $ 1,160,000 | | |
| $ 4,000,000 | | |
| $ 1,235,000 | | |
| $ 2,720,000 | | |
| $25,925,000 | | |

Table 15 continued on next page.

Table 15 continues.

## Burleigh County
## Federal, State and Local Funding

| Short Range Urban Projects | Long Range Urban Projects | Regional Projects* |
|---|---|---|
| $ 2,120,000 | $ 5,070,000 | $ 9,240,000 |
| $ 600,000 | $ 1,840,000 | $ 9,240,000 |
| $ 930,000 | $ 600,000 | |
| $ 3,650,000 | $ 7,510,000 | |

## City of Mandan
## Federal, State and Local Funding

| Short Range Urban Projects | Long Range Urban Projects | Regional Projects* |
|---|---|---|
| $ 5,570,000 | $ 3,600,000 | $ 6,150,000 |
| $ 3,710,000 | $10,500,000 | $ 6,150,000 |
| $ 1,500,000 | $ 4,850,000 | |
| $10,780,000 (Total) | $ 3,810,000 | |
| $ 8,962,000 (- Available funding) | $22,760,000 | |
| $ 1,818,000 (Local overmatch) | | |

## Morton County
## Federal, State and Local Funding

| Short Range Urban Projects | Long Range Urban Projects | Regional Projects* |
|---|---|---|
| $ 663,000 | $ 2,030,000 | $ 4,650,000 |
| $ 2,000,000 | $ 2,060,000 | $ 4,650,000 |
| $ 2,000,000 | $ 1,200,000 | |
| $ 4,663,000 (Total) | $ 5,290,000 | |
| $ 4,562,000 (-Available funding) | | |
| $ 101,000 (Local overmatch) | | |

* Regional Projects refer to those projects within a given jurisdiction whose federal funds are supplied by Primary or Secondary Regional System funding. All regional projects are programmed for short range implementation, except for the Highway 1806 project in Morton County. Short range regional projects total $65,680,000.

## B. Transit Funding

The following table summarizes Bismarck-Mandan Transit system changes that will be experienced with implementation of the recommended transit plan service alternative. Changes summarized include operating costs, fare revenues, operating deficit, ridership, peak fleet, and capital costs.

# Table 16

| Summary of Changes with Implementation of Recommended Plan Alternative | | | |
|---|---|---|---|
| | **Existing** | **Proposed** | **Change** |
| Operating Cost | $ 1.0 million | $ 1.15 million | + $ .15 million |
| Fare Revenues | $ 300,000 | $ 330,000 | + $30,000 |
| Operating Deficit | $ 700,000 | $ 800,000 | + $100,000 |
| Ridership | 175,000 | 210,000 | + 35,000 |
| Peak Fleet | | | +3 mid-size buses |
| Capital Cost<br>- New Buses (3 mid-size)<br>- Electronic Payment System ( 12 units) | | | <br>+ $450,000<br>+ $175,000 |
| **Total Capital Costs** | | | **+ $625,000** |

Current operating costs are made up from approximately 1/3 federal, 1/3 local and 1/3 farebox funds. It is proposed that the increase due to planning system changes would come from a 1 mil tax increase in Bismarck and a ½ mil tax increase in Mandan. This would bring both cities to 3 mils for transit.

The $625,000 in proposed capital costs is anticipated to come from a $1.0 million request for Federal Transit Administration (FTA) earmark funds and a $400,000 request for City of Bismarck sales tax funds. Implementation of the transit recommendations is dependent on the ability to successfully obtain the FTA, sales tax, and mil levy funding.

## C. Bikeway and Pedestrian Facility Funding

Bikeway and pedestrian facility projects are typically funded using Federal Transportation Enhancement (TE) funds or using Urban Roads Program funds when federal aid is used. Both programs require a 20% local match to supplement the federal dollars allocated.

When urban funds are used, the improvements normally coincide with adjacent street improvements. Projects using TE funds must compete with other City or County TE projects submitted throughout the State of North Dakota. Therefore, it is difficult to predict the amount of funding available for local TE projects. Historical funding allocations and municipal averages were used to estimated the funding levels probable through 2010.

For estimating purposes, bikeways were estimated to cost $132,000 per mile. Bismarck's annual TE funding was estimated at $155,000 and Mandan's annual TE funding was estimated at $100,000. Total TE funding through 2010 for Bismarck and Mandan were estimated at approximately $1.4 million and $900,000 respectively. Short range TE bikeway project alternatives proposed in Chapter V fall within these estimated limits.

## X. Public Process

The public process used for development of this Long Range Transportation Plan utilized a combination of public meetings and hearings, newsletters, special interest and technical committee meetings, and jurisdictional planning commission and governing body meetings.

Three sets of public meetings and hearing were held throughout the development of this plan. Early in the development process, (June-July 2000) a set of five public meetings was held during local jurisdiction's planning commission meetings to identify issues relative to transportation. In addition, two public meetings were held to receive input on transportation issues from special interest groups. Staff also met with each local governing body, the Bismarck-Mandan Chamber of Commerce and the MPO Technical Advisory Committee (TAC) during this time to receive further input. Minutes from the public meetings are found in Appendix 5. The mailing list used for special interest group public meetings and for newsletter distribution is also found in Appendix 5.

The second set of public meetings was held in February 2001 to receive input on transportation and transit alternatives. Five public meetings were held during local jurisdiction's planning commission meetings and two additional public meetings were held to receive input specifically regarding transit recommendations.

The final set of public meetings was held with the ten local planning commissions and governing bodies. These meetings were held during the review and approval process for the Long Range Transportation Plan. Care was taken to meet the North Dakota Century Code requirements for approval of master plans.

In addition to the numerous public meeting opportunities, presentations were made to the Bismarck-Mandan Chamber of Commerce on two occasions, and to the Bismarck and Mandan Parks and Recreation District boards. Each jurisdiction's elected body was also provided updates and opportunities for comment throughout the planning process.

Two newsletters were prepared during the planning process. The first newsletter introduced the reader to the purpose and use of the plan, as well as to the transportation issues identified during the first set of public meetings. The second newsletter discussed the progress made following the first newsletter and highlighted the alternatives proposed to address the issues that were identified. This newsletter also advertised upcoming public meeting opportunities. (See Appendix 5 for newsletters and mailing list).

A final key to the input process was the intensive effort to work with local staff as the plan was being developed. Much of this was accomplished through the monthly MPO Technical Advisory Committee (TAC) meetings. However, ongoing communication with local engineering and planning department staffs was essential to developing a plan that addressed the needs of the transportation system. This also served to build a familiarity among local staff with the plan's alternatives and recommendations.

# XI. Recommendations

The 2001 Bismarck-Mandan Metropolitan Area Long Range Transportation Plan fulfills the federal mandate for urban long range transportation plans. The plan has also responded to the many issues raised during the process and provides viable solutions to address those issues. These solutions are provided in the form of proposed projects and changes in local policy. This section of the report provides a summary of the recommended projects and changes in local policy. Guidance for future model development and long range planning efforts is also presented.

## A. Project Recommendations

Short range (2001-2010) and long range (2011-2025) projects were evaluated and screened on the basis of technical, environmental, social and financial factors. Those projects that survived the screening process and are recommended are shown in Tables 17 and 18, and in Figure 11-1.

## B. Transit Service Recommendations

Transit services offered in the Bismarck-Mandan metropolitan area should be expanded. Door-to-door, demand-response type service should remain, but members of the general public should be served by fixed-route, regularly-scheduled transit service operating Monday through Friday, 7:00 a.m. to 6:00 p.m. and 9:00 a.m. to 3:00 p.m. on weekends. This service should operate five routes and is a variation of what was identified as Option 2, Limited Expansion of Rider Markets in Section VI of this report.

The demand-response service currently offered should be expanded to include certain transit-dependent persons as defined by Bis–Man Transit (typically defined as low-income individuals). These customers must be pre-certified to use the service. The advanced reservation time for demand-response service will be reduced to 4 to 6 hours instead of 24 hours. Fixed-route service will comprise five routes established to serve the area's key travel generators. Fixed-route service will be offered only to limited areas within the Bismarck-Mandan city limits. Demand-response service will continue to be offered within this same area and up to two miles outside the city limits. Further recommendations regarding capital requirements, advanced technology applications, and service and management planning are contained in the Bismarck-Mandan Transit Plan under separate cover.

## C. Freight Movement Recommendations

Three alternatives to improve freight movement were described in detail in Section VI.C of the report. They are:

1. Adopt City of Mandan truck route map (see Figure 6-2).
2. Develop a metropolitan beltway.

3. Study metropolitan rail relocation options.

It is recommended that implementation of all three alternatives be pursued at the appropriate levels of local government.

## D. Pedestrian/Bicycle Transportation Recommendations

Based on the system analysis completed, a map of existing and proposed multi-use trails has been prepared and is shown in Figure 6-3 of this report. Short and long range projects have been identified within the potential funding limits available through the federal Transportation Enhancement (TE) program.

It is recommended that local jurisdictions continue to submit annual TE applications to fund their highest priority projects. These efforts should be coordinated with roadway projects being completed under other funding programs. It is further recommended that each jurisdiction continue to evaluate and upgrade their local sidewalk systems to increase accessibility and to eliminate existing gaps within their respective sidewalk systems.

## E. Policy Recommendations

Policy level recommendations arose from the review of fringe area deficiencies and local policies. It is proposed the access control and right-of-way policies should be applied to individual roadways on the basis of their existing or future functional classification. Development of an updated functional classification system should be a priority for the MPO in their future work program.

Beyond use of the existing functional classification maps, this Long Range Transportation Plan identifies locations where future functional classifications should be considered from a corridor preservation standpoint.

### 1. Rural Functional Classification Recommendations

On a case-by-case basis, local staff should decide if collectors are intended to carry mid distance trips. Collector roadways are typically defined as those which carry traffic from local streets to arterial roadways. However, they often serve as minor arterials because they act as reliever routes for intra-city trips. If collector roadways are going to act as reliever routes, it is best to design the roadway and the adjoining land use to accommodate this function. This means that such collectors should have common intersections with arterial roadways to provide the most effective continuity. It also means that road right-of-ways may need to be wider than typical. But most importantly, strong consideration should be given to prohibiting or limiting the access of driveways onto such collectors. This means creating residential developments that back onto the collector. This will allow the collectors to function more efficiently and reduce the complaints about traffic on the roadway.

| Table 17. Short Range Transportation Improvements | | | | |
|---|---|---|---|---|
| **Location**<br><br>***City of Bismarck Streets and Highways*** | ***Project No*** | ***Construction*** | ***Study*** | ***Preservation*** |
| *East Century Avenue (Centennial - 80th Street)* | *1* | | | √ |
| *Bismarck Expressway (Divide Avenue - Rosser)* | *2* | √ | | |
| *Bismarck Expressway (River - Airport Road)* | *3* | √ | | |
| *Washington Street (Main Avenue - Century Avenue) / Avenue C (Raymond St. – 3rd St.)* | *4* | √❋ | √ | |
| *Schafer Street (Divide Avenue - Main Avenue)* | *5* | √ | | |
| *12th Street (Boulevard Avenue - University Drive)* | *6* | √ | √ | |
| *Highway 1804 (Bismarck Expressway - 48th Avenue)* | *7* | √ | | |
| *England Street (Burleigh Avenue - 48th Avenue)* | *8* | | | √ |
| *London Avenue (Riverwood Drive - Washington Street)* | *9* | | | √ |
| *I-94 at 52nd Street* | *10* | | | √ |
| *3rd Street (Main Avenue - Arbor Avenue)* | *11* | √ | | |
| *State Street (43rd Avenue - Boulevard)* | *12* | √ | | |
| *Divide Avenue (State Street - 19th Street)* | *13* | | | √ |
| *Divide Avenue (26th Street - Bismarck Expressway)* | *14* | √ | | √ |
| *26th Street (Bismarck Expressway - Airway Avenue)* | *15* | √ | | |
| *Airway Avenue (Airport Road - Yegen Road)* | *16* | √ | | |
| *Tyler Parkway (West Century Avenue – Highway 1804)* | *17* | | | √ |
| *Divide Avenue (Bismarck Expressway – 66th Street)* | *18* | √ | | |
| *Valley Drive to Ash Coulee Connection* | *19* | √ | | |
| *43rd Avenue (River Road-Tyler Parkway)* | *20* | | | √ |
| *Ash Coulee Extension to River Road* | *21* | | | √ |
| *❋Proposed short range construction on Washington Street extends from Avenue D to Rosser Avenue* | | | | |

| Location | Project No | Construction | Study | Preservation |
|---|---|---|---|---|
| ***Burleigh County Streets & Highways*** | | | | |
| 71st Avenue (Centennial - 80th Street) | 1 | √ | | |
| Centennial Road (Century Avenue - Highway 1804) | 2 | √ | | |
| Washington Street (Calgary Avenue - Highway 1804) | 3 | | | √ |
| I-94 at 66th Street | 4 | | | √ |
| I-94 at 80th Street | 5 | | | √ |
| Highway 1804 (48th Avenue - RP 67.5) | 6 | √ | | |
| ***Burleigh County - City of Lincoln Streets & Highways*** | | | | |
| Lincoln Road (Airway Avenue - 66th Street) | 1 | √ | | |
| Lincoln-Bismarck Direct Access Route (Airway Avenue to Lincoln Road) | 2 | | | √ |
| 52nd Street (Lincoln Road - 48th Avenue) | 3 | | | √ |
| ***City of Mandan Streets & Highways*** | | | | |
| Division Street (Lohstreter Road - Missouri Drive) | 1 | √ | | |
| Boundary Street Northwest (Sunset Drive - Lohstreter Road) | 2 | | | √ |
| Old Red Trail (Sunset Drive - Mandan Avenue) | 3 | √ | | |
| I-94 at 56th Avenue Northwest | 4 | | | √ |
| I-94 at 32nd Avenue Northwest | 5 | | | √ |
| 19th Street Southeast (ND 6 - Highway 1806) | 6 | √ | | |
| 46th Avenue Southeast (Memorial Highway - McKenzie Drive) | 7 | √ | | |
| Long Spur Trail (24th Avenue Southeast - 40th Avenue Southeast) | 8 | | | √ |
| Captains Landing Access (Captain Leach Drive - Memorial Highway) | 9 | | | √ |
| McKenzie Drive (46th Avenue SE - Highway 1806) | 10 | | | √ |

| Table 17. Short Range Transportation Improvements | | | | |
|---|---|---|---|---|
| **Location**<br><br>***Morton County Streets & Highways*** | **Project No** | **Construction** | **Study** | **Preservation** |
| North Dakota Highway 1806 (Old Red Trail - 37th Street) | 1 | | | √ |
| 34th Street (North Dakota 25 - 22nd Avenue) | 2 | | | √ |
| 35th Street at Square Butte Creek | 3 | √ | | |
| 36th Street (North Dakota 25 to 25th Avenue) | 4 | | | √ |
| 37th Street (25th Avenue to 24th Avenue) | 5 | | | √ |
| 25th Avenue (36th Street to 37th Street) | 6 | | | √ |
| County 139A (North Dakota 25 to County Highway 82) | 7 | √ | | |
| 25th Avenue at I-94 | 8 | | | √ |
| County 140 Cut Across (Highway 25-Highway 1806) | 9 | √ | | |
| County 138 (North Dakota 6 - Highway 1806) | 10 | | | √ |
| 44th Street South (North Dakota 6 - 20th Avenue South) | 11 | | | √ |
| 29th Avenue (County 139 - County 140) | 12 | | | √ |
| 24th Avenue (37th Street – County 139A) | 13 | | | √ |
| ***Bismarck-Mandan Regional Highways*** | | | | |
| Northside Missouri River Bridge Crossing | 1 | | | √ |
| Northside Beltway Arterial | 2 | | | √ |
| Southside Beltway Arterial | 3 | | | √ |
| Eastside Beltway Arterial | 4 | | | √ |
| Westside Beltway Arterial | 5 | | | √ |
| Southside Missouri River Bridge Crossing | 6 | | | √ |

| Table 18. Long Range Transportation Improvements | | | | |
|---|---|---|---|---|
| **Location** | **Project No** | **Construction** | **Study** | **Preservation** |
| ***City of Bismarck Streets and Highways*** | | | | |
| East Century Avenue (19th Street - Centennial) | 1 | √ | | |
| Schafer Street (Divide Avenue - Main Avenue) | 2 | √ | | |
| Tyler Parkway (West Century Avenue – Highway 1804) | 3 | √ | | |
| 43rd Avenue (River Road-Tyler Parkway) | 4 | √ | | |
| Ash Coulee to River Road | 5 | √ | | |
| ***Burleigh County Streets & Highways*** | | | | |
| River Road (Burnt Boat Drive – Highway 1804) | 1 | √ | | |
| Washington Street (Calgary Avenue - Highway 1804) | 2 | √ | | |
| I-94 at 66th Street | 3 | √ | | |
| ***Burleigh County - City of Lincoln Streets & Highways*** | | | | |
| 52nd Street (Lincoln Road - 48th Avenue) | 1 | √ | | |
| ***City of Mandan Streets & Highway*** | | | | |
| Boundary Street Northwest (Sunset Drive - Lohstreter Road) | 1 | √ | | |
| I-94 at 56th Avenue Northwest | 2 | √ | | |
| Long Spur Trail (24th Avenue Southeast - 40th Avenue Southeast) | 3 | √ | | |
| McKenzie Drive (46th Avenue SE - Highway 1806) | 4 | √ | | |
| ***Morton County Streets & Highways*** | | | | |
| North Dakota Highway 1806 (Old Red Trail - 37th Street) | 1 | √ | | |
| 22nd Avenue (32-1/2 Street - 34th Street) | 2 | √ | | |
| 32-1/2 Street (22nd Avenue - Highway 1806) | 3 | √ | | |
| County 139 (ND 25 – East of Highway 83) | 4 | √ | | |

### a. Proposed Corridor Designations for Preservation Purposes:

* Metropolitan Beltway Corridor - Principal or minor arterial roadway.
* All Other Non-Interstate Mile Line Roads - Minor arterial roadway.
* All One-Half Mile Line Roadways (to include one north-south and one east-west roadway within each section) - Collector roadway.

## 2. Access Control Measures

One of the most significant land use-transportation conflicts occurring in suburban fringe areas is poorly located direct access points onto transportation corridors with growing traffic. Access control needs to address the following issues as much as forty years in advance of suburbanization in order to ensure the most effective coordination between land use and transportation interests:

a. Avoid approval of occasional one lot subdivision without consideration for full development.
b. Require one lot subdivisions to develop in a manner which will allow the access point to serve as a future street intersection.
c. Coordinate access points of nearby subdivisions ultimately requiring center turn lanes to ensure sufficient spacing for queues.

As was stated earlier, arterial and collector roadways place a greater emphasis on mobility and a lower emphasis on land access. For this reason, it is critical that local units of governments vigorously enforce guidelines for access control within the MPO study area. Bismarck and Burleigh County should consider adopting less restrictive access control ordinances pertaining to collector roadways. Mandan and Morton County should adopt new access control ordinances similar to those proposed in Bismarck and Burleigh County.

## 3. Corridor Preservation

A significant land use-transportation conflict typical in urban fringe areas is that of insufficient right-of-way for the ultimate transportation corridor needed at full development. It is important to establish mechanisms to preserve and obtain sufficient right-of-way. But it is more important to ensure structures and trees are setback even farther than the anticipated right-of-way in order to avoid concerns about encroachment on pre-existing development.

Chapter VII.B of this Report presents ideal values for right-of-way widths for standard urban and rural functionally classified roadways. It is recommended that each jurisdiction review their standards and policies and consider appropriate revisions. Also, each jurisdiction should consider possible funding sources that may be used to secure right-of-way in key locations.

## 4. Land Use Recommendations

The land use plan analysis has shown that there is and will be an increasing level of conflict between rural and urban development patterns as the Bismarck-Mandan Metropolitan Area continues to grow. The existing pattern of development and its inherent conflicts will continue unless there is a change in land use policies by local jurisdictions. Therefore, the following recommendations outline a course of action to address future land use management needs in the Bismarck-Mandan Metropolitan Area.

a. Due to the variety of land use management practices and entities involved, each MPO member jurisdiction needs to identify the best approach to accomplish the common objectives and actions noted in this analysis.

b. Develop a comprehensive plan that integrates school district and park plans. Set aside land for commercial development at key locations outside the Cities of Bismarck and Mandan. Incorporate greenway plans where appropriate.

c. The MPO or individual jurisdictions should complete a detailed study identifying corridor locations throughout the MPO Study Area. Use official mapping to preserve any non-section line roadways. Establish a fund to purchase needed right-of-way when no other means of preservation is available.

d. Local jurisdictions should complete additional studies when necessary to identify and preserve key land use areas for non-residential uses, viewsheds, and green space. Decide locations of significant greenspace or viewsheds now. Just as a single development can encroach on a preferred roadway corridor and damage its effectiveness, a single development in the wrong spot can damage a viewshed or disrupt the continuity of greenspace. Inventory these features and determine which ones can or should be protected. Establish a fund to preserve them when conservation easements cannot be utilized.

e. Local jurisdictions should modify existing zoning and subdivision regulations to ensure more compact development and to preserve transportation corridors.

- Secure ROW for full development needs.
- Establish setbacks beyond ROW for structures and trees.
- Avoid approval of occasional one lot subdivision without consideration for full development access needs.
- Require one lot subdivisions to develop in a manner which will allow the access point to serve as a future street intersection.
- Coordinate access points of nearby subdivisions ultimately requiring center turn lanes to ensure sufficient spacing for queues.
- Use cluster development concepts to minimize sprawl.

f. Decide if collectors are intended to carry mid distance trips.

g. Decide if urban growth boundaries serve jurisdictional objectives. If warranted, implement necessary changes to zoning and subdivision regulations. This can include establishing density limitations and prohibiting large subdivisions unless they have urban services provided.

h. Plan a slow change from residential to commercial land use along Tyler Parkway and Old Red Trail.

i. Change the MPO boundaries to include additional land on the east side of Bismarck and allow for appropriate inclusion of all areas of projected growth and transportation corridor planning.

## F. Future Planning Recommendations

Two important data elements used to update the travel demand model and the Long Range Transportation Plan are Census data and the NDDOT Traffic Volume Map.

The Census Long Form contains statistical information used for developing the model and the plan. It is expected to become available by the end of 2001. Likewise, the Traffic Volume Map should become available by the end of 2001. A possible schedule for future update activities is shown as follows:

| Date | Update Activity |
|---|---|
| 2002 | New Census and Traffic Map Data Available |
| 2003 | Minor Long Range Plan Amendment |
| 2005 | Traffic Map Data Available |
| 2007 | Begin Major Plan Update |
| 2008 | Complete Major Plan Update |
| 2009 | Traffic Map Data Available |
| 2012 | Begin Major Plan Update |
| | New Census Data Available |
| 2013 | Complete Major Plan Update |
| | Traffic Map Data Available |

With the proposed planning schedule, plan development will coincide with essential data elements. This schedule will allow the MPO to update the plans every five (5) years on a desirable cycle that makes use of recent Census and Traffic Volume Map data. It will be important to begin future plan updates in January or February of the given year to allow additional time for preparation of complete population, household and employment projections. The 2003 Plan Amendment should include preparation of new population, household and employment projections based on the 2000 Census. A review should be made to see whether significant changes in growth patterns are projected, or whether the

traffic patterns on the new traffic volume map are significantly different. Based on this information, the decision could be made to either update the zone data in the model or to completely recalibrate the model. Similarly, the proposed policies and projects found in the 2001 Plan could be reviewed and updated as needed.

The new model included many improvements over the past model. However, in retrospect, further improvements to the model should be addressed in future years to increase the level of accuracy in model outputs.

Zone size is traditionally a problem, but more zones do not necessarily mean a better forecast. The experience with the existing zone structure was that the only area that zone size was a problem was in downtown Bismarck where the one-way street pairs cut through a zone. This made the highway loading "lumpy". This means that the base year volumes and projections along some corridors had the tendency to oscillate between being too high and too low.

The major problem with calibrating the Bismarck-Mandan model was in assumptions that had to be made about vehicle occupancies, external trip destinations and non-work trips. These would only be remedied through additional survey work such as roadside interviews, vehicle occupancy counts and home interview surveys.

With respect to reviewing the model, it is recommended that as soon as the data become available to:

1. Do a quick check of population-household size-auto ownership relationships to see whether they have changed significantly.
2. Look at average trip lengths to see whether they have changed significantly.
3. Look at the external trips/Morton County/Burleigh County work trip distribution to see whether any major changes in distribution patterns have taken place.

## G. MPO Study Area Recommendations

The MPO study area is the region wherein the MPO can expend funds on transportation planning activities. A review of the MPO study area boundary was conducted during the development of the Long Range Transportation Plan to identify whether future changes to the boundary would be beneficial to metropolitan transportation planning efforts.

Based on a review of the current MPO study area boundary, some changes to the boundary were recommended for the following reasons:

- Portions of the existing boundary line coincide with boundaries of the Traffic Analysis Zone (TAZ) map. Some of the zones that are adjacent to the MPO boundary show significant future growth. This occurred primarily on the north side of Bismarck. This indicates that the need for transporta-

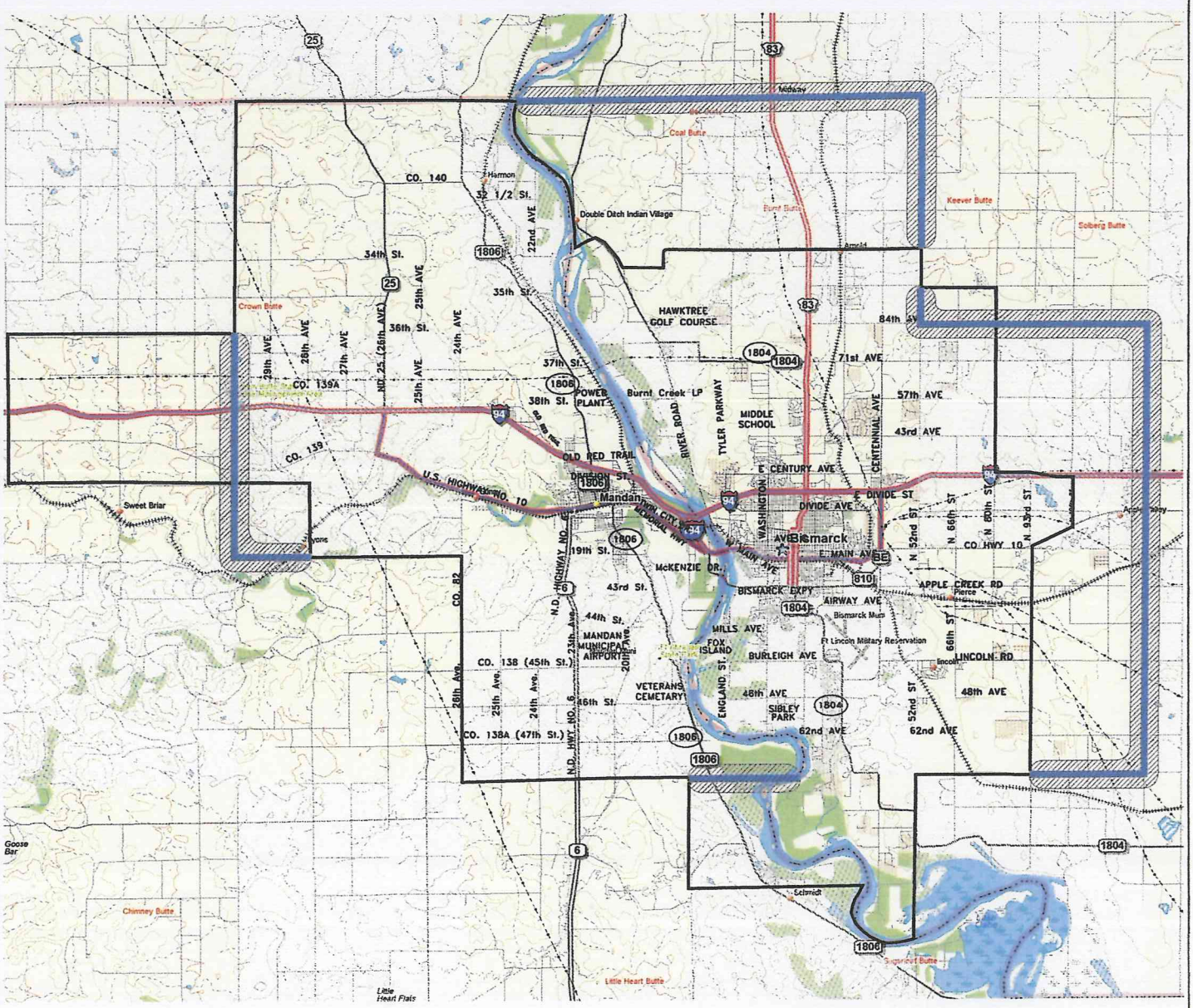
- tion planning in some extraterritorial areas has reached the MPO study area boundary and in those cases, the boundary line should be moved further away from the urban center.

- The MPO study area boundary cuts through some townships for no apparent reason. For data gathering purposes, it is desirable to include whole townships since some census data elements are stratified by township.

- The western MPO study area boundary that intersects I-94 extends well beyond the rest of the planning area for no apparent reason. This creates sizing and scaling problems for mapping purposes.

In response to these issues, an alternative MPO study area boundary has been proposed as shown in Figure 11-2. Adoption of the revised MPO study area boundary will enable MPO transportation planning funds to be extended where needed for future planning, will simplify census data collection and analysis, and will improve sizing and scaling of MPO study area mapping.

# BISMARCK MANDAN METROPOLITAN PLANNING ORGANIZATION STUDY BOUNDARY/ALTERNATIVE




## LEGEND

METROPOLITAN PLANNING ORGANIZATION STUDY BOUNDARY

STUDY BOUNDARY/ALTERNATIVE

TOWNSHIP BOUNDARY

NOT TO SCALE

| FIGURE 11-2 STUDY BOUNDARY/ALTERNATIVE | | |
|---|---|---|
| BISMARCK-MANDAN LONG RANGE TRANSPORTATION PLAN | | |
| ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO • BISMARCK • MINNEAPOLIS • SIOUX FALLS | | |
| DRAWN BY: JJK | SCALE: NO SCALE | PROJECT NO. 00-8007 |
| CHECKED BY: | DATE: 6/18/2001 | |
| APPROVED BY: | | FIG11-2.DWG |

# Appendix 1

# Metropolitan Issues, Goals and Objectives

## Table 1
## Metropolitan Transportation Issues

A. Insufficient Roadway Capacity

B. Inadequate Roadway Access / Continuity

C. Undefined Transportation Facilities in Developing and Extraterritorial Areas

D. Unsafe Traffic Conditions

E. Uncertain Transportation Project Funding

F. Frequent Auto / Train Conflicts

G. Deteriorated Roadway Pavement

H. Deficient Intersection Design and Signalization

I. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes

J. Inadequate Freight Routes

## Table 2
## Metropolitan Transportation Goals and Objectives

### A. Insufficient Roadway Capacity

1. Goals:
   a. Improve capacity of collector and arterial roadways.
   b. Reduce the usage of automobiles through successful implementation of various Traffic Demand Management (TDM) techniques and through efficiency of the transit system.

2. Objectives:
   a. Reduce 25-year projected "traffic volume to capacity ratios" (V/C) to an equivalent Level Of Service (LOS) that meets state and federal standards for all minor arterial and collector streets in existing developed areas.*
   b. Reduce 25-year projected "traffic volume to capacity ratios" (V/C) to an equivalent LOS that meets state and federal standards for all principal arterials and interstate highways.*
   c. Research various TDM techniques to determine applicability to the Bismarck-Mandan area transportation policies.
   d. Quantify impacts that TDM techniques would have on reducing traffic volumes along major corridors or in high traffic generation / attraction areas.

### B. Inadequate Roadway Access / Continuity

1. Goals:
   a. Remove barriers to network continuity on arterial and collector system.
   b. Improve intercity traffic circulation and reduce traffic congestion on existing bridges.

2. Objectives:
   a. Investigate high volume primary routes of over 20,000 Average Daily Traffic (ADT) to determine if additional linkages to other major routes will improve traffic circulation.
   b. Identify routes having significant misdirection and evaluate access alternatives to resolve barriers.
   c. Improve access onto or across I-94.
   d. Increase access to high traffic generation / attraction sites.
   e. Determine the need for additional river crossings (or other improvements that could countermand the need for bridges) to resolve traffic

circulation and congestion problems at existing bridge locations having projected 25- year "traffic volume to capacity ratios" equivalent to a Level Of Service (LOS) "D," "E" or "F."

## C. Undefined Transportation Facilities in Developing and Extraterritorial Areas

1. Goals:
   a. Establish a sound arterial / collector roadway system to accommodate growth in the developing and extraterritorial areas.
   b. Design arterial and collector roadway capacities to satisfy the projected traffic volumes created by development proposals.

2. Objectives:
   a. Establish arterial roadway locations at 1 mile spacing.
   b. Establish collector roadway locations at ½ mile spacing.
   c. Extend corridors when needed to improve traffic circulation patterns.
   d. Recommend roadway lane that meets a projected 25-year "traffic volume to capacity ratios" (V/C) which is equivalent to a LOS that meets state and federal standards for all minor arterials and collectors.*
   e. Coordinate future needs for arterials / collectors with adjacent land use decisions.

## D. Unsafe Traffic Conditions

1. Goal:
   a. Review vehicular high accident locations, determine probable causes and provide alternatives to resolve the safety problem.

2. Objectives:
   a. Recommend alternatives (design, speed, land use) for locations that have higher than average accident rates.
   b. Reduce the number of auto conflicts at these key locations.
   c. Program projects that improve intersection / corridor design and geometrics to comply with Design Safety Standards.

## E. Uncertain Transportation Project Funding

1. Goal:
   a. Establish a comprehensive financial strategy that is sensitive to local, state and federal funding capacities for all short range projects that are programmed in the plan.

2. Objectives:
   a. Work with local officials to prioritize projects considered candidates for the short range project element.
   b. Provide specific funding policies for projects programmed in the short range element of the plan.
   c. Consider jurisdictional issues that may exist pertaining to funding of transportation projects.

## F. Frequent Auto / Train Conflicts

1. Goal:
   a. Reduce, or minimize the number of auto / train conflicts.

2. Objectives:
   a. Identify sites that exceed 300,000 auto-rail exposures. Locations where autos x trains >300,000 may indicate that an underpass is desirable.
   b. Analyze the level of need, and evaluate critical conflict areas to determine alternative strategies which address identified needs.

## G. Deteriorated Roadway Pavement

1. Goal:
   a. Improve the efficiency of major transportation corridors.

2. Objectives:
   a. Review local pavement management system information to determine corridors / streets that function poorly.
   b. Recommend rehabilitation of specific corridors that have a poor sufficiency / condition rating as defined by local pavement management systems or staff.
   c. Consider as an alternative to roadway reconstruction, Transportation System Management (TSM), striping, signing, channelization, signal optimization options for corridor improvements.

## H. Deficient Intersection Design and Traffic Signalization

1. Goal:
   a. Improve intersection capacity / signalization at critical locations as part of the overall recommended corridor improvements.

2. Objectives:
   a. Identify critical intersection locations on the functional class system which have a 25-year projected volume to capacity ratio equating to a LOS "D," "E" or "F."

b. Plan future corridor improvements to meet a V/C ratio which equates to a LOS that meets federal and state standards.
c. Consider as an alternative to roadway reconstruction, TSM, striping, signing, channelization, signal optimization options for corridor improvements.

## I. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes

1. Goals:
   a. Improve pedestrian crossing safety at critical locations, and along major corridors.
   b. Improve bicycle safety, and expand the metropolitan bikeway system's continuity and connectivity.

2. Objectives:
   a. Prioritize critical pedestrian / auto conflict areas as identified during the public process.
   b. Investigate the need for pedestrian underpasses, changes in land uses, or alternate traffic / pedestrian routes to improve pedestrian safety at the selected conflict areas.

## J. Inadequate Freight Routes

1. Goals:
   a. Provide adequate roadway facilities where freight hauling is occurring.
   b. Provide improved connectivity between intermodal facilities.

2. Objectives:
   a. Review current truck routes to identify deficiencies.
   b. Locate freight intensive land uses in the study area.
   C. Identify barriers to freight movement and investigate alternatives to address these barriers.

*A LOS "C" is preferred as a Highway Plan objective. A minimum LOS "D" may be accepted for specific alternatives, when the effects of providing LOS "C" greatly increase the project cost, or increase social / environmental impact of the project.

# Appendix 2

# Household and Employment Data

Rev. October 20, 2000

# Household Projections

| Table 2.9<br>2020 Households and Trips at Stable Population<br>(MPO Population Data) | | | | | |
|---|---|---|---|---|---|
| | 1990 Population | Households 1990 | Households 2020 | Difference | Trips |
| Burleigh | 57,103 | 23,853 | 27,192 | 3,339 | 36,424 |
| Morton | 16,442 | 6,478 | 7,830 | 1,352 | 15,417 |
| Total | 73,545 | 30,331 | 35,022 | 4,691 | 51,841 |

Source: Page 19, 1996 Bis-Man Long Range Plan

| 2020 and 2025 Households and Trips at Projected Population | | | | | |
|---|---|---|---|---|---|
| | 1990 Population | Households 2000 | Households 2010 | Households 2020 | Households 2025 |
| Burleigh | 57,103 | 26,570 | 32,744 | 38,917 | 42,003 |
| Morton | 16,442 | 7,574 | 8,398 | 9,222 | 9,634 |
| Total | 73,545 | 34,144 | 41,142 | 48,139 | 51,637 |

Year 2020 households were derived using number of households from 1996 plan plus 191 year 2000 households located in expanded Morton County zone area.

# Employment Projections
# UEI Project m 2000-8007
# December 31, 2000

| Table 2.6<br>Total Population and Work Force Size Projections for the UZA | | | | | | |
|---|---|---|---|---|---|---|
| **Work Force Participa-tion** | **Area** | **Population** | | | | |
| | | **90 Census Adjusted** | **1994 Estimate** | **2000 Projection** | **2010 Projection** | **2020 Projection** |
| | UZA | 66,607 | 70,202 | 75,526 | 84,400 | 93,230 |
| | Burleigh | 51,231 | 54,460 | 59,277 | 67,306 | 75,292 |
| | Morton | 15,376 | 15,742 | 16,249 | 17,094 | 17,938 |
| | | **Work Force** | | | | |
| | UZA | 35,914 | 37,862 | 40,747 | 45,560 | 50,348 |
| 54.43% | Burleigh | 27,885 | 29,643 | 32,264 | 36,635 | 40,982 |
| 52.21% | Morton | 8,028 | 8,219 | 8,483 | 8,925 | 9,366 |

Source: Page 12, 1996 Bis-Man Long Range Plan

| Recommended Revised<br>Total Population and Work Force Size Projections for the UZA | | | | | | |
|---|---|---|---|---|---|---|
| **Work Force Participa-tion** | **Area** | **Population** | | | | |
| | | **90 Census Adjusted** | **2000 Projection** | **2010 Projection** | **2020 Projection** | **2025 Projection** |
| | UZA | 73,545 | 82,727 | 91,909 | 101,091 | 108,438 |
| | Burleigh | 57,103 | 65,310 | 73,518 | 81,725 | 88,152 |
| | Morton | 16,442 | 17,417 | 18,391 | 19,366 | 20,286 |
| | | **Work Force** | | | | |
| 57.39%** | UZA | – | 47,477 | 53,835 | 59,057 | 63,377 |
| 60.58%** | Burleigh | – | 39,564 | 45,111 | 49,509 | 53,436 |
| 45.43%** | Morton | – | 7,913 | 8,724* | 9,548* | 9,941 |

*Includes additional 750 employment from anticipated development.
**New work force participation rates were derived using projected year 2000 population data and actual year 2000 North Dakota Job Service employment data.

5/5/01
2000-8007-EmpProj1.doc

| TAZ Zone | Year 2000 HH | Year 2010 HH | Year 2025 HH | Year 2000 Employment | | Year 2010 Employment | | Year 2025 Employment | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Non-Retail | Retail | Non-Retail | Retail | Non-Retail | Retail |
| 1 | 57 | 160 | 314 | 0 | 0 | 0 | 1 | 0 | 3 |
| 2 | 74 | 84 | 98 | 1 | 0 | 1 | 0 | 1 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 70 | 181 | 348 -181 | 17 | 0 | 56 | 2 | 115 -35 | 6 |
| 5 | 32 | 83 | 159 | 0 | 0 | 20 | 0 | 50 | 0 |
| 6 | 22 | 38 | 62 | 46 | 0 | 50 | 0 | 55 | 0 |
| 7 | 11 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 6 | 6 | 6 | 865 | 4 | 865 | 10 | 865 - 965 | 20 - |
| 9 | 209 | 209 | 209 | 65 | 0 | 82 | 0 | 107 | 0 |
| 10 | 11 | 12 | 13 | 84 | 19 | 188 | 34 | 343-- | 56 |
| 11 | 57 | 57 | 57 | 103 | 10 | 103 | 10 | 103 | 10 |
| 12 | 4 | 4 | 4 | 865 | 0 | 865 | 0 | 865 | 0 |
| 13 | 390 | 426 | 479 -406 | 413 | 0 | 463 | 4 | 538-- 413 | 10 |
| 14 | 49 | 98 | 172 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 52 | 70 | 97 - 52 | 139 | 0 | 331 | 4 | 619 - 200 | 9 |
| 16 | 113 | 113 | 113 | 8 | 0 | 62 | 0 | 142 | 0 |
| 17 | 0 | 0 | 0 | 71 | 0 | 83 | 0 | 100 | 0 |
| 18 | 35 | 35 | 35 | 18 | 0 | 18 | 0 | 18 | 0 |
| 19 | 12 | 20 | 33 | 18 | 0 | 18 | 0 | 18 | 1 |
| 20 | 127 | 218 | 354 | 0 | 0 | 8 | 6 | 20 | 15 |
| 21 | 515 | 515 | 515 | 54 | 12 | 54 | 20 | 54 | 31 |
| 22 | 583 | 583 | 583 | 42 | 0 | 42 | 0 | 42 | 0 |
| 23 | 876 | 876 | 876 | 249 | 27 | 249 | 27 | 249 | 27 |
| 24 | 336 | 336 | 336 | 57 | 14 | 57 | 15 | 57 | 16 |
| 25 | 28 | 28 | 28 | 13 | 0 | 16 | 1 | 20 | 3 |
| 26 | 363 | 363 | 363 | 21 | 0 | 21 | 0 | 21 | 0 |
| 27 | 119 | 119 | 119 | 262 | 212 | 277 | 212 | 300 | 212 |
| 28 | 273 | 273 | 273 | 895 | 281 | 911 | 288 | 936 | 299 |
| 29 | 343 | 343 | 343 | 225 | 132 | 230 | 137 | 238 | 144 |
| 30 | 186 | 186 | 186 | 110 | 152 | 110 | 152 | 110 | 152 |
| 31 | 0 | 0 | 0 | 338 | 92 | 338 | 92 | 338 | 92 |
| 32 | 0 | 0 | 0 | 15 | 38 | 17 | 42 | 20 | 49 |
| 33 | 55 | 64 | 77 | 0 | 0 | 10 | 0 | 25 | 0 |
| 34 | 0 | 4 | 10 | 92 | 0 | 104 | 0 | 122 | 0 |
| 35 | 59 | 61 | 65 | 14 | 0 | 14 | 0 | 14 | 0 |
| 36 | 163 | 163 | 163 | 7 | 0 | 7 | 0 | 7 | 0 |
| 37 | 136 | 136 | 136 | 374 | 64 | 391 | 64 | 417 | 64 |
| 38 | 319 | 339 | 370 | 29 | 7 | 37 | 7 | 48 | 7 |
| 39 | 50 | 50 | 50 | 1 | 0 | 3 | 0 | 5 | 0 |
| 40 | 5 | 5 | 5 | 131 | 218 | 141 | 218 | 156 | 218 |
| 41 | 208 | 208 | 208 | 234 | 6 | 234 | 15 | 235 | 28 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 128 | 133 | 141 - 261 | 14 | 0 | 14 | 0 | 14 | 0 -50 |
| 44 | 140 | 140 | 140 | 10 | 3 | 10 | 3 | 10 | 3 |
| 45 | 263 | 263 | 263 | 75 | 37 | 87 | 37 | 105 | 37 |
| 46 | 149 | 151 | 153 | 1 | 0 | 2 | 0 | 4 | 0 |
| 47 | 12 | 16 | 22 | 0 | 0 | 6 | 5 | 16 | 13 |
| 48 | 28 | 71 | 136 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 306 | 306 | 306 | 8 | 1 | 8 | 1 | 8 | 1 |
| 50 | 5 | 5 | 5 | 0 | 0 | 2 | 2 | 5 | 5 |
| 51 | 44 | 194 | 419 | 3 | 1 | 3 | 5 | 3 | 11 |
| 52 | 170 | 178 | 190 | 6 | 0 | 10 | 0 | 17 | 0 |
| 53 | 28 | 44 | 68 | 0 | 0 | 0 | 2 | 0 | 4 |
| 54 | 45 | 57 | 76 - 195 | 0 | 2 | 8 | 11 | 20 | 25 |
| 55 | 106 | 106 | 106 ~~-30~~ | 1 | 20 | 1 | 20 | 1 | 20 |
| 56 | 0 | 0 | 0 - ~~80~~ 20 | 27 | 0 | 27 | 11 | 27 - 50 | 27 - 57 |
| 57 | 43 | 87 | 153 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 1 | 81 | 200 | 0 | 0 | 0 | 6 | 0 | 14 |
| 59 | 13 | 103 | 239 | 0 | 0 | 0 | 18 | 0 | 44 |
| 60 | 15 | 147 | 345 | 0 | 0 | 0 | 28 | 0 | 71 |
| 61 | 7 | 50 | 115 | 0 | 0 | 0 | 0 | 0 | 0 |
| 62 | 52 | 154 | 306 | 0 | 0 | 0 | 0 | 0 | 0 |
| 63 | 15 | 523 | 1286 | 8 | 0 | 133 | 111 | 320 | 277 |
| 64 | 37 | 533 | 1278 | 0 | 0 | 124 | 116 | 309 | 289 |
| 65 | 20 | 152 | 351 | 0 | 0 | 0 | 0 | 0 | 0 |
| 66 | 24 | 74 | 148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 67 | 1 | 447 | 1116 | 0 | 0 | 200 | 18 | 289 | 45 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 68 | 677 | 737 | 827 | 134 | 0 | 134 | 0 | 134 | 0 |
| 69 | 671 | 691 | 721 | 3 | 0 | 3 | 0 | 3 | 0 |
| 70 | 188 | 328 | 538 | 0 | 0 | 0 | 0 | 0 | 0 |
| 71 | 138 | 206 | 309 | 66 | 0 | 66 | 0 | 66 | 0 |
| 72 | 3 | 82 | 200 | 144 | 86 | 144 | 99 | 144 | 119 |
| 73 | 409 | 493 | 618 | 277 | 82 | 277 | 207 | 277 | 395 |
| 74 | 56 | 541 | 1269 | 116 | 3 | 116 | 19 | 116 | 44 |
| 75 | 0 | 0 | 0 | 519 | 1 | 519 | 5 | 519 | 10 |
| 76 | 15 | 79 | 175 | 0 | 0 | 0 | 0 | 0 | 0 |
| 77 | 22 | 259 | 615 | 0 | 0 | 44 | 61 | 111 | 153 |
| 78 | 22 | 93 | 200 | 0 | 0 | 0 | 0 | 0 | 0 |
| 79 | 255 | 255 | 255 | 15 | 132 | 55 | 132 | 115 | 132 |
| 80 | 258 | 282 | 318 | 216 | 0 | 256 | 0 | 316 | 0 |
| 81 | 165 | 196 | 242 | 134 | 0 | 214 | 0 | 334 | 0 |
| 82 | 779 | 819 | 879 | 122 | 14 | 204 | 178 | 328 | 423 |
| 83 | 445 | 445 | 445 | 45 | 11 | 45 | 11 | 45 | 11 |
| 84 | 443 | 443 | 443 | 428 | 961 | 428 | 1064 | 428 | 1218 |
| 85 | 2 | 1 | 0 | 1312 | 300 | 1392 | 338 | 1512 | 395 |
| 86 | 4 | 84 | 204 | 67 | 0 | 80 | 0 | 100 | 0 |
| 87 | 224 | 287 | 382 | 5 | 37 | 44 | 62 | 102 | 100 |
| 88 | 19 | 59 | 119 | 895 | 32 | 895 | 38 | 895 | 47 |
| 89 | 1097 | 1137 | 1197 | 152 | 130 | 194 | 150 | 258 | 180 |
| 90 | 548 | 548 | 548 | 565 | 33 | 567 | 33 | 571 | 33 |
| 91 | 730 | 730 | 730 | 433 | 218 | 433 | 218 | 433 | 218 |
| 92 | 748 | 748 | 748 | 464 | 169 | 478 | 169 | 500 | 169 |
| 93 | 787 | 798 | 815 | 82 | 0 | 109 | 0 | 150 | 0 |
| 94 | 0 | 0 | 0 | 199 | 0 | 259 | 0 | 350 | 0 |
| 95 | 0 | 360 | 900 | 328 | 147 | 662 | 154 | 1163 | 165 |
| 96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 97 | 20 | 42 | 74 | 0 | 0 | 337 | 22 | 842 | 54 |
| 98 | 5 | 28 | 63 | 0 | 0 | 0 | 31 | 0 | 78 |
| 99 | 55 | 135 | 256 | 4 | 0 | 360 | 34 | 893 | 86 |
| 100 | 130 | 130 | 130 | 68 | 117 | 81 | 117 | 100 | 117 |
| 101 | 81 | 81 | 81 | 0 | 0 | 14 | 0 | 35 | 0 |
| 102 | 497 | 501 | 506 | 110 | 1 | 112 | 3 | 116 | 6 |
| 103 | 20 | 20 | 20 | 144 | 0 | 154 | 0 | 169 | 0 |
| 104 | 667 | 667 | 667 | 74 | 122 | 74 | 128 | 74 | 137 |
| 105 | 1 | 1 | 1 | 2551 | 0 | 2603 | 0 | 2681 | 0 |
| 106 | 934 | 934 | 934 | 406 | 27 | 408 | 27 | 412 | 27 |
| 107 | 727 | 727 | 727 | 502 | 0 | 503 | 0 | 505 | 0 |
| 108 | 79 | 79 | 79 | 11 | 1 | 11 | 1 | 11 | 1 |
| 109 | 1 | 104 | 258 | 0 | 0 | 0 | 0 | 0 | 0 |
| 110 | 8 | 8 | 8 | 535 | 53 | 555 | 76 | 585 | 111 |
| 111 | 458 | 458 | 459 | 184 | 49 | 186 | 49 | 190 | 49 |
| 112 | 383 | 384 | 385 | 63 | 0 | 78 | 0 | 100 | 0 |
| 113 | 631 | 633 | 636 | 207 | 31 | 212 | 31 | 220 | 31 |
| 114 | 0 | 0 | 0 | 192 | 0 | 235 | 0 | 300 | 0 |
| 115 | 1097 | 1105 | 1116 | 135 | 14 | 151 | 14 | 175 | 14 |
| 116 | 962 | 962 | 962 | 99 | 0 | 101 | 0 | 105 | 0 |
| 117 | 454 | 454 | 454 | 199 | 6 | 199 | 7 | 199 | 8 |
| 118 | 350 | 350 | 350 | 54 | 0 | 58 | 0 | 65 | 0 |
| 119 | 449 | 451 | 453 | 146 | 95 | 148 | 135 | 152 | 195 |
| 120 | 305 | 305 | 305 | 46 | 9 | 68 | 9 | 100 | 9 |
| 121 | 325 | 325 | 325 | 196 | 19 | 196 | 19 | 196 | 19 |
| 122 | 335 | 335 | 335 | 1217 | 228 | 1217 | 263 | 1217 | 316 |
| 123 | 289 | 302 | 321 | 4983 | 439 | 4983 | 481 | 4983 | 545 |
| 124 | 254 | 258 | 263 | 2096 | 64 | 2096 | 64 | 2096 | 64 |
| 125 | 3 | 3 | 3 | 393 | 119 | 393 | 119 | 393 | 119 |
| 126 | 88 | 53 | 0 | 236 | 68 | 236 | 101 | 236 | 151 |
| 127 | 0 | 0 | 0 | 208 | 83 | 244 | 83 | 298 | 83 |
| 128 | 179 | 179 | 179 | 658 | 76 | 712 | 76 | 1008 | 76 |
| 129 | 106 | 108 | 110 | 209 | 109 | 229 | 149 | 259 | 209 |
| 130 | 576 | 576 | 576 | 543 | 975 | 543 | 975 | 543 | 975 |
| 131 | 9 | 9 | 9 | 846 | 166 | 846 | 208 | 846 | 270 |
| 132 | 91 | 91 | 91 | 460 | 1647 | 460 | 1653 | 460 | 1661 |
| 133 | 55 | 55 | 55 | 61 | 43 | 95 | 43 | 146 | 43 |
| 134 | 265 | 265 | 265 | 135 | 306 | 175 | 346 | 235 | 406 |
| 135 | 105 | 105 | 105 | 186 | 85 | 186 | 85 | 186 | 85 |
| 136 | 526 | 526 | 527 | 308 | 59 | 341 | 59 | 390 | 59 |
| 137 | 2 | 2 | 2 | 1758 | 195 | 1775 | 195 | 1800 | 195 |
| 138 | 0 | 0 | 0 | 46 | 0 | 86 | 0 | 146 | 0 |
| 139 | 2 | 2 | 2 | 24 | 0 | 93 | 0 | 196 | 0 |
| 140 | 2 | 2 | 2 | 64 | 0 | 212 | 10 | 435 | 26 |
| 141 | 38 | 86 | 157 | 27 | 0 | 27 | 34 | 27 | 85 |
| 142 | 55 | 75 | 104 | 0 | 0 | 0 | 0 | 0 | 0 |
| 143 | 11 | 48 | 103 | 2 | 0 | 2 | 0 | 2 | 0 |
| 144 | 1 | 9 | 21 | 5 | 0 | 5 | 0 | 5 | 0 |
| 145 | 25 | 96 | 203 | 0 | 0 | 0 | 0 | 0 | 0 |
| 146 | 50 | 107 | 192 | 17 | 0 | 17 | 0 | 17 | 0 |
| 147 | 80 | 100 | 130 | 6 | 0 | 6 | 40 | 6 | 100 |
| 148 | 663 | 663 | 663 | 40 | 0 | 50 | 0 | 66 | 0 |
| 149 | 772 | 772 | 772 | 99 | 14 | 99 | 14 | 99 | 14 |
| 150 | 439 | 439 | 439 | 310 | 76 | 310 | 76 | 310 | 76 |
| 151 | 922 | 922 | 922 | 71 | 47 | 71 | 47 | 71 | 47 |
| 152 | 272 | 272 | 272 | 11 | 0 | 11 | 0 | 11 | 0 |
| 153 | 126 | 226 | 376 | 1 | 0 | 1 | 0 | 1 | 0 |
| 154 | 2 | 94 | 231 | 0 | 0 | 0 | 14 | 0 | 35 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 156 | 609 | 609 | 609 | 170 | 121 | 170 | 121 | 170 | 121 |
| 157 | 303 | 306 | 310 | 827 | 116 | 899 | 116 | 1007 | 116 |
| 158 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 126 | 0 |
| 159 | 0 | 0 | 0 | 677 | 31 | 865 | 39 | 1148 | 52 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 160 | 1 | 1 | 1 | 114 | 8 | 226 | 8 | 394 | 8 |
| 161 | 47 | 47 | 47 | 280 | 0 | 362 | 0 | 485 | 0 |
| 162 | 0 | 0 | 0 | 96 | 0 | 136 | 0 | 196 | 0 |
| 163 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 164 | 0 | 0 | 0 | 842 | 0 | 1105 | 6 | 1500 | 14 |
| 165 | 18 | 175 | 411 | 13 | 4 | 28 | 2 | 50 | 0 |
| 166 | 8 | 8 | 8 | 247 | 180 | 268 | 300 | 300 | 480 |
| 167 | 0 | 0 | 0 | 33 | 1 | 243 | 19 | 558 | 47 |
| 168 | 107 | 129 | 162 | 3 | 0 | 5 | 0 | 9 | 0 |
| 169 | 0 | 84 | 210 | 0 | 0 | 0 | 24 | 0 | 60 |
| 170 | 109 | 118 | 132 | 70 | 0 | 70 | 5 | 70 | 13 |
| 171 | 133 | 204 | 310 | 0 | 0 | 0 | 0 | 0 | 0 |
| 172 | 67 | 107 | 167 | 335 | 0 | 415 | 8 | 535 | 20 |
| 173 | 34 | 124 | 260 | 0 | 0 | 0 | 0 | 0 | 0 |
| 174 | 536 | 559 | 594 | 0 | 0 | 0 | 0 | 0 | 0 |
| 175 | 159 | 327 | 580 | 0 | 0 | 0 | 0 | 0 | 0 |
| 176 | 250 | 282 | 331 | 8 | 0 | 8 | 80 | 8 | 200 |
| 177 | 15 | 123 | 285 | 0 | 0 | 0 | 0 | 0 | 0 |
| 178 | 49 | 214 | 462 | 2 | 0 | 2 | 0 | 2 | 0 |
| 179 | 203 | 323 | 503 | 3 | 9 | 3 | 9 | 3 | 9 |
| 180 | 182 | 182 | 182 - 400 | 119 | 43 | 143 | 51 | 179 -- 250 | 63 - 163 |
| 181 | 0 | 4 | 10 | 0 | 0 | 40 | 0 | 100 | 0 |
| 182 | 0 | 4 | 10 | 112 | 224 | 112 | 224 | 112 | 224 |
| 183 | 5 | 9 | 15 | 42 | 0 | 42 | 0 | 42 | 0 |
| 184 | 15 | 58 | 122 | 0 | 0 | 0 | 0 | 0 | 0 |
| 185 | 2 | 78 | 191 | 0 | 0 | 0 | 0 | 0 | 0 |
| 186 | 1 | 144 | 358 | 0 | 0 | 0 | 0 | 0 | 0 |
| 187 | 3 | 66 | 158 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTALs | 34144 | 41142 | 51637 | 37689 | 9788 | 42291 | 11544 | 49198 | 14179 |
| Morton | 7574 | 8398 | 9634 | 6294 | 1619 | 6991 | 1733 | 8036 | 1905 |
| Burleigh | 26570 | 32744 | 42003 | 31395 | 8169 | 35300 | 9811 | 41162 | 12274 |

| BISMARCK TAZ Zone | Year 2000 HH | Year 2010 HH | Year 2025 HH | Year 2000 Employment Non-Retail | Year 2000 Employment Retail | Year 2010 Employment Non-Retail | Year 2010 Employment Retail | Year 2025 Employment Non-Retail | Year 2025 Employment Retail |
|---|---|---|---|---|---|---|---|---|---|
| 67 | 1 | 447 | 1116 | 0 | 0 | 200 | 18 | 289 | 45 |
| 68 | 677 | 737 | 827 | 134 | 0 | 134 | 0 | 134 | 0 |
| 69 | 671 | 691 | 721 | 3 | 0 | 3 | 0 | 3 | 0 |
| 70 | 188 | 328 | 538 | 0 | 0 | 0 | 0 | 0 | 0 |
| 71 | 138 | 206 | 309 | 66 | 0 | 66 | 0 | 66 | 0 |
| 72 | 3 | 82 | 200 | 144 | 86 | 144 | 99 | 144 | 119 |
| 73 | 409 | 493 | 618 | 277 | 82 | 277 | 207 | 277 | 395 |
| 74 | 56 | 541 | 1269 | 116 | 3 | 116 | 19 | 116 | 44 |
| 75 | 0 | 0 | 0 | 519 | 1 | 519 | 5 | 519 | 10 |
| 79 | 255 | 255 | 255 | 15 | 132 | 55 | 132 | 115 | 132 |
| 80 | 258 | 282 | 318 | 216 | 0 | 256 | 0 | 316 | 0 |
| 81 | 165 | 196 | 242 | 134 | 0 | 214 | 0 | 334 | 0 |
| 82 | 779 | 819 | 879 | 122 | 14 | 204 | 178 | 328 | 423 |
| 83 | 445 | 445 | 445 | 45 | 11 | 45 | 11 | 45 | 11 |
| 84 | 443 | 443 | 443 | 428 | 961 | 428 | 1064 | 428 | 1218 |
| 85 | 2 | 1 | 0 | 1312 | 300 | 1392 | 338 | 1512 | 395 |
| 86 | 4 | 84 | 204 | 67 | 0 | 80 | 0 | 100 | 0 |
| 87 | 224 | 287 | 382 | 5 | 37 | 44 | 62 | 102 | 100 |
| 88 | 19 | 59 | 119 | 895 | 32 | 895 | 38 | 895 | 47 |
| 89 | 1097 | 1137 | 1197 | 152 | 130 | 194 | 150 | 258 | 180 |
| 90 | 548 | 548 | 548 | 565 | 33 | 567 | 33 | 571 | 33 |
| 91 | 730 | 730 | 730 | 433 | 218 | 433 | 218 | 433 | 218 |
| 92 | 748 | 748 | 748 | 464 | 169 | 478 | 169 | 500 | 169 |
| 93 | 787 | 798 | 815 | 82 | 0 | 109 | 0 | 150 | 0 |
| 94 | 0 | 0 | 0 | 199 | 0 | 259 | 0 | 350 | 0 |
| 95 | 0 | 360 | 900 | 328 | 147 | 662 | 154 | 1163 | 165 |
| 100 | 130 | 130 | 130 | 68 | 117 | 81 | 117 | 100 | 117 |
| 101 | 81 | 81 | 81 | 0 | 0 | 14 | 0 | 35 | 0 |
| 102 | 497 | 501 | 506 | 110 | 1 | 112 | 3 | 116 | 6 |
| 103 | 20 | 20 | 20 | 144 | 0 | 154 | 0 | 169 | 0 |
| 104 | 667 | 667 | 667 | 74 | 122 | 74 | 128 | 74 | 137 |
| 105 | 1 | 1 | 1 | 2551 | 0 | 2603 | 0 | 2681 | 0 |
| 106 | 934 | 934 | 934 | 406 | 27 | 408 | 27 | 412 | 27 |
| 107 | 727 | 727 | 727 | 502 | 0 | 503 | 0 | 505 | 0 |
| 108 | 79 | 79 | 79 | 11 | 1 | 11 | 1 | 11 | 1 |
| 109 | 1 | 104 | 258 | 0 | 0 | 0 | 0 | 0 | 0 |
| 110 | 8 | 8 | 8 | 535 | 53 | 555 | 76 | 585 | 111 |
| 111 | 458 | 458 | 459 | 184 | 49 | 186 | 49 | 190 | 49 |
| 112 | 383 | 384 | 385 | 63 | 0 | 78 | 0 | 100 | 0 |
| 113 | 631 | 633 | 636 | 207 | 31 | 212 | 31 | 220 | 31 |
| 114 | 0 | 0 | 0 | 192 | 0 | 235 | 0 | 300 | 0 |
| 115 | 1097 | 1105 | 1116 | 135 | 14 | 151 | 14 | 175 | 14 |
| 116 | 962 | 962 | 962 | 99 | 0 | 101 | 0 | 105 | 0 |
| 117 | 454 | 454 | 454 | 199 | 6 | 199 | 7 | 199 | 8 |
| 118 | 350 | 350 | 350 | 54 | 0 | 58 | 0 | 65 | 0 |
| 119 | 449 | 451 | 453 | 146 | 95 | 148 | 135 | 152 | 195 |
| 120 | 305 | 305 | 305 | 46 | 9 | 68 | 9 | 100 | 9 |
| 121 | 325 | 325 | 325 | 196 | 19 | 196 | 19 | 196 | 19 |
| 122 | 335 | 335 | 335 | 1217 | 228 | 1217 | 263 | 1217 | 316 |
| 123 | 289 | 302 | 321 | 4983 | 439 | 4983 | 481 | 4983 | 545 |
| 124 | 254 | 258 | 263 | 2096 | 64 | 2096 | 64 | 2096 | 64 |
| 125 | 3 | 3 | 3 | 393 | 119 | 393 | 119 | 393 | 119 |
| 126 | 88 | 53 | 0 | 236 | 68 | 236 | 101 | 236 | 151 |
| 127 | 0 | 0 | 0 | 208 | 83 | 244 | 83 | 298 | 83 |
| 128 | 179 | 179 | 179 | 658 | 76 | 712 | 76 | 1008 | 76 |
| 129 | 106 | 108 | 110 | 209 | 109 | 229 | 149 | 259 | 209 |
| 130 | 576 | 576 | 576 | 543 | 975 | 543 | 975 | 543 | 975 |
| 131 | 9 | 9 | 9 | 846 | 166 | 846 | 208 | 846 | 270 |
| 132 | 91 | 91 | 91 | 460 | 1647 | 460 | 1653 | 460 | 1661 |
| 133 | 55 | 55 | 55 | 61 | 43 | 95 | 43 | 146 | 43 |
| 134 | 265 | 265 | 265 | 135 | 306 | 175 | 346 | 235 | 406 |
| 135 | 105 | 105 | 105 | 186 | 85 | 186 | 85 | 186 | 85 |
| 136 | 526 | 526 | 527 | 308 | 59 | 341 | 59 | 390 | 59 |
| 137 | 2 | 2 | 2 | 1758 | 195 | 1775 | 195 | 1800 | 195 |
| 138 | 0 | 0 | 0 | 46 | 0 | 86 | 0 | 146 | 0 |
| 139 | 2 | 2 | 2 | 24 | 0 | 93 | 0 | 196 | 0 |
| 146 | 50 | 107 | 192 | 17 | 0 | 17 | 0 | 17 | 0 |
| 147 | 80 | 100 | 130 | 6 | 0 | 6 | 40 | 6 | 100 |
| 148 | 663 | 663 | 663 | 40 | 0 | 50 | 0 | 66 | 0 |
| 149 | 772 | 772 | 772 | 99 | 14 | 99 | 14 | 99 | 14 |
| 150 | 439 | 439 | 439 | 310 | 76 | 310 | 76 | 310 | 76 |
| 151 | 922 | 922 | 922 | 71 | 47 | 71 | 47 | 71 | 47 |
| 152 | 272 | 272 | 272 | 11 | 0 | 11 | 0 | 11 | 0 |
| 153 | 126 | 226 | 376 | 1 | 0 | 1 | 0 | 1 | 0 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 156 | 609 | 609 | 609 | 170 | 121 | 170 | 121 | 170 | 121 |
| 157 | 303 | 306 | 310 | 827 | 116 | 899 | 116 | 1007 | 116 |
| 159 | 0 | 0 | 0 | 677 | 31 | 865 | 39 | 1148 | 52 |
| 160 | 1 | 1 | 1 | 114 | 8 | 226 | 8 | 394 | 8 |
| 166 | 8 | 8 | 8 | 247 | 180 | 268 | 300 | 300 | 480 |
| 176 | 250 | 282 | 331 | 8 | 0 | 8 | 80 | 8 | 200 |
| 179 | 203 | 323 | 503 | 3 | 9 | 3 | 9 | 3 | 9 |
| 187 | 3 | 66 | 158 | 0 | 0 | 0 | 0 | 0 | 0 |
| total | 24792 | 27359 | 31208 | 29611 | 8164 | 31640 | 9262 | 34687 | 10908 |

| BURLEIGH | | | | Year 2000 Employment | | Year 2010 Employment | | Year 2025 Employment | |
|---|---|---|---|---|---|---|---|---|---|
| TAZ Zone | Year 2000 HH | Year 2010 HH | Year 2025 HH | Non-Retail | Retail | Non-Retail | Retail | Non-Retail | Retail |
| 57 | 43 | 87 | 153 | 0 | 0 | 0 | 0 | 0 | 0 |
| 58 | 1 | 81 | 200 | 0 | 0 | 0 | 6 | 0 | 14 |
| 59 | 13 | 103 | 239 | 0 | 0 | 0 | 18 | 0 | 44 |
| 60 | 15 | 147 | 345 | 0 | 0 | 0 | 28 | 0 | 71 |
| 61 | 7 | 50 | 115 | 0 | 0 | 0 | 0 | 0 | 0 |
| 62 | 52 | 154 | 306 | 0 | 0 | 0 | 0 | 0 | 0 |
| 63 | 15 | 523 | 1286 | 8 | 0 | 133 | 111 | 320 | 277 |
| 64 | 37 | 533 | 1278 | 0 | 0 | 124 | 116 | 309 | 289 |
| 65 | 20 | 152 | 351 | 0 | 0 | 0 | 0 | 0 | 0 |
| 66 | 24 | 74 | 148 | 0 | 0 | 0 | 0 | 0 | 0 |
| 76 | 15 | 79 | 175 | 0 | 0 | 0 | 0 | 0 | 0 |
| 77 | 22 | 259 | 615 | 0 | 0 | 44 | 61 | 111 | 153 |
| 78 | 22 | 93 | 200 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 97 | 20 | 42 | 74 | 0 | 0 | 337 | 22 | 842 | 54 |
| 98 | 5 | 28 | 63 | 0 | 0 | 0 | 31 | 0 | 78 |
| 99 | 55 | 135 | 256 | 4 | 0 | 360 | 34 | 893 | 86 |
| 140 | 2 | 2 | 2 | 64 | 0 | 212 | 10 | 435 | 26 |
| 141 | 38 | 86 | 157 | 27 | 0 | 27 | 34 | 27 | 85 |
| 142 | 55 | 75 | 104 | 0 | 0 | 0 | 0 | 0 | 0 |
| 143 | 11 | 48 | 103 | 2 | 0 | 2 | 0 | 2 | 0 |
| 144 | 1 | 9 | 21 | 5 | 0 | 5 | 0 | 5 | 0 |
| 145 | 25 | 96 | 203 | 0 | 0 | 0 | 0 | 0 | 0 |
| 154 | 2 | 94 | 231 | 0 | 0 | 0 | 14 | 0 | 35 |
| 158 | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 126 | 0 |
| 161 | 47 | 47 | 47 | 280 | 0 | 362 | 0 | 485 | 0 |
| 162 | 0 | 0 | 0 | 96 | 0 | 136 | 0 | 196 | 0 |
| 163 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 164 | 0 | 0 | 0 | 842 | 0 | 1105 | 6 | 1500 | 14 |
| 167 | 0 | 0 | 0 | 33 | 1 | 243 | 19 | 558 | 47 |
| 168 | 107 | 129 | 162 | 3 | 0 | 5 | 0 | 9 | 0 |
| 169 | 0 | 84 | 210 | 0 | 0 | 0 | 0 | 0 | 60 |
| 170 | 109 | 118 | 132 | 70 | 0 | 70 | 0 | 70 | 13 |
| 171 | 133 | 204 | 310 | 0 | 0 | 0 | 0 | 0 | 0 |
| 172 | 67 | 107 | 167 | 335 | 0 | 415 | 0 | 535 | 20 |
| 173 | 34 | 124 | 260 | 0 | 0 | 0 | 0 | 0 | 0 |
| 175 | 159 | 327 | 580 | 0 | 0 | 0 | 0 | 0 | 0 |
| 177 | 15 | 123 | 285 | 0 | 0 | 0 | 0 | 0 | 0 |
| 178 | 49 | 214 | 462 | 2 | 0 | 2 | 0 | 2 | 0 |
| 185 | 2 | 78 | 191 | 0 | 0 | 0 | 0 | 0 | 0 |
| 186 | 1 | 144 | 358 | 0 | 0 | 0 | 0 | 0 | 0 |
| total | 1224 | 4650 | 9790 | 1771 | 1 | 3633 | 510 | 6425 | 1366 |

| LINCOLN | | | | Year 2000 Employment | | Year 2010 Employment | | Year 2025 Employment | |
|---|---|---|---|---|---|---|---|---|---|
| TAZ Zone | Year 2000 HH | Year 2010 HH | Year 2025 HH | Non-Retail | Retail | Non-Retail | Retail | Non-Retail | Retail |
| 165 | 18 | 175 | 411 | 13 | 4 | 28 | 2 | 50 | 0 |
| 174 | 536 | 559 | 594 | 0 | 0 | 0 | 0 | 0 | 0 |
| total | 554 | 734 | 1005 | 13 | 4 | 28 | 2 | 50 | 0 |

| MORTON TAZ Zone | Year 2000 HH | Year 2010 HH | Year 2025 HH | Year 2000 Employment Non-Retail | Year 2000 Employment Retail | Year 2010 Employment Non-Retail | Year 2010 Employment Retail | Year 2025 Employment Non-Retail | Year 2025 Employment Retail |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 57 | 160 | 314 | 0 | 0 | 0 | 1 | 0 | 3 |
| 5 | 32 | 83 | 159 | 0 | 0 | 20 | 0 | 50 | 0 |
| 6 | 22 | 38 | 62 | 46 | 0 | 50 | 0 | 55 | 0 |
| 7 | 11 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 4 | 4 | 4 | 865 | 0 | 865 | 0 | 865 | 0 |
| 14 | 49 | 98 | 172 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | 12 | 20 | 33 | 18 | 0 | 18 | 0 | 18 | 1 |
| 20 | 127 | 218 | 354 | 0 | 0 | 8 | 6 | 20 | 15 |
| 33 | 55 | 64 | 77 | 0 | 0 | 10 | 0 | 25 | 0 |
| 34 | 0 | 4 | 10 | 92 | 0 | 104 | 0 | 122 | 0 |
| 47 | 12 | 16 | 22 | 0 | 0 | 6 | 5 | 16 | 13 |
| 51 | 44 | 194 | 419 | 3 | 1 | 3 | 5 | 3 | 11 |
| 53 | 28 | 44 | 68 | 0 | 0 | 0 | 2 | 0 | 4 |
| 181 | 0 | 4 | 10 | 0 | 0 | 40 | 0 | 100 | 0 |
| 183 | 5 | 9 | 15 | 42 | 0 | 42 | 0 | 42 | 0 |
| 184 | 15 | 58 | 122 | 0 | 0 | 0 | 0 | 0 | 0 |
| total | 473 | 1025 | 1852 | 1066 | 1 | 1166 | 19 | 1316 | 47 |

| MANDAN TAZ Zone | Year 2000 HH | Year 2010 HH | Year 2025 HH | Year 2000 Employment Non-Retail | Year 2000 Employment Retail | Year 2010 Employment Non-Retail | Year 2010 Employment Retail | Year 2025 Employment Non-Retail | Year 2025 Employment Retail |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 74 | 84 | 98 | 1 | 0 | 1 | 0 | 1 | 0 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 70 | 181 | 348 | 17 | 0 | 56 | 2 | 115 | 6 |
| 8 | 6 | 6 | 6 | 865 | 4 | 865 | 10 | 865 | 20 |
| 9 | 209 | 209 | 209 | 65 | 0 | 82 | 0 | 107 | 0 |
| 10 | 11 | 12 | 13 | 84 | 19 | 188 | 34 | 343 | 56 |
| 11 | 57 | 57 | 57 | 103 | 10 | 103 | 10 | 103 | 10 |
| 13 | 390 | 426 | 479 | 413 | 0 | 463 | 4 | 538 | 10 |
| 15 | 52 | 70 | 97 | 139 | 0 | 331 | 4 | 619 | 9 |
| 16 | 113 | 113 | 113 | 8 | 0 | 62 | 0 | 142 | 0 |
| 17 | 0 | 0 | 0 | 71 | 0 | 83 | 0 | 100 | 0 |
| 18 | 35 | 35 | 35 | 18 | 0 | 18 | 0 | 18 | 0 |
| 21 | 515 | 515 | 515 | 54 | 12 | 54 | 20 | 54 | 31 |
| 22 | 583 | 583 | 583 | 42 | 0 | 42 | 0 | 42 | 0 |
| 23 | 876 | 876 | 876 | 249 | 27 | 249 | 27 | 249 | 27 |
| 24 | 336 | 336 | 336 | 57 | 14 | 57 | 15 | 57 | 16 |
| 25 | 28 | 28 | 28 | 13 | 0 | 16 | 1 | 20 | 3 |
| 26 | 363 | 363 | 363 | 21 | 0 | 21 | 0 | 21 | 0 |
| 27 | 119 | 119 | 119 | 262 | 212 | 277 | 212 | 300 | 212 |
| 28 | 273 | 273 | 273 | 895 | 281 | 911 | 288 | 936 | 299 |
| 29 | 343 | 343 | 343 | 225 | 132 | 230 | 137 | 238 | 144 |
| 30 | 186 | 186 | 186 | 110 | 152 | 110 | 152 | 110 | 152 |
| 31 | 0 | 0 | 0 | 338 | 92 | 338 | 92 | 338 | 92 |
| 32 | 0 | 0 | 0 | 15 | 38 | 17 | 42 | 20 | 49 |
| 35 | 59 | 61 | 65 | 14 | 0 | 14 | 0 | 14 | 0 |
| 36 | 163 | 163 | 163 | 7 | 0 | 7 | 0 | 7 | 0 |
| 37 | 136 | 136 | 136 | 374 | 64 | 391 | 64 | 417 | 64 |
| 38 | 319 | 339 | 370 | 29 | 7 | 37 | 7 | 48 | 7 |
| 39 | 50 | 50 | 50 | 1 | 0 | 3 | 0 | 5 | 0 |
| 40 | 5 | 5 | 5 | 131 | 218 | 141 | 218 | 156 | 218 |
| 41 | 208 | 208 | 208 | 234 | 6 | 234 | 15 | 235 | 28 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 43 | 128 | 133 | 141 | 14 | 0 | 14 | 0 | 14 | 0 |
| 44 | 140 | 140 | 140 | 10 | 3 | 10 | 3 | 10 | 3 |
| 45 | 263 | 263 | 263 | 75 | 37 | 87 | 37 | 105 | 37 |
| 46 | 149 | 151 | 153 | 1 | 0 | 2 | 0 | 4 | 0 |
| 48 | 28 | 71 | 136 | 0 | 0 | 0 | 0 | 0 | 0 |
| 49 | 306 | 306 | 306 | 8 | 1 | 8 | 1 | 8 | 1 |
| 50 | 5 | 5 | 5 | 0 | 0 | 2 | 2 | 5 | 5 |
| 52 | 170 | 178 | 190 | 6 | 0 | 10 | 0 | 17 | 0 |
| 54 | 45 | 57 | 76 | 0 | 2 | 8 | 11 | 20 | 25 |
| 55 | 106 | 106 | 106 | 1 | 20 | 1 | 20 | 1 | 20 |
| 56 | 0 | 0 | 0 | 27 | 0 | 27 | 11 | 27 | 27 |
| 180 | 182 | 182 | 182 | 119 | 43 | 143 | 51 | 179 | 63 |
| 182 | 0 | 4 | 10 | 112 | 224 | 112 | 224 | 112 | 224 |
| total | 7101 | 7373 | 7782 | 5228 | 1618 | 5825 | 1714 | 6720 | 1858 |

# Appendix 3

# Model Calibration Technical Memorandum

SRF CONSULTING GROUP, INC.

Transportation ▪ Civil ▪ Structural ▪ Environmental ▪ Planning ▪ Traffic ▪ Landscape Architecture ▪ Parking

SRF No. 0003756

# MEMORANDUM

RECEIVED
MAR 26 2001
ULTEIG ENGINEERS
Fargo, ND

TO: Steven Grabill
Ulteig Engineers, Inc.

FROM: Csaba Kelen, Engineer
Steven Wilson, Senior Associate

DATE: March 23, 2001

SUBJECT: BISMARCK-MANDAN TRAFFIC FORECASTING MODEL DEVELOPMENT AND CALIBRATION

## INTRODUCTION

The purpose of this memorandum is to document the development and the calibration of the regional travel forecasting model of the Bismarck-Mandan Metropolitan Planning Organization (MPO).

The Bismarck-Mandan forecasting model uses the traditional "four step" model with a minor modification. The model includes trip generation, trip distribution, mode choice, temporal distribution and trip assignment. The model structure and the most critical input and output data can be found in Figure 1.

The Bismarck-Mandan model area encompasses the cities of Bismarck and Mandan as well as parts of the counties of Burleigh and Morton.

The technical process of the modeling is described in greater detail in Appendix F. This appendix includes the preparation of the input data such as the demographics, external traffic volumes and the roadway network, as well as model execution and output data identification.

One Carlson Parkway North, Suite 150, Minneapolis, MN 55447-4443
Telephone (763) 475-0010 ▪ Fax (763) 475-2429 ▪ http://www.srfconsulting.com

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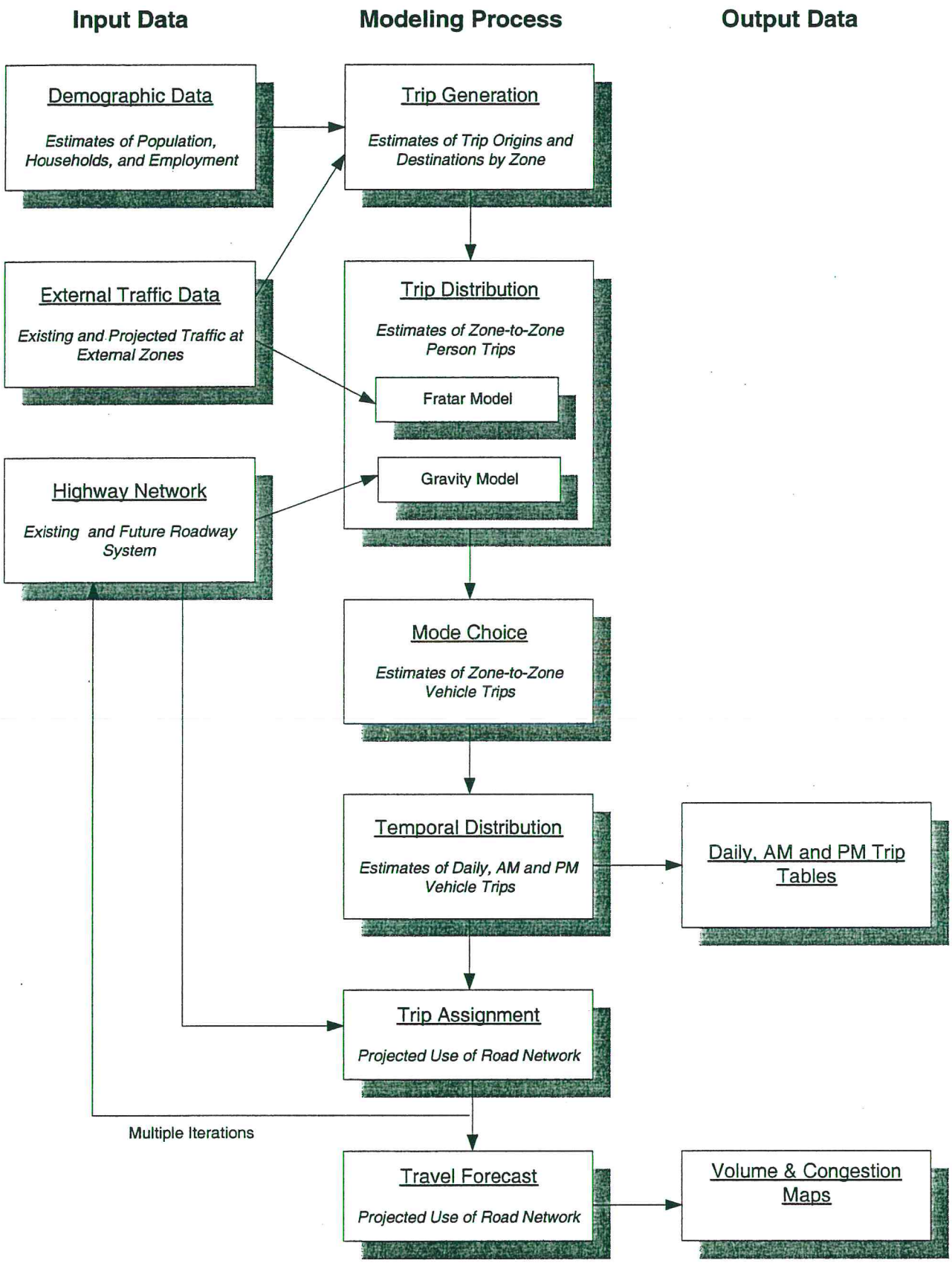


**FIGURE 1**
**Bismarck-Mandan Transportation Model**
**Travel Forecasting Process**

## SOCIOECONOMIC AND TRAFFIC ANALYSIS ZONE DATA PREPARATION

The socioeconomic data of the Bismarck-Mandan model area were provided by the Bismarck-Mandan MPO (November 2000). Total population, households and employment data are summarized below by planning years. City and county level summary of the socioeconomic data can be found in Appendix A.

### TABLE 1
### Existing and Future Demographics of the Bismarck-Mandan Area

| Year | 2000 | 2010 | 2025 | Growth (2000-2010) | Growth (2000-2025) |
|---|---|---|---|---|---|
| Population | 82,727 | 91,909 | 108,438 | 11% | 31% |
| Households | 34,144 | 41,142 | 51,637 | 20% | 51% |
| Retail Employment | 9,788 | 11,544 | 14,179 | 18% | 45% |
| Non-retail Employment | 37,689 | 42,291 | 49,198 | 12% | 31% |
| *Employment Total* | *47,477* | *53,835* | *63,377* | *13%* | *33%* |

Existing (2000) population, household and employment data were used in the model calibration process. Twenty-ten and 2025 are show for comparison reasons.

The Bismarck-Mandan model area was subdivided into 187 Traffic Analysis Zones (TAZ), which are geographical subdivisions of the model area by land use and transportation system characteristics. The Bismarck-Mandan model area TAZ map can be found in Figure 2. TAZ level socioeconomic data can be found in Appendix B.

As part of the data preparation for the forecasting model, the TAZ level data were broken down into various household groups. Specifically, the number of households by auto ownership (Bismarck-Mandan, 1995) was cross-tabulated with the number of households by household size (CTTP, 1990). Employment data was stratified to retail, service and other employment based on the type of industries that exist in each TAZ (CTTP, 1990). The resulting disaggregated household data were used as an input into the trip generation model.

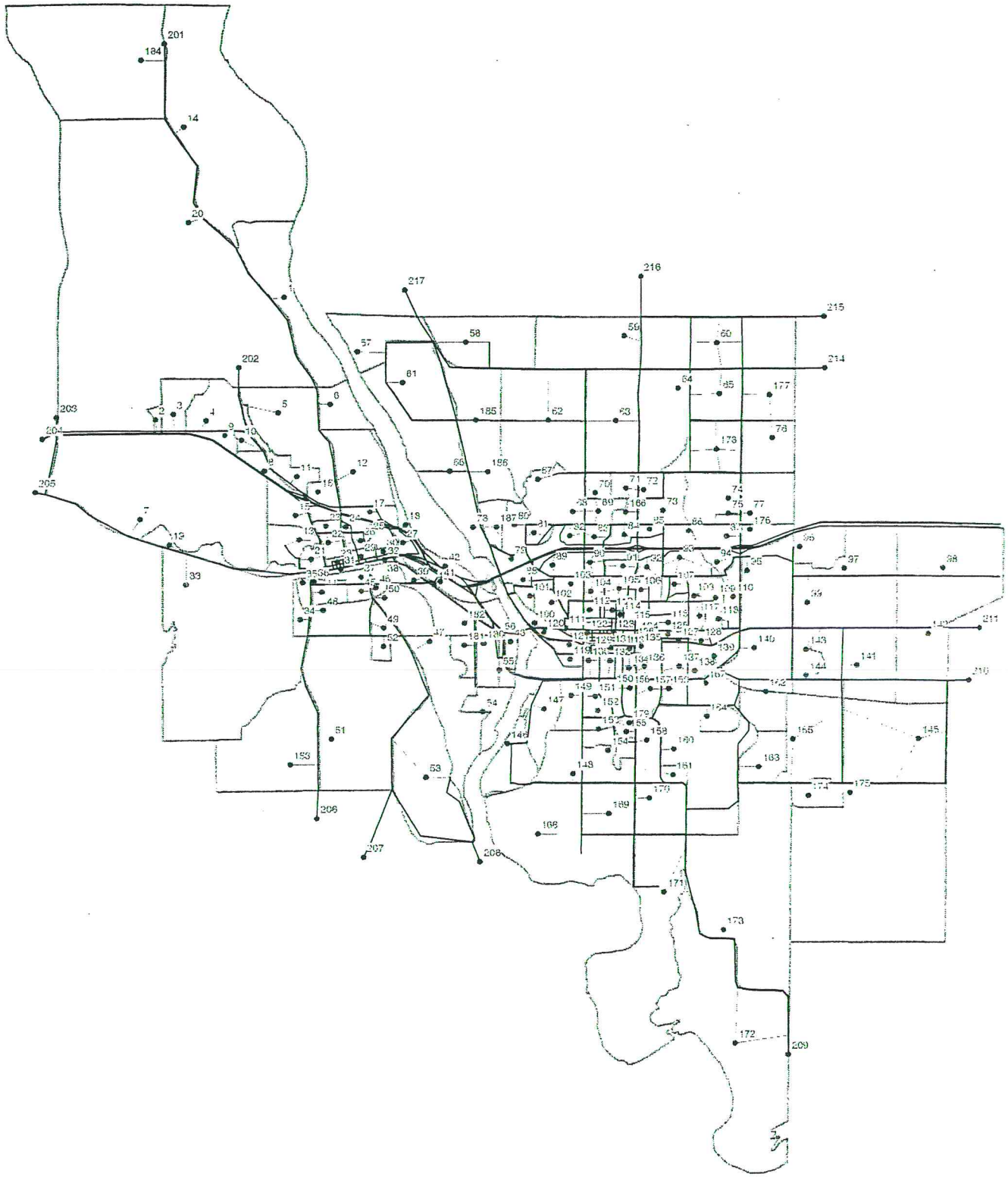

FIGURE 2
BISMARCK-MANDAN TRANSPORTATION MODEL
TRAFFIC ANALYSIS ZONES AND MODEL HIGHWAY NETWORK

Viper Software by The Urban Analysis Group

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## NETWORK PREPARATION

The 1995 highway network of the Bismarck-Mandan area was updated to reflect year 2000 road configuration and the most recent traffic counts (city streets: 1997, freeways: 1999). A standard speed-capacity table was developed based on the 1995 model network and field information (Appendix C). Maximum speed and capacity for a given road segment was determined by the road facility type (freeway, divided or undivided arterial, collector, one-way street), the area type where the road is located (downtown, residential, industrial, shopping, suburban), and the number of lanes. The model representation of the Bismarck-Mandan area roadway system can be found in Figure 3.

In the next step, a turning movement penalty file was created. The centroid-to-centroid penalty file encourages vehicles to use the road network when traversing between adjacent TAZs, thus better emulating real traffic conditions. Without the penalties, trips would go directly from an upstream centroid to a downstream centroid, thus reaching a destination without using the physical road network.

Finally, network skim tables were prepared in three steps. First the zone-to-zone travel times were determined. Then, the intra-zonal travel times were calculated by using the average of the inter-zonal travel times of the three nearest TAZs. Finally, the terminal times were added to the previous times, thus producing the time skims of the model network.

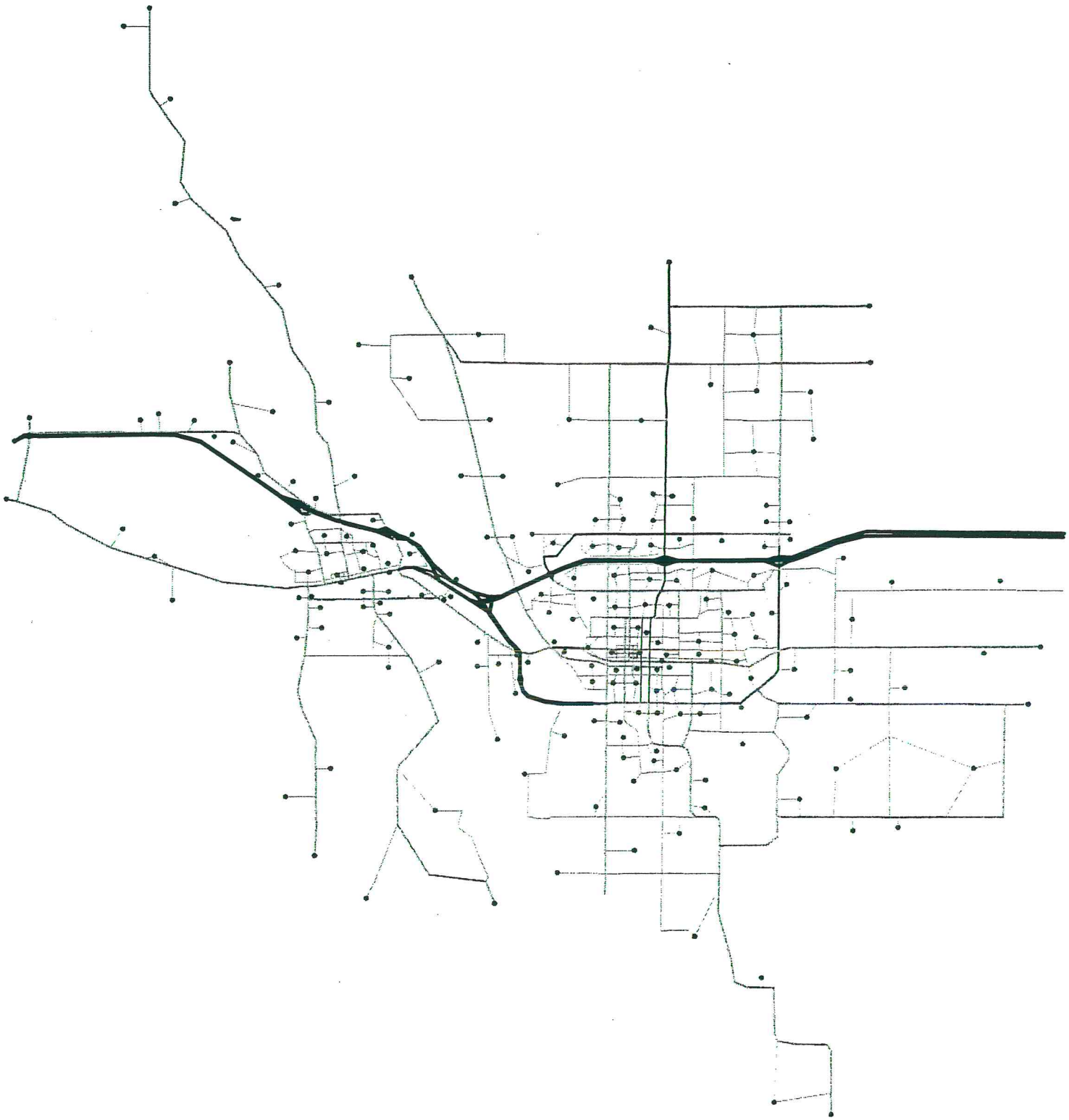
## TRIP GENERATION

In the trip generation phase, the number of person trips produced and attracted by the 187 TAZs and the 17 external zones were determined. This was achieved by a disaggregate trip generation model by using the following daily trip generation rates:

### TABLE 2
### Trip Generation Rates by Household Size and Auto Ownership

| | 0 auto/HH | 1 auto/HH | 2 autos/HH | 3+ autos/HH |
|---|---|---|---|---|
| 1 person/HH | 3.4 | 4.3 | 4.3 | 4.3 |
| 2 person /HH | 5.6 | 8.0 | 9.4 | 9.8 |
| 3 person/HH | 8.6 | 10.2 | 10.8 | 13.0 |
| 4+ person/HH | 10.7 | 12.5 | 14.4 | 15.5 |

The applied trip generation rates were developed by modifying the trip generation rates recommended for small cities (Page 26, NCHRP Report 365, Transportation Research Board, 1998), based on the socioeconomic and travel characteristics of the Bismarck-Mandan area.



Freeway
Divided arterial
Undivided arterial
One way street (CBD)
Collector
Centroid conntector

FIGURE 3
BISMARCK-MANDAN TRANSPORTATION MODEL
EXISTING HIGHWAY NETWORK BY FACILITY TYPE

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The percentage of daily person trips by purpose was also adjusted according to the model area characteristics as follows.

**TABLE 3**
**Daily Person Trips by Trip Purpose**

| | Home-based work (%) | Home-based other (%) | Non-home based (%) |
|---|---|---|---|
| 1 person/HH | 16 | 59 | 25 |
| 2 person /HH | 21 | 55 | 24 |
| 3 person/HH | 20 | 55 | 25 |
| 4+ person/HH | 20 | 56 | 24 |

Total trip generation and trip attraction by the model TAZs were calculated by applying the formulas listed below (Page 26, NCHRP Report 365, Transportation Research Board, 1998). Trip attraction formulas for HBO and NHB trips were modified to achieve a better match between trip production and attraction.

- HBW production = Σ (HH * Trip Rate * HBW%) - summed by HH group
- HBO production = Σ (HH * Trip Rate * HBO%) - summed by HH group
- NHB production = Σ (HH * Trip Rate * NHB%) - summed by HH group
- HBW attraction = 1.45 * Total Employment

For TAZs located in the Central Business Districts:

- HBO attraction = (8.10 * retail) + (2.05 * service) + (0.60 * other) + (0.90 * HH
- NHB attraction = (3.75 * retail) + (1.45 * service) + (0.60 * other) + (0.50 * HH)

For TAZs located outside the Central Business Districts:

- HBO attraction = (10.80 * retail) + (2.05 * service) + (0.60 * other) + (0.90 * HH)
- NHB attraction = (5.00 * retail) + (1.45 * service) + (0.60 * other) + (0.50 * HH)

External-internal (EI) and internal-external (IE) trip generation was based on projecting future level of traffic at the external stations, and allocating the internal end of the trip to TAZs proportionately to their unbalanced trip attractions. Existing and projected traffic volumes at the external stations can be found in Appendix D.

In the last step of the trip generation, trip attractions and productions were balanced. For HBW, HBO and IE and EI trips this was achieved by balancing the attractions to the productions. For HBO trip the trips were balanced at the mean of the productions and attractions.

## TRIP DISTRIBUTION

Trip distribution was achieved by applying the Fratar model for external-external trips and by the Gravity model for the rest of the trip purposes.

The external-external tip table was determined by factoring the 1995 external-external trip table according to the current external station counts. Without current origin-destination survey data, the underlying assumption was that the external-external trip distribution did not alter in the last five years.

The internal-internal, internal-external and external-internal trip distribution was determined by the Gravity model. In order to run the model, K-factors and friction-factors had to be calibrated.

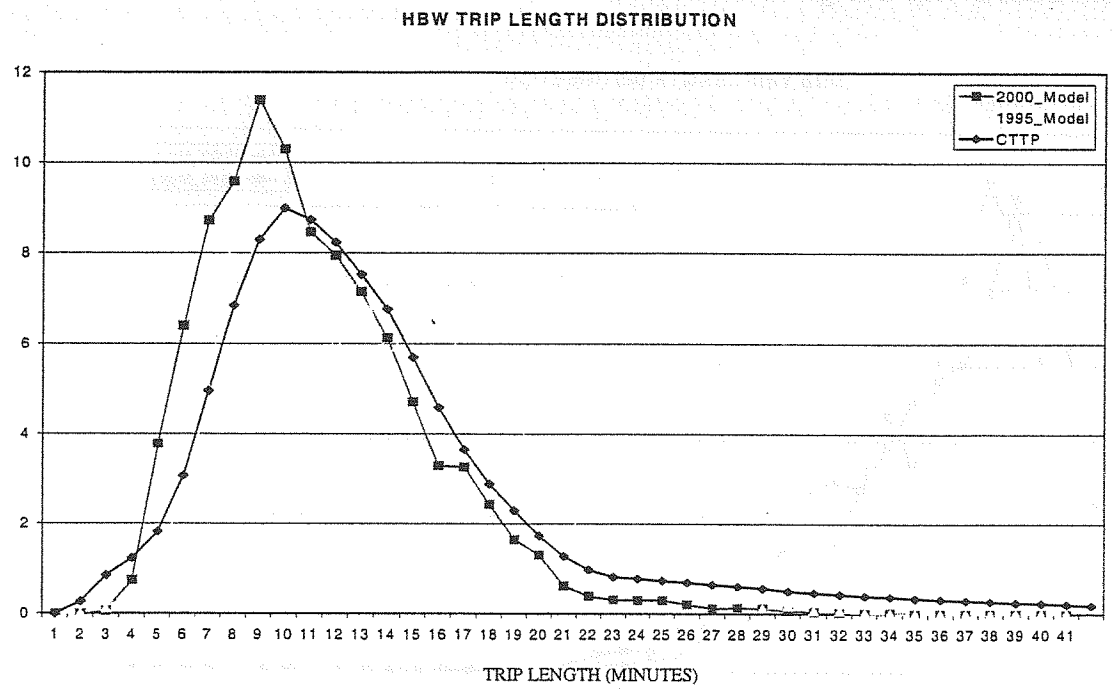
The Bismarck-Mandan model traditionally used K-factors to correct for the model trip generation that is significantly higher then traffic counts between the east and the west side of the Missouri River. The new K-factors were calibrated by using the new model person trips and the existing traffic counts. The result of the calibration can be found in the following table.

**TABLE 4**
**K Factors**

| Trip Purpose | HBW | HBO | NHB | INT-EXT | EXT-INT |
|---|---|---|---|---|---|
| West-East | 0.387 | 0.456 | 0.440 | 0.478 | 0.405 |
| East-West | 0.523 | 0.533 | 0.531 | 0.435 | 0.504 |

The assumption behind the friction factor calibration was that the trip length frequency distribution (TLFD) within the model area did not change in the last five to 10 years significantly. The friction factors were calibrated for each trip purpose. The 1995 model's friction factors were used to determine an initial TLFD. For the HBW trips this was compared to the 1990 CTTP trip length frequency distribution (for the rest of the purposes no survey data was available). Then the friction factors were modified to achieve a better fit between the model TLFD and the survey TLFD in an iterative manner. For the rest of the purposes, the 1995 model TLFD was compared with that of the new model. Friction factors were then modified to achieve a better fit. The calibrated friction factors are summarized in Appendix E, and the result of the TLFD comparison is shown in Figures 4 through 6.

## FIGURE 4
## Home-based Work Trip Length Distribution




## FIGURE 5
## Home-Based Other Trip Length Distribution

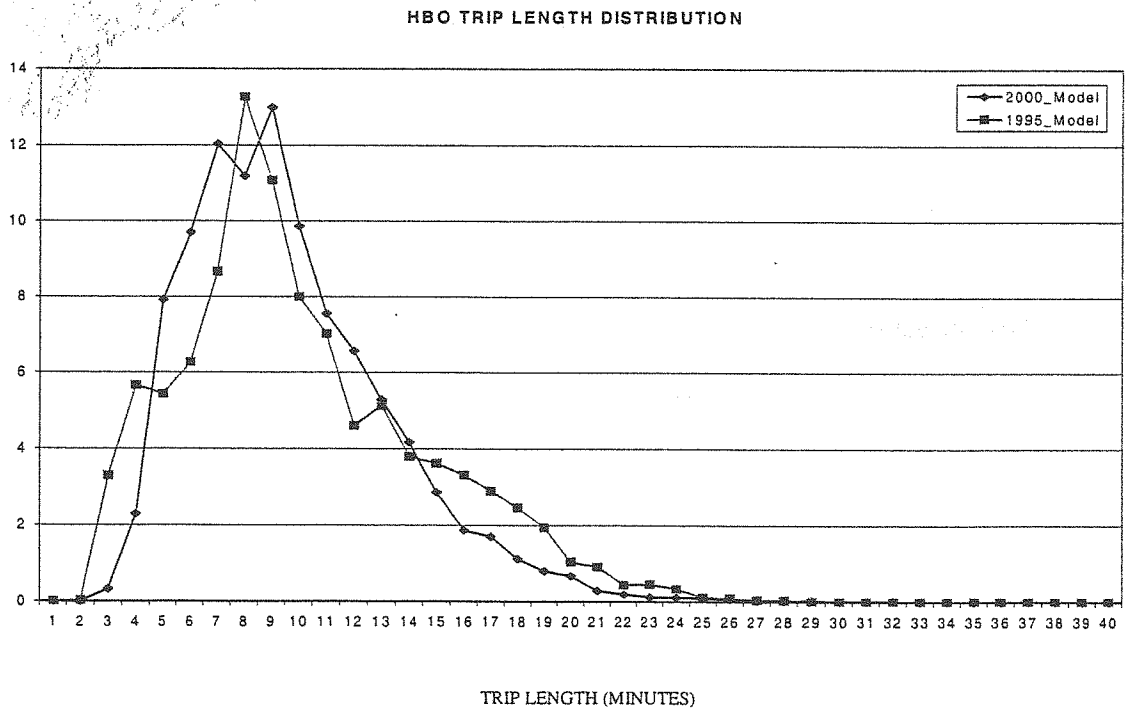
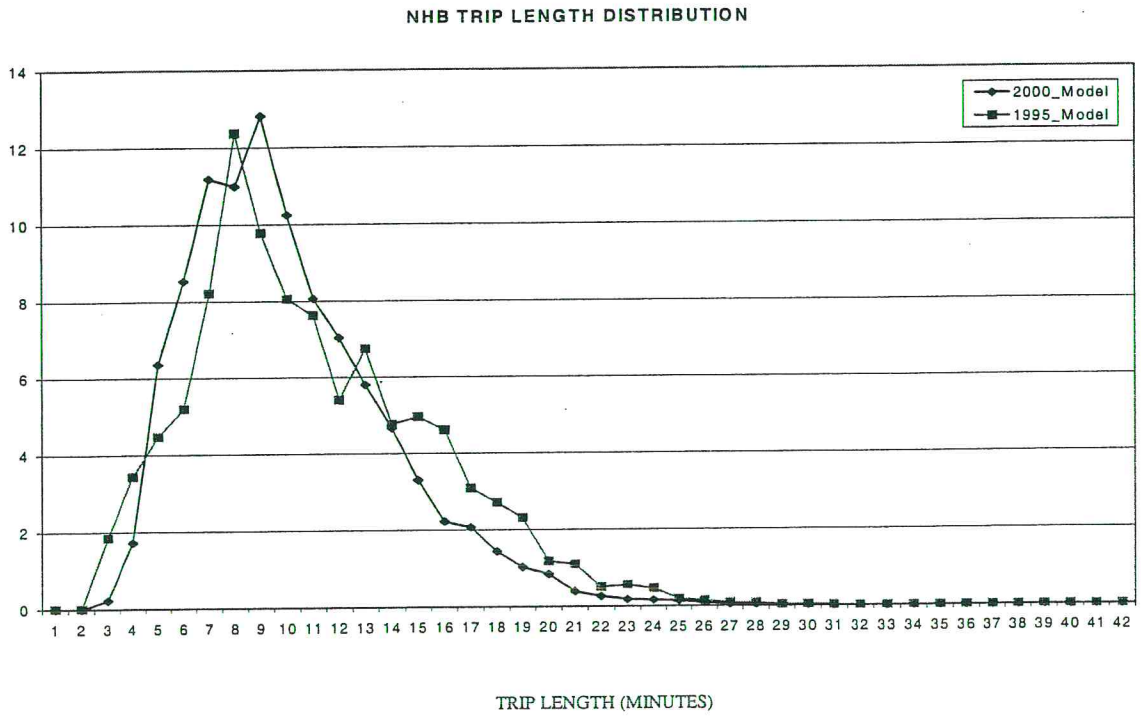


**FIGURE 6**
**Non-Home-based Trip Length Distribution**




The number of trips between TAZ(i) and TAZ(j) were determined by the Gravity model formula as follows:

Trips(ij)=Production(i)*Attraction(j)*FF(ij)*K(ij))/Σ(ij)(Attraction(j)*FF(ij)K(ij))

Where:

Production (i) – Trip production at TAZ (i)
Attraction (j) – Trip attraction at TAZ (j)
K(ij) – K-factor between TAZ (i) and (j)
FF(ij) – Friction factor between TAZ (i) and (j)

The output of the gravity model was production-attraction tables for HBW, HBO, NHB, I-E and E-I trips purposes.

## MODE CHOICE

There is no explicit mode choice phase in the model, since no transit mode was assumed for the purpose of roadway calibration and forecast. However, the mode choice of auto drivers is implicitly modeled through the vehicle occupancy rates.

The production-attraction person trip tables that resulted from the trip distribution model phase were converted into production-attraction vehicle trip tables by applying the vehicle occupancy rates to the tables. The vehicle occupancies were determined through adjusting the occupancy data from NCHRP Report 365 (page 78) and Twin Cities' Traffic Behavior Inventory (1990), according to the special characteristics of the Bismarck-Mandan area. The vehicle occupancies by trip purpose are defined as follows.

**TABLE 5**
**Vehicle Occupancy by Trip Purpose**

| Trip Purpose | HBW | HBO | NHB | INT-EXT | EXT-INT |
|---|---|---|---|---|---|
| Vehicle Occupancy | 1.043 | 1.190 | 1.180 | 1.140 | 1.140 |

## TEMPORAL DISTRIBUTION

In the temporal distribution the daily, morning peak, and afternoon peak vehicle trip tables were determined.

The production-attraction vehicle trip tables were converted to origin-destination tables for five purposes, including HBW, HBO, NHB, IE and EI trips purposes. In addition, the external-external trips were added as the sixth trip purpose. Finally, these trip tables were aggregated into the daily vehicle trip table.

The morning and afternoon peak trip tables were determined from the daily trip tables by applying morning and afternoon peak hour factors (page 96, NCHRP Report 187, Transportation Research Board, 1978) by purpose. The peak hour factors are summarized in the following table.

**TABLE 6**
**Peak Hour Factors By Trip Purpose**

| Trip Purpose | HBW | HBO | NHB | INT-EXT | EXT-INT | EXT-EXT |
|---|---|---|---|---|---|---|
| AM Peak | 0.192 | 0.058 | 0.066 | 0.125 | 0.125 | 0.085 |
| PM Peak | 0.137 | 0.081 | 0.080 | 0.109 | 0.109 | 0.085 |

## TRIP ASSIGNMENT

Trip assignment was done by a system equilibrium assignment model, resulting in a daily, morning peak hour and afternoon peak hour assignment. The daily assignment was calibrated against traffic counts collected in 1997 (city streets) and 1999 (freeways). Three calibration criteria were developed: screen line calibration, facility-based calibration and volume-based calibration.

The screen lines were created to determine the reasonableness of the model traffic forecast between different parts of the Bismarck-Mandan model area. The screen line locations and the screen line calibration results are as follows:

Screen line 1 – Missouri River (N-S screen line)

Screen line 2 – South Mandan and Bismarck (E-W screen line)

Screen line 3 – East Bismarck (N-S screen line)

Screen line 4 – North Mandan and Bismarck (E-W screen line)

Screen line 5 – Around Bismarck's inner city (cordon)

Screen line 6 – West Mandan (N-S screen line)

Screen line 7 – Around Bismarck-Mandan area (cordon)

**Table 7**
**Screen Line Calibration**

| Screen line ID | # of Counts | Average Count | Average Model | Difference (model-count) | Factor (model/count) | RMSE % |
|---|---|---|---|---|---|---|
| 1 | 5 | 9,985 | 10,534 | 549 | 5.5 | 15.5 |
| 2 | 19 | 8,098 | 7,532 | -566 | -7.0 | 23.9 |
| 3 | 11 | 3,839 | 3,664 | -175 | -4.6 | 51.9 |
| 4 | 11 | 10,158 | 10,325 | 167 | 1.6 | 18.8 |
| 5 | 22 | 8,006 | 7,492 | -514 | -6.4 | 24.9 |
| 6 | 11 | 4,247 | 4,039 | -208 | -4.9 | 44.8 |
| 7 | 19 | 1,790 | 1,790 | 0 | 0.0 | 0.1 |

The results show that screen lines 1,2,4 and 7 calibrated well (RMSE<30%), while screen lines 3 and 6 calibrated moderately well (RMSE around 50%).

The model was calibrated for different roadway facilities, such as freeways, divided, undivided and one-way arterials, and collectors. The results of the calibration can be found in the following table.

**TABLE 8**
**Facility-based Calibration**

| Facility | # of Counts | Average Count | Average Model | Model - Count | Model/ Count | RMSE % |
|---|---|---|---|---|---|---|
| Freeway | 68 | 4,818 | 5,331 | 513 | 10.6 | 17.3 |
| Divided Arterial | 16 | 12,682 | 13,047 | 365 | 2.9 | 37.0 |
| Undivided Arterial | 233 | 7,605 | 7,318 | -287 | -3.8 | 23.8 |
| One-way Arterial | 16 | 11,384 | 11,113 | -271 | -2.4 | 14.3 |
| Collector | 106 | 3,151 | 2,521 | -630 | -20.0 | 29.1 |

The results show that freeways, divided arterials, one-way arterials and collectors calibrated within the 30 percent threshold. Only divided arterials show an RMSE value slightly higher than 30 percent.

In the volume-based calibration, roadways with different levels of traffic were analyzed to determine how well these roadways of various volume level are modeled and to determine how well the entire model calibrates. Project-specific criteria were developed for each volume group in terms of the percentage of links where the model volume was within a certain margin of error from the counts. These calibration thresholds for acceptable model results are more stringent then the FHWA criteria. The level of acceptable error was established in part to acknowledge that the purpose of the model is to make facility recommendations (e.g. two-lane versus four-lane). Because of this, a low-volume roadway's model estimate can be off by a significant percent without affecting the accuracy of the recommendations. (Page 34, Calibration and Adjustment of System Planning Models, FHWA, 1990).

**TABLE 9**
**Facility-based Calibration**

| Count (1000 vpd) | # of Counts | Average Count | Average Model | Model-Count | Model/ Count | Criteria (Model/ Count) | Links meet criteria (%) | RMSE (%) |
|---|---|---|---|---|---|---|---|---|
| 0-2.5 | 108 | 1,306 | 1,519 | 213 | 16.3 | 50.0 | 56.0 | 93.2 |
| 2.5-5 | 95 | 3,648 | 3,422 | -226 | -6.2 | 40.0 | 59.6 | 50.5 |
| 5-10 | 140 | 7,276 | 7,278 | 2 | 0.0 | 28.0 | 70.0 | 26.3 |
| 10-15 | 69 | 12,187 | 10,890 | -1297 | -10.6 | 25.0 | 75.4 | 22.4 |
| 15-20 | 15 | 16,801 | 15,333 | -1468 | -8.7 | 21.0 | 81.3 | 19.8 |
| 20-30 | 12 | 23,122 | 24,898 | 1776 | 7.7 | 18.0 | 100.0 | 11.1 |
| *Total* | *439* | *6,794* | *6,617* | *-177* | *-3* | - | *66.8* | *29.3* |

The results show that the model is calibrated moderately well on links with less than 5000 vehicles per day, with 55 to 60 percent of the links meeting the criteria. This is primarily due to the relatively large zone size used for the Bismarck-Mandan forecasting model. Had higher number of TAZs with smaller size been used, the accuracy of low-volume road forecasts would have been higher. For links with traffic between five and twenty thousand vehicles per day, at least 70 percent of the links meet the criteria. For links with more then twenty thousand vehicles per day, all links meet the criteria. In general, the higher the daily volume, the better the calibration results. In terms of the RMSE, similar pattern can be found. Only roadways with volumes below 5000 vpd fall below the 30 percent threshold.

Overall, the entire network calibration results show that out of the 439 links with traffic counts, 66.8 percent (or 293 links) meets the criteria. As a comparison, the more lenient FHWA criteria would allow 78.5 percent of the links (or 345 links) to meet the criteria. The network-wide RMSE is 29.3 percent, which is below the threshold of 30 percent.

# APPENDIX C

## SPEED AND CAPACITY TABLE USED IN THE MODEL

**TABLE C-1**
**Speed and Capacity Table Used in the Model**

| Facility Type | Lanes | Speed (mph) | | | | | Capacity per Lane (vph) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Area Type 1 | Area Type 2 | Area Type 3 | Area Type 4 | Area Type 5 | Area Type 1 | Area Type 2 | Area Type 3 | Area Type 4 | Area Type 5 |
| Freeway | 1 | 30 | 40 | 30 | 30 | 30 | 1350 | 1350 | 1350 | 1350 | 1350 |
| Divided Arterial | 1 | 30 | 35 | 35 | 35 | 35 | 700 | 750 | 750 | 750 | 800 |
| Undivided Arterial | 1 | 30 | 35 | 35 | 35 | 35 | 550 | 600 | 600 | 600 | 650 |
| One-way Street | 1 | 30 | 25 | 30 | 30 | 30 | 650 | 700 | 700 | 700 | 750 |
| Collector | 1 | 25 | 30 | 30 | 30 | 30 | 450 | 500 | 500 | 500 | 550 |
| Centroid Connector | 1 | 15 | 15 | 15 | 15 | 15 | 9999 | 9999 | 9999 | 9999 | 9999 |
| Freeway | 2 | 55 | 55 | 55 | 55 | 60 | 1750 | 1750 | 1750 | 1750 | 1750 |
| Divided Arterial | 2 | 35 | 40 | 40 | 40 | 40 | 950 | 1000 | 1000 | 1000 | 1100 |
| Undivided Arterial | 2 | 30 | 35 | 35 | 35 | 35 | 550 | 600 | 600 | 600 | 650 |
| One-way Street | 2 | 35 | 30 | 35 | 35 | 35 | 650 | 700 | 700 | 700 | 750 |
| Collector | 2 | 25 | 35 | 35 | 35 | 35 | 450 | 500 | 500 | 500 | 550 |
| Centroid Connector | 2 | 15 | 15 | 15 | 15 | 15 | 9999 | 9999 | 9999 | 9999 | 9999 |
| Divided Arterial | 3 | 35 | 40 | 40 | 40 | 40 | 650 | 700 | 700 | 700 | 750 |
| Undivided Arterial | 3 | 30 | 35 | 35 | 35 | 35 | 950 | 1000 | 1000 | 1000 | 1100 |
| One-way Street | 3 | 30 | 35 | 35 | 35 | 35 | 550 | 600 | 600 | 600 | 650 |
| One-way Street | 4 | 30 | 35 | 35 | 35 | 35 | 650 | 700 | 700 | 700 | 750 |

# APPENDIX D

## EXISTING AND PREDICTED TRAFFIC VOLUMES AT THE EXTERNAL STATIONS

**TABLE D-1**
**Existing and Predicted Traffic Volumes at the External Stations**

| External Station | TAZ | 1999 | 2010 | 2025 |
|---|---|---|---|---|
| State Hwy 1806 (N) | 201 | 380 | 640 | 1,000 |
| Old Red Trail | 202 | 200 | 350 | 580 |
| ND Hwy 25 | 203 | 1,200 | 1,500 | 2,200 |
| I-94 (W) | 204 | 6,600 | 8,900 | 14,000 |
| CR 139 | 205 | 730 | 930 | 1,400 |
| CR 82 | 206 | 1,800 | 2,300 | 3,200 |
| CR 81 | 207 | 110 | 140 | 200 |
| State Hwy 1806 (S) | 208 | 1,950 | 2,900 | 4,400 |
| State Hwy 1804 (S) | 209 | 750 | 950 | 1,400 |
| Apple Creak Rd. | 210 | 700 | 1,200 | 1,800 |
| Co. Hwy 10 | 211 | 3,000 | 3,800 | 5,600 |
| E Divide Ave | 212 | 270 | 350 | 500 |
| I-94 (E) | 213 | 8,000 | 11,500 | 15,000 |
| 71th Avenue | 214 | 460 | 590 | 850 |
| 84th Avenue | 215 | 70 | 90 | 130 |
| US Hwy 83 | 216 | 6,600 | 8,300 | 11,000 |
| State Hwy 1804 (N) | 217 | 1,200 | 1,600 | 2,400 |

# APPENDIX E

## FRICTION FACTORS USED IN THE MODEL

**TABLE E-1**
**Friction Factors Used in the Model**

| Time (min) | HBW | HBO | NHB | EI & IE | Time (min) | HBW | HBO | NHB | EI & IE |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 130,540 | 155,461 | 65,270 | 31 | 1 | 4 | 52 | 2 |
| 2 | 1 | 29,804 | 50,440 | 14,902 | 32 | 1 | 3 | 44 | 2 |
| 3 | 1 | 11,848 | 24,946 | 5,924 | 33 | 1 | 2 | 38 | 1 |
| 4 | 1 | 6,279 | 15,578 | 3,140 | 34 | 1 | 2 | 33 | 1 |
| 5 | 1 | 3,756 | 10,655 | 1,878 | 35 | 1 | 2 | 28 | 1 |
| 6 | 1 | 2,372 | 7,551 | 1,186 | 36 | 1 | 1 | 24 | 1 |
| 7 | 1 | 1,598 | 5,932 | 799 | 37 | 1 | 1 | 21 | 1 |
| 8 | 1 | 1,154 | 4,912 | 577 | 38 | 1 | 1 | 18 | 1 |
| 9 | 1 | 898 | 4,125 | 449 | 39 | 1 | 1 | 15 | 1 |
| 10 | 1 | 715 | 3,402 | 358 | 40 | 1 | 1 | 13 | 1 |
| 11 | 1 | 574 | 2,944 | 287 | 41 | 1 | 1 | 11 | 1 |
| 12 | 1 | 499 | 2,534 | 250 | 42 | 1 | 0 | 10 | 0 |
| 13 | 1 | 428 | 2,186 | 214 | 43 | 1 | 0 | 9 | 0 |
| 14 | 1 | 350 | 1,877 | 175 | 44 | 1 | 0 | 7 | 0 |
| 15 | 1 | 277 | 1,603 | 138 | 45 | 1 | 0 | 6 | 0 |
| 16 | 1 | 217 | 1,371 | 109 | 46 | 1 | 0 | 6 | 0 |
| 17 | 1 | 170 | 1,174 | 85 | 47 | 1 | 0 | 5 | 0 |
| 18 | 1 | 126 | 998 | 63 | 48 | 1 | 0 | 4 | 0 |
| 19 | 1 | 103 | 849 | 51 | 49 | 1 | 0 | 4 | 0 |
| 20 | 1 | 82 | 712 | 41 | 50 | 1 | 0 | 3 | 0 |
| 21 | 1 | 62 | 585 | 31 | 51 | 1 | 0 | 3 | 0 |
| 22 | 1 | 46 | 471 | 23 | 52 | 1 | 0 | 2 | 0 |
| 23 | 1 | 34 | 376 | 17 | 53 | 1 | 0 | 2 | 0 |
| 24 | 1 | 26 | 280 | 13 | 54 | 1 | 0 | 2 | 0 |
| 25 | 1 | 19 | 207 | 10 | 55 | 1 | 0 | 2 | 0 |
| 26 | 1 | 15 | 152 | 8 | 56 | 1 | 0 | 1 | 0 |
| 27 | 1 | 11 | 109 | 6 | 57 | 1 | 0 | 1 | 0 |
| 28 | 1 | 9 | 84 | 5 | 58 | 1 | 0 | 1 | 0 |
| 29 | 1 | 6 | 71 | 3 | 59 | 1 | 0 | 1 | 0 |
| 30 | 1 | 4 | 61 | 2 | 60 | 1 | 0 | 1 | 0 |

# Appendix F

## Bismarck-Mandan Transportation Forecast Model User's Guide

# BISMARCK-MANDAN TRANSPORTATION FORECAST MODEL USER'S GUIDE

## INTRODUCTION

The purpose of this memorandum is to explain how to execute the Bismarck-Mandan transportation model. For the purpose of this memorandum, the Existing (2000) model setup was used as an example. Once the necessary model input files are updated, the entire model can be run by executing the model script named **2000model.s**. In this memorandum the following letter styles are used to ease the identification of various model files:

- Pre-model spreadsheets where input files are prepared: Underlined Characters
- Model script and input files: **Bold Characters**
- Internal model files and setup files: Regular Characters
- Model output files: Italicized Characters

### Socioeconomic Data Preparation

The Bismarck-Mandan model area was subdivided into 187 Traffic Analysis Zones (TAZ). Socioeconomic data from the Bismarck-Mandan area included population, households, retail and non-retail employment (November, 2000). Household data by auto ownership (Bismarck-Mandan, 1995) was cross-tabulated with household data by household size (CTTP, 1990) The socioeconomic data preparation can be found in a spreadsheet named CreateZonalData2000.xls. The user inputs the current socioeconomic data to the spreadsheet, and copies the output into **zdata2000.dbf**.

### Road Network Preparation

The road network of the Bismarck-Mandan area is located in **2000basenet.net**. The user can make changes to this road network by changing the links (representing roadways) or nodes (representing intersections) in the network. The user only needs to update link attributes "areatype", "asgngrp", "nlanes", "count" and node attributes "origtime" and "desttime". By running the model, the network speeds and capacities will be updated through a standard speed-capacity table resulting in 2000network.net. Also, a centroid-to-centroid penalty file named 2000penalty.prn will be created to force vehicles to use the road network when traversing between adjacent TAZs, thus better emulating real traffic conditions.

### Trip Generation

Trip generation was achieved by the disaggregate trip generation model, by which trip production and attraction in the 187 internal zones (TAZs) and 17 external zones was determined.

Internal trip generation was based on the standard trip generation functions (NCHRP 365, Transportation Research Board, 1998). The trip generation rates recommended by this manual were modified due to the unique travel characteristics of the Bismarck-Mandan area, and can be found in gen_lookup.csv. Trip generation totals by each TAZ were determined by summing the product of trip generation rates and corresponding household numbers. Trip attraction totals were determined by summing the product of the employments and corresponding trip attraction factors. External trip generation was based on projecting future level of traffic at the external stations, and allocating the internal end of the trip to TAZs proportionately to their unbalanced trip attractions. The external trip productions and attractions are calculated in a spreadsheet called CreateExternalData2000.xls. If the user needs to make changes to the traffic projections or directional distribution at the external stations, then changes need to be made in this spreadsheet. Then the user needs to copy the calculated external-external trip productions/attractions to **EE_PA_2000.csv**, and the internal-external and external-internal trip productions/attractions to **EI_PA_2000.dbf**. The trip generation model input files are the zonal data (**zdata2000.dbf),** the internal-external production-attraction data (**EI_PA_2000.dbf**) and the trip generation rates (gen_lookup.csv). In the trip generation phase, the forecasting model yields the trip production and attraction totals (pa_2000.prn), that is an input into the trip distribution model.

## Trip Distribution

The distribution of internal-internal and internal-external trips was done by the gravity model. To run the Gravity model script, the model needs trip generation totals (pa_2000.txt), friction factors (FricFac.prn), K-factors (kfac.mat) and travel time skim tables (2000_ffskim.skm or 2000_congskim.skm), which are all created internally by the **2000model.s** script. The person trip table output with five purposes (HBW, HWO, NHB, IE and EI) can be found in Person_triptab_2000.mat.

The distribution of external-external trips was achieved by the Fratar model. In the model the current trip productions and attractions at the external stations were distributed according to the 1995 model percentages. To run the Fratar model script, it needs the 1995 external-external trip table (oldexttab_ok.trp) and the current production and attraction totals **EE_PA_2000.csv**. The external-external trip table output is stored in Ext_Vehtriptab_2000.mat.

## Mode Choice

Mode choice in this model is limited to the conversion of person trip tables to vehicle trip tables by applying pre-specified occupancy rates by trip purpose. First the internal, internal-external and external-internal trip tables are converted from production-attraction to origin-destination format. Then these person trip tables are converted into vehicle trip table format by applying various vehicle occupancy rates by trip purpose. The output of this conversion yields Vehicle_triptab_2000.mat, which includes five trip purposes (HBW, HWO, NHB, IE and EI). Then, the vehicle trip tables located in this files and the external-external vehicle trip table (Ext_Vehtriptab_2000.mat) are aggregated to obtain the daily vehicle trip table (*Total_vehtriptab_2000.mat*).

## Temporal Distribution

Time-of day distribution was based on the time-of-day traffic percentiles published by NCHRP 187 Transportation Research Board (1982). Two temporal vehicle trip tables were created, Morning Peak and Afternoon Peak, which were appended to the daily trip table *(Total_vehtriptab_2000.mat).*

## Trip Assignment

The trip assignment is done by a system equilibrium model, which requires a network file (2000network.net), a vehicle trip table (*Total_vehtriptab_2000.mat*), and a penalty file (2000penalty.prn). The output of the assignment yields a loaded network (2000Assignment_tmp.net), which undergoes post processing to calculate some link traffic measures to obtain *2000Daily_Assignment.net*. Similar assignments and post-processing is done to obtain an AM and a PM peak hour loading, located in *2000AM_Assignment.net* and *2000PM_Assignment.net*.

## Turning Movement Estimation

Future turning movements at intersections can be estimated by running the model script named **turnfcast.s**. This process may be run after the completion of the model forecast, for which the user is seeking to estimate intersection turning movements. Since planning level forecast models are not specifically suited for turning movement forecast, these movements are estimated by the so-called iterative directional method (Page 105, NCHRP 255, Highway traffic data for urbanized area project planning and design, 1982). The Turnmove.xls spreadsheet is used to prepare the input files of the model script. The user enters the turning movement counts into the spreadsheet and copies the formatted count data into **turn_cnt.dbf**. The user also copies the forecasted approach volumes from the *2000AM_Assignment.net* or *2000PM_Assignment.net* to the spreadsheet and copies the formatted data into **approach_fcast.csv.** The output of the turning movement estimation can be found in *Turn_fcast.mat*. The estimation is done by factoring the turning movement counts to the forecasted approach volumes, and balancing the results to the average of the inbound and outbound approaches.

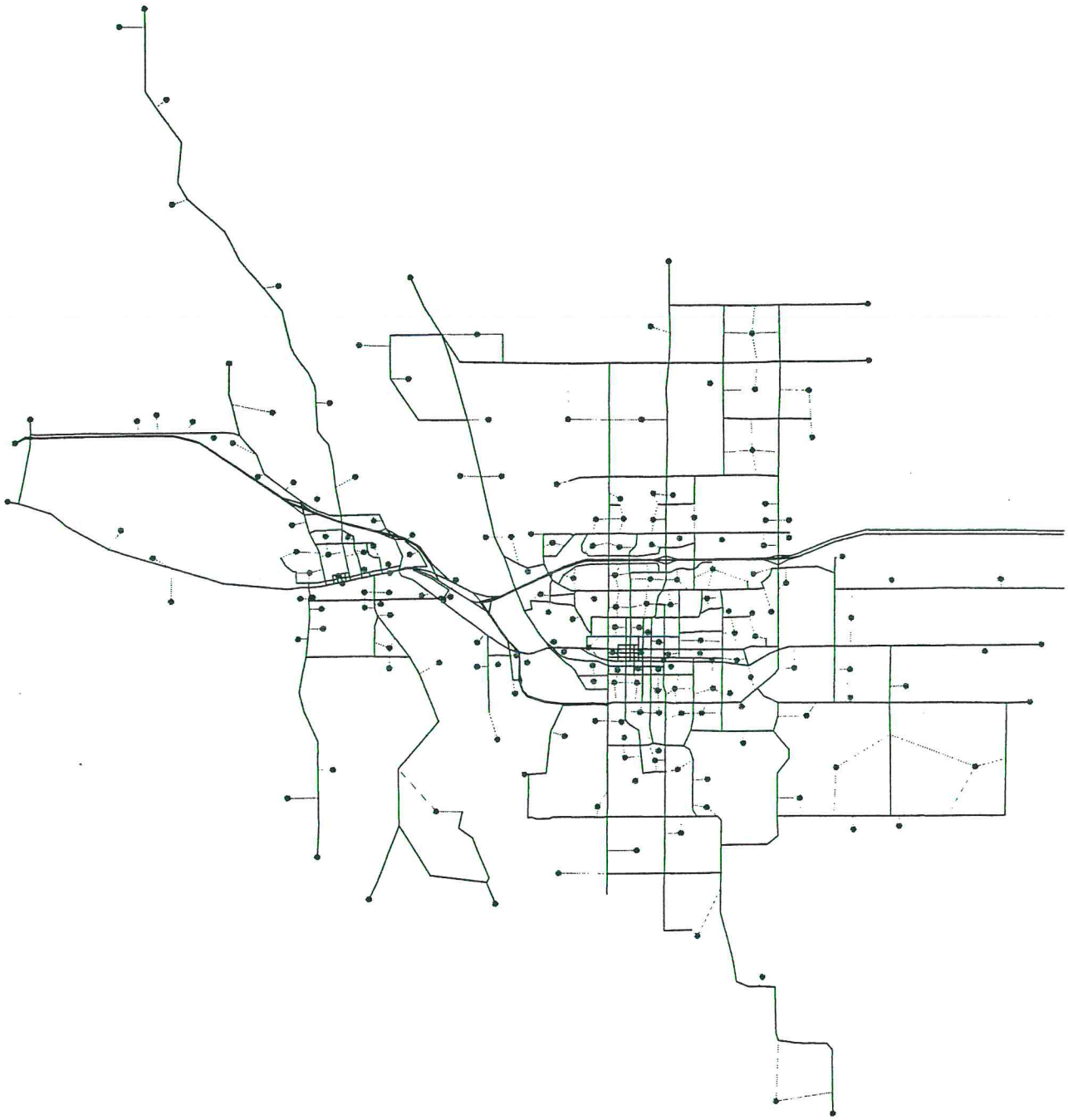
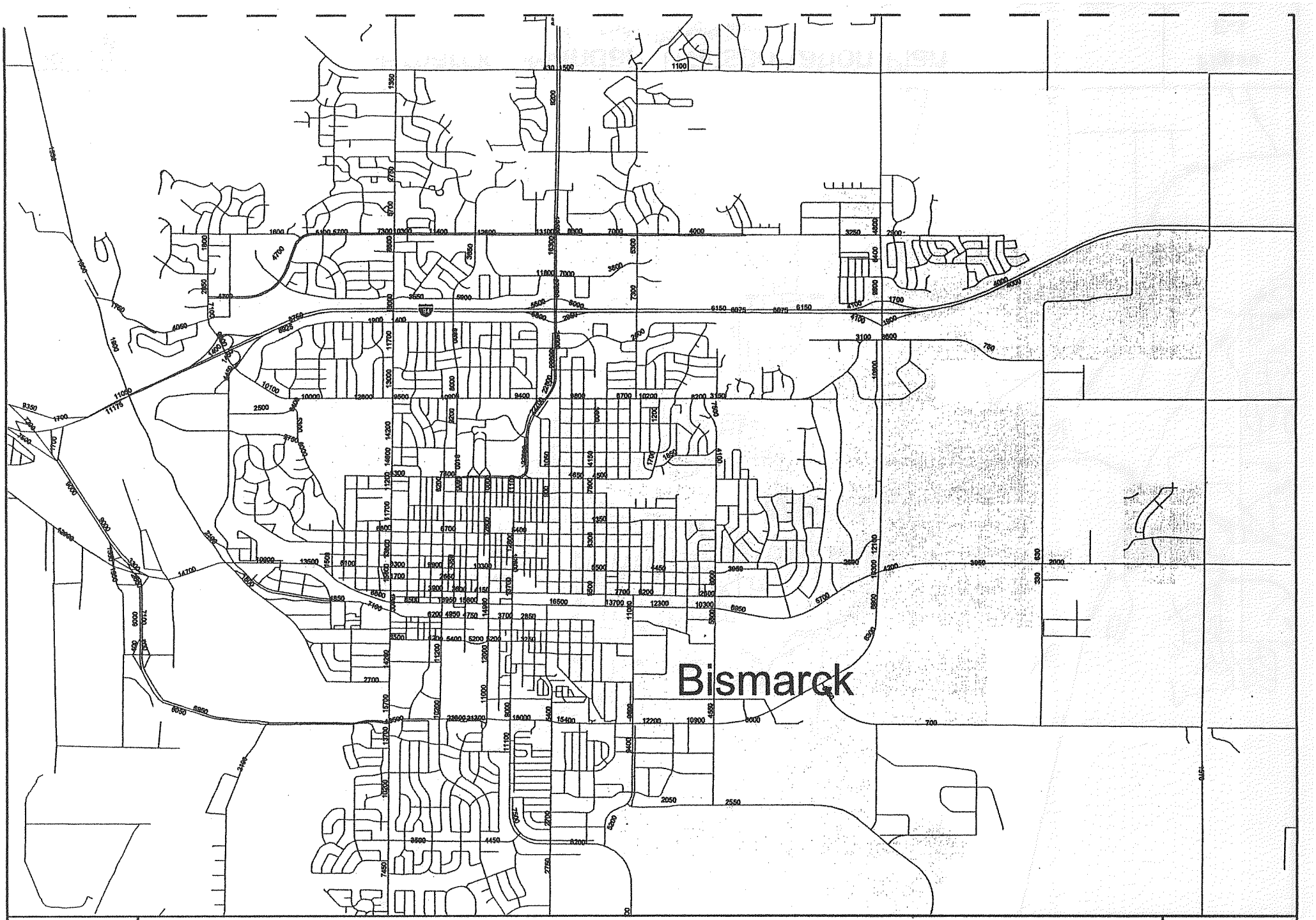


FIGURE E-1
BISMARCK-MANDAN TRANSPORTATION MODEL
EXISTING HIGHWAY NETWORK

Viper Software by The Urban Analysis Group

Licensed to SRF Consulting Group, Inc.

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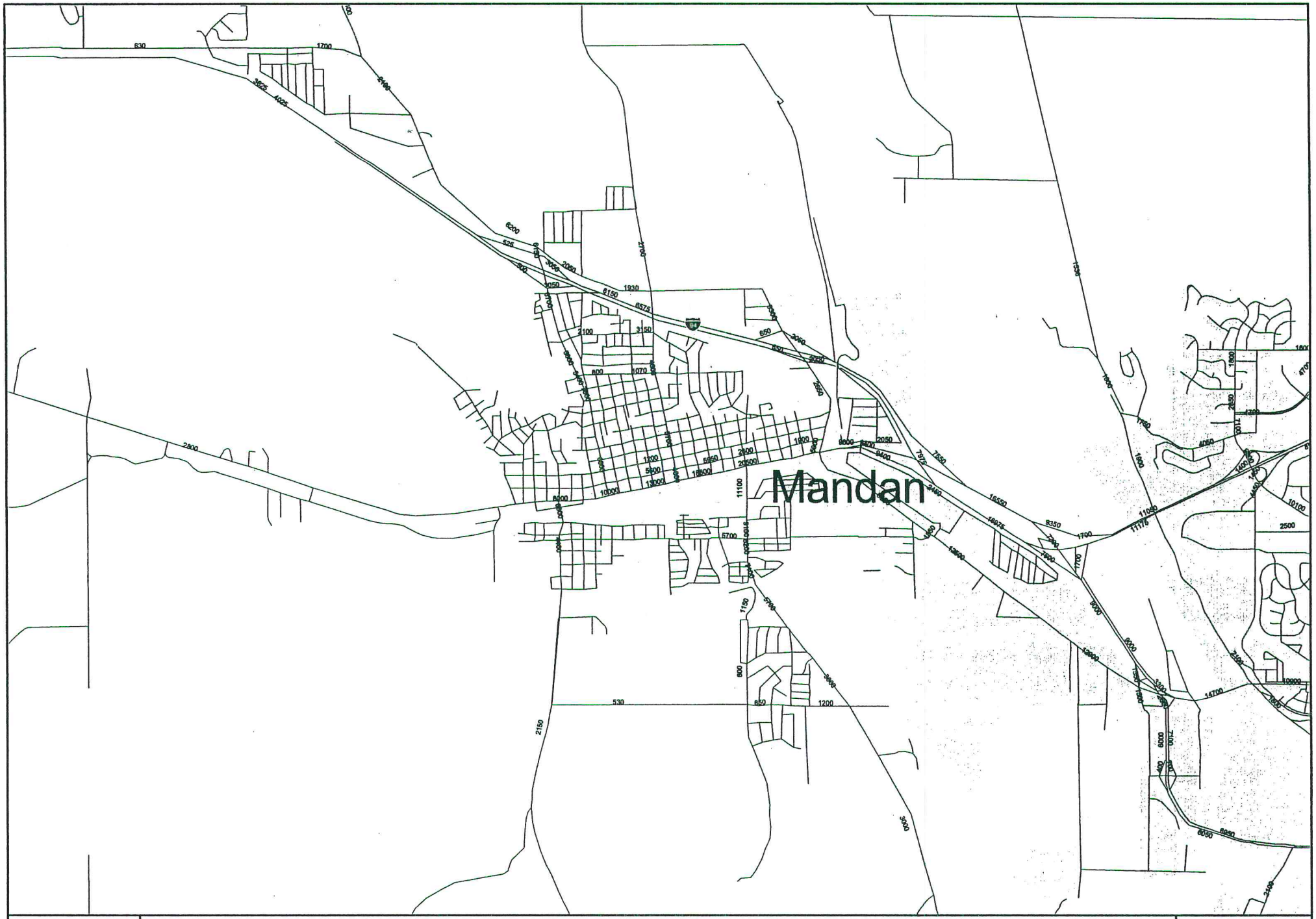
# Bismarck - Mandan Transportation Plan

Existing Daily Traffic Volumes

Figure
E-2

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# Bismarck - Mandan Transportation Plan

Existing Daily Traffic Volumes

**Figure E-3**

# Appendix 4

# Project Alternative Spreadsheets

## Potential Future Transportation Improvements

| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
|---|---|---|---|---|---|---|
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| ***City of Bismarck*** | | | | | | |
| 1. East Century Avenue (19th Street - Centennial)<br>A. No action.<br>**B. Construct as a four-lane roadway with turn lanes.** | $0.00<br>**$14,870,000(T)**<br>**$3,000,000(L)** | | √ | | Fairview Cemetery<br>Pebble Creek Golf Course<br>Hay Creek/Railroad | Overall Support |
| 2. East Century Avenue (Centennial - 80th Street)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Construct as a two-lane roadway with turn lanes. | $0.00<br>**$0.00**<br>$7,600,000(T)<br>$1,520,000(L) | √ | | | Drainage Impacts | No comments received |
| 3. Bismarck Expressway (Divide Avenue - Rosser)<br>A. No action.<br>**B. Reconstruct as a four-lane roadway with turn lanes.** | $0.00<br>**$5,300,000(T)**<br>**$1,060,000(L)** | √ | | √ | | No comments received |
| 4. Bismarck Expressway (River - Airport Road)<br>A. No action.<br>**B. Add turn lanes/signal modifications.**<br>C. Prepare concept study for future six lanes.<br>D. Reconstruct as six-lane roadway with turn lanes. | $0.00<br>**$3,000,000(T)**<br>**$600,000(L)**<br>$500,000(T)<br>$45,000,000(T)<br>$4,500,000(L) | √ | | | ROW Acquisition | Significant citizen requests for improvements (especially at 12th Street) |



*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 5. Washington Street (Main Avenue - Century Avenue) / Avenue C (Raymond St. – 3rd St.) | | | | | | |
| A. No action | $0.00 | | | | Trees<br>Buildings<br>Greenspace<br>Utilities | Significant social concerns. |
| **B. Study the corridor for opportunities for capacity expansion.** | **$150,000(T)** | √ | | | | |
| C. Remove parking north of Avenue D. Restripe as a three-lane roadway from Avenue D to Central Avenue, and restripe as a three- or four-lane roadway from Central Avenue to Century Avenue. | $100,000(T) | | | | Significant historical impacts possible | |
| **D. Widen the section from Avenue D to Rosser Avenue from 30 feet to 40 feet and restripe as a three-lane section.** | **$2,790,000(T)<br>$558,000(L)** | √ | | | | |
| E. Reconstruct as a five-lane roadway. | $11,210,000(T)$ 2,240,000(L) | | | | | |
| 6. Schafer Street (Divide Avenue - Main Avenue) | | | | | | No comments received |
| A. No action. | $0.00 | | | | | |
| **B. Construct a two-lane roadway with turn lanes from Edwards Avenue to Main Avenue.** | **$2,040,000(T)<br>$400,000(L)** | √ | | | Railroad Impacts<br>BSC and Bowl Impacts | |
| **C. Construct a two-lane roadway with turn lanes from Edwards Avenue to Divide Avenue.** | **$1,020,000(T)<br>$204,000(L)** | | √ | | | |
| 7. 12th Street (Boulevard Avenue - University Drive) | | | | | Myhre School<br>Railroad | No comments received |
| A. No action. | $0.00 | | | | | |
| **B. Conduct a Corridor Study from Boulevard Avenue to 48th Avenue.** | **$100,000 (T)** | √ | | | | |
| **C. Reconstruct as a two-lane roadway with turn lanes from Main Avenue to University Drive.** | **$4,000,000(T)<br>$800,000(L)** | √ | | | | |

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*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| Technical Options (Bold Represents Preferred Option) | Cost Total (T) Local (L) | Within Short Range Capability | Not Within Short Range Capability | No Impacts Noted | Possible Impacts Noted | Comments Pertaining to Social Acceptability |
| 8. 12th Street (University Drive - Burleigh Avenue)<br>A. **No action.**<br>B. Construct as a two-lane roadway with turn lanes. | **$0.00**<br>$3,000,000(T)<br>$600,000(L) | | | | Cottonwood Park Lincoln Oaks | No comments received |
| 9. Highway 1804 (Bismarck Expressway - 48th Avenue)<br>A. No action.<br>**B. Construct as a four-lane roadway with turn lanes.** | $0.00<br>**$9,250,000(T)**<br>**$925,000(L)** | √ | | | Addressed by Environmental Assessment | No comments received |
| 10. England Street (Burleigh Avenue - 48th Avenue)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Construct as a two-lane roadway with turn lanes. | $0.00<br>**$5,000**<br>$2,370,000(T)<br>$474,000(L) | √ | | | Park District Concerns/Trees | No comments received |
| 11. London Avenue (Riverwood Drive - Washington Street)<br>A. No action<br>**B. Preserve right-of-way.**<br>C. Construct as a two-lane roadway with turn lanes.<br>D. Extend Riverwood Drive from Mills Avenue to Tavis Road. | $0.00<br>**$15,000**<br>$3,900,000(T)<br>$780,000(L)<br>$3,900,000(T)<br>$780,000(L) | √ | | | Park District Concerns/Trees | No comments received |
| 12. I-94 at 52nd Street<br>A. No action.<br>**B. Preserve right-of-way for a future overpass.**<br>C. Preserve right-of-way for a future interchange.<br>D. Construct an overpass at 52nd Street.<br>E. Construct an interchange at 52nd Street. | $0.00<br>**$0.00**<br>$0.00<br>$6,000,000(T)<br>$1,200,000(L)<br>$10,500,000(T)<br>$1,050,000(L) | √ | | √ | | No comments received |

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*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 13. 3rd Street (Main Avenue - Arbor Avenue)<br>A. No action.<br>B. Reconstruct as a four-lane roadway.<br>**C. Reconstruct as a five-lane roadway.** | <br>$0.00<br>$2,500,000(T)<br>$500,000(L)<br>**$2,500,000(T)**<br>**$500,000** | <br><br><br>√ | | | Railroad Access to Businesses | No comments received |
| 14. State Street (43rd Avenue - Boulevard)<br>A. No action.<br>**B. Reconstruct as a rural four lane roadway from 43rd Avenue to Calgary Avenue, and as an urban 6-lane roadway from Calgary Avenue to Boulevard.** | <br>$0.00<br>**$17,740,000(T)**<br>**$1,700,000(L)** | <br><br>√ | | <br>√ | Access to Business | No comments received |
| 15. Divide Avenue (State Street - 19th Street)<br>A. No action.<br>**B. Reconstruct as a four-lane roadway with turn lanes.** | <br>$0.00<br>**$1,480,000(T)**<br>**$296,000(L)** | <br><br>√ | | | Utilities | No comments received |
| 16. Divide Avenue (26th Street - Bismarck Expressway)<br>A. No action.<br>**B. Preserve Right-of-Way.**<br>**C. Reconstruct as a four-lane roadway extending east into Bismarck Expressway.** | <br>$0.00<br>**$280,000(T)**<br>**$4,000,000(T)**<br>**$800,000(L)** | <br><br>√<br>√ | | | Right-of-Way Impacts | No comments received |
| 17. 26th Street (Bismarck Expressway - Airway Avenue)<br>A. No action.<br>**B. Reconstruct as a two lane roadway with turn lanes.**<br>C. Reconstruct as a four lane roadway with turn lanes. | <br>$0.00<br>**$1,160,000(T)**<br>**$232,000(L)**<br>$1,900,000(T)<br>$380,000(L) | <br><br>√ | | <br>√ | | No comments received |



*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| Technical Options<br>(Bold Represents Preferred Option) | Cost<br>Total (T)<br>Local (L) | Within Short Range Capability | Not Within Short Range Capability | No Impacts Noted | Possible Impacts Noted | Comments Pertaining to Social Acceptability |
| 18. Airway Avenue (Airport Road - Yegen Road)<br>A. No action.<br>**B. Reconstruct as a two-lane roadway with turn lanes.**<br>C. Reconstruct as a four-lane roadway with turn lanes. | $0.00<br>**$4,000,000(T)**<br>**$800,000(L)**<br>$6,320,000(T)<br>$1,260,000(L) | √ | | √ | | No comments received |
| 19. Tyler Parkway (West Century Avenue – Highway 1804)<br>A. No action.<br>**B. Preserve right-of-way for future extension.**<br>**C. Construct as a two-lane roadway with turn lanes.**<br>D. Construct as a four-lane roadway with turn lanes. | $0.00<br>**$110,000(T)**<br>**$7,080,000(T)**<br>**$1,420,000(L)**<br>$11,450,000(T)<br>$2,290,000(L) | √ | √ | √ | | No comments received |
| 20. Divide Avenue (Bismarck Expressway – 66th Street)<br>A. No action.<br>**B. Construct as a two-lane roadway with turn lanes.** | $0.00<br>**$1,235,000(T)**<br>**$250,000(L)** | √ | | | ROW Impacts | No comments received |
| 21. Valley Drive to Ash Coulee Connection<br>A. No action.<br>**B. Construct as a two-lane roadway with turn lanes.** | $0.00<br>**$2,720,000(T)**<br>**$544,000(L)** | √ | | | ROW Impacts | No comments received |
| 22. 43rd Avenue (River Road-Tyler Parkway)<br>A. No action.<br>**B. Preserve right-of-way.**<br>**C. Construct as a two-lane roadway with turn lanes.** | $0.00<br>**$0.00**<br>**$1,235,000(T)**<br>**$247,000(L)** | √ | √ | | ROW Impacts | No comments received |

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*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 23. Ash Coulee Extension to River Road | | | | | ROW Impacts | No comments received |
| A. No action. | $0.00 | | | | | |
| **B. Preserve right-of-way for future extension.** | **$55,000(T)** | √ | | √ | | |
| **C. Construct as a two-lane roadway with turn lanes.** | **$4,000,000(T) $800,000(L)** | | √ | | | |



*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| Technical Options<br>(Bold Represents Preferred Option) | Cost<br>Total (T)<br>Local (L) | Within Short Range Capability | Not Within Short Range Capability | No Impacts Noted | Possible Impacts Noted | Comments Pertaining to Social Acceptability |
| ***Burleigh County*** | | | | | | |
| 1. 71st Avenue (Centennial - 80th Street)<br>A. No action.<br>**B. Construct as a two-lane roadway with turn lanes.** | $0.00<br>**$2,120,000(T)**<br>**$424,000(L)** | √ | | √ | | No Comments Received |
| 2. Centennial Road (Century Avenue - Highway 1804)<br>A. No action.<br>**B. Add turn lanes at key intersections.** | $0.00<br>**$600,000(T)**<br>**$120,000(L)** | √ | | √ | | Significant Citizen Support |
| 3. River Road (Burnt Boat Drive – Highway 1804)<br>A. No action.<br>**B. Reconstruct as a two-lane roadway with turn lanes.**<br>C. Reconstruct as a four-lane roadway with turn lanes. | $0.00<br>**$5,070,000(T)**<br>**$1,010,000(L)**<br>$8,000,000(T)<br>$1,600,000(L) | | √ | | ROW Impacts<br>Wetland Impacts | No Comments Received |
| 4. Washington Street (Calgary Avenue - Highway 1804)<br>A. No action.<br>**B. Preserve minimum 150-foot right-of-way.**<br>**C. Reconstruct as a four-lane roadway from Calgary to 43rd Avenue.** | $0.00<br>**$27,300(T)**<br>**$27,300(L)**<br>**$1,840,000(T)**<br>**$368,000(L)** | √ | √ | √ | ROWImpact | No Comments Received |
| 5. I-94 at 66th Street<br>A. No action.<br>B. Preserve right-of-way for a future overpass.<br>**C. Preserve right-of-way for a future interchange.**<br>D. Construct an overpass at 66th Street.<br>**E. Construct an interchange at 66th Street.** | $0.00<br>$0.00<br>**$0.00**<br>$6,000,000(T)<br>$600,000(L)<br>**$10,500,000(T)**<br>**$105,000(L)** | √ | √ | √ | | No Comments Received |

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*Planning, Engineering and Utilities Construction Not Included in Estimates

| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 6. I-94 at 80th Street<br>A. No action.<br>**B. Preserve right-of-way for a future interchange.**<br>C. Construct an interchange at 80th Street. | <br>$0.00<br>**$0.00**<br><br>$25,000,000(T)<br>$2,500,000(L) | √ | | √ | | No Comments Received |
| 7. Highway 1804 (48th Avenue - RP 67.5)<br>A. No action.<br>**B. Construct as a two-lane roadway with turn lanes.** | <br>$0.00<br>**$9,240,000(T)**<br>**$0.00(L)** | √ | | | Addressed by Environmental Assessment | No Comments Received |



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| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| **Technically Sound** | | **Financially Feasible** | | **Environmentally Sensitive** | | **Socially Acceptable** |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| ***Burleigh County - City of Lincoln*** | | | | | | |
| 1. Lincoln Road (Airway Avenue - 66th Street)<br>A. No action.<br>**B. Reconstruct as a two-lane roadway with turn lanes.** | <br>$0.00<br>**$930,000(T)**<br>**$186,000(L)** | <br><br>√ | | | ROW Impacts | Significant Citizen Support |
| 2. Lincoln Road at Apple Creek Bridge<br>**A. No action.**<br>B. Replace bridge at higher elevation to improve access during flood conditions. | <br>**$0.00**<br>$600,000(T)<br>$120,000(L) | | | <br>√ | | No Comments Received |
| 3. Lincoln-Bismarck Direct Access Route (Airway Avenue to Lincoln Road)<br>A. No action.<br>B. Preserve right-of-way along abandoned railroad.<br>**C. Preserve right-of-way for corridor parallel with and 1500 feet east of Airway Avenue.**<br>D. Construct as a two-lane roadway with turn lanes, parallel with and 1500 feet east of Airway Avenue. | <br>$0.00<br>$64,000(T)<br>**$64,000(T)**<br>$2,630,000(T)<br>$526,000(L) | <br><br><br>√ | | <br>√ | | No Comments Received |
| 4. 52nd Street (Lincoln Road - 48th Avenue)<br>A. No action.<br>**B. Preserve right-of-way.**<br>**C. Reconstruct as a two-lane roadway.** | <br>$0.00<br>**$15,000(T)**<br>**$600,000(T)**<br>**$120,000(L)** | <br><br>√ | <br><br>√ | <br><br>√ | <br><br>Right-of-Way Impacts | No Comments Received |

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| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| ***City of Mandan*** | | | | | | |
| 1. Division Street (Lohstreter Road - Missouri Drive)<br>A. No action.<br>**B. Construct as a two-lane roadway with turn lanes.**<br>C. Construct as a four-lane roadway with turn lanes. | <br>$0.00<br>**$5,570,000(T)**<br>**$3,210,000(L)**<br><br>$8,000,000(T)<br>$1,600,000(L) | <br><br>√ | | | Historical, Archeological, Railroad, Right-of-Way | Significant Citizen support for east side connection. |
| 2. Boundary Street Northwest (Sunset Drive - Lohstreter Road)<br>A. No action.<br>**B. Preserve right-of-way.**<br>**C. Construct as a two-lane roadway with turn lanes.** | <br>$0.00<br>**$0.00**<br>**$3,600,000(T)**<br>**$720,000(L)** | <br><br>√ | <br><br><br>√ | <br><br>√ | | No Comments Received |
| 3. Old Red Trail (Sunset Drive - Mandan Avenue)<br>A. No action.<br>B. Reconstruct as a two-lane roadway with turn lanes.<br>**C. Reconstruct as a four-lane roadway with turn lanes.** | <br>$0.00<br>$3,890,000(T)<br>$778,000(L)<br>**$6,150,000(T)**<br>**$615,000(L)** | <br><br><br>√ | | <br><br><br>√ | | No Comments Received |
| 4. I-94 at 56th Avenue Northwest<br>A. No action.<br>**B. Preserve right-of-way for future interchange.**<br>C. Construct overpass and preserve right-of-way.<br>**D. Construct interchange.** | <br>$0.00<br>**$0.00**<br><br>$6,000,000(T)<br>$1,200,000(L)<br>**$10,500,000(T)**<br>**$2,100,000(L)** | <br><br>√ | <br><br><br><br>√ | <br><br>√ | | No Comments Received |

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| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| Technical Options (Bold Represents Preferred Option) | Cost Total (T) Local (L) | Within Short Range Capability | Not Within Short Range Capability | No Impacts Noted | Possible Impacts Noted | Comments Pertaining to Social Acceptability |
| 5. I-94 at 32nd Avenue Northwest<br>A. No action.<br>**B. Preserve right-of-way for future interchange or underpass.**<br>C. Construct overpass and preserve right-of-way.<br>D. Construct interchange. | $0.00<br>**$0.00**<br>$6,000,000(T)<br>$1,200,000(L)<br>$10,500,000(T)<br>$2,100,000(L) | √ | | √ | | No Comments Received |
| 6. 19th Street Southeast (ND 6 - Highway 1806)<br>A. No action.<br>B. Preserve right-of-way.<br>**C. Construct as a urban two-lane roadway with turn lanes.** | $0.00<br>$0.00<br>**$3,710,000(T)**<br>**$2,139,000(L)** | √ | | √ | | No Comments Received |
| 7. 46th Avenue Southeast (Memorial Highway - McKenzie Drive)<br>A. No action.<br>B. Preserve right-of-way.<br>**C. Construct as a two-lane roadway with turn lanes.** | $0.00<br>$2,000<br>**$1,500,000(T)**<br>**$865,000(L)** | √ | | √ | | No Comments Received |
| 8. Long Spur Trail (24th Avenue Southeast - 40th Avenue Southeast)<br>A. No action.<br>**B. Preserve right-of-way.**<br>**C. Construct as a two-lane roadway with turn lanes.** | $0.00<br>**$0.00**<br>**$4,850,000(T)**<br>**$970,000(L)** | √ | √ | √ | | No Comments Received |
| 9. Captain's Landing Access (Captain Leach Drive - Memorial Highway)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Construct as a two-lane roadway with an underpass at I-94. | $0.00<br>**$264,000(T)**<br>$9,260,000(T)<br>$1,850,000(L) | √ | | √ | | No Comments Received |

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| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 10. McKenzie Drive (46th Avenue SE - Highway 1806) | | | | | | |
| A. No action. | $0.00 | | | | Historical, Archeological | No Comments Received |
| **B. Preserve right-of-way.** | **$40,000(T)** | √ | | | | |
| **C. Construct as a two-lane roadway with turn lanes.** | **$3,810,000(T) $762,000(L)** | | √ | | | |



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|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| Technical Options (Bold Represents Preferred Option) | Cost Total (T) Local (L) | Within Short Range Capability | Not Within Short Range Capability | No Impacts Noted | Possible Impacts Noted | Comments Pertaining to Social Acceptability |
| ***Morton County*** | | | | | | |
| 1. North Dakota Highway 1806 (Old Red Trail - 37th Street) | | | | | | No Comments Received |
| A. No action. | $0.00 | | | | | |
| **B. Preserve corridor for future connection to Sunset Drive interchange.** | **$0.00** | √ | | √ | | |
| **C. Construct as a two-lane roadway with turn lanes connecting at the Sunset Drive interchange.** | **$4,650,000(T)**<br>**$0.00(L)** | | √ | √ | | |
| 2. 34th Street (North Dakota 25 - 22nd Avenue) | | | | | Historical, Archeological | No Comments Received |
| A. No action. | $0.00 | | | | | |
| **B. Preserve right-of-way.** | **$0.00** | √ | | | | |
| C. Construct as a two-lane roadway with turn lanes. | $5,187,000(T)<br>$1,037,000(L) | | | | | |
| 3. 35th Street at Square Butte Creek | | | | | | No Comments Received |
| A. No action. | $0.00 | | | | | |
| B. Preserve right-of-way. | $0.00 | | | | | |
| **C. Reconstruct Square Butte Creek bridge.** | **$663,000(T)**<br>**$133,000(L)** | √ | | √ | | |
| 4. 22nd Avenue (32-1/2 Street - 34th Street) | | | | | | No Comments Received |
| A. No action. | $0.00 | | | | | |
| B. Preserve right-of-way. | $20,000 | | | | | |
| **C. Reconstruct as a two-lane roadway.** | **$2,030,000(T)**<br>**$406,000(L)** | | √ | √ | | |
| 5. 32-1/2 Street (22nd Avenue - Highway 1806) | | | | | | No Comments Received |
| A. No action. | $0.00 | | | | | |
| B. Preserve right-of-way. | $0.00 | | | | | |
| **C. Reconstruct as a two-lane roadway.** | **$2,060,000(T)**<br>**$412,000(L)** | | √ | √ | | |

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| Potential Future Transportation Improvements | | | | | | |
|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 6. 36th Street (North Dakota 25 to 25th Avenue)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Reconstruct as a two-lane roadway with turn lanes. | $0.00<br>**$16,600(T)**<br>$1,040,000(T)<br>$208,000(L) | √ | | √ | | No Comments Received |
| 7. 37th Street (25th Avenue to 24th Avenue)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Reconstruct as a two-lane roadway with turn lanes. | $0.00<br>**$0.00**<br>$1,310,000(T)<br>$262,000(L) | √ | | √ | | No Comments Received |
| 8. 25th Avenue (36th Street to 37th Street)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Reconstruct as a two-lane roadway with turn lanes. | $0.00<br>**$23,000(T)**<br>$1,450,000(T)<br>$290,000(L) | √ | | √ | | No Comments Received |
| 9. County 139A (North Dakota 25 to County Highway 82)<br>A. No action.<br>**B. Construct as a paved two-lane roadway with turn lanes.** | $0.00<br>**$2,000,000(T)**<br>**$400,000(L)** | √ | | √ | | No Comments Received |
| 10. 25th Avenue at I-94<br>A. No action.<br>**B. Preserve right-of-way for future interchange.**<br>C. Construct new interchange. | $0.00<br>**$0.00**<br>$10,500,000(T)<br>$1,050,000(L) | √ | | √ | | No Comments Received |
| 11. County 140 Cut Across (Highway 25-Highway 1806)<br>A. No action.<br>B. Preserve right-of-way.<br>**C. Construct paved two-lane surface.** | $0.00<br>$0.00<br>**$2,000,000(T)**<br>**$501,000(L)** | √ | | √ | | No Comments Received |

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| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| Technical Options (Bold Represents Preferred Option) | Cost Total (T) Local (L) | Within Short Range Capability | Not Within Short Range Capability | No Impacts Noted | Possible Impacts Noted | Comments Pertaining to Social Acceptability |
| 12. County 138 (North Dakota 6 - Highway 1806)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Construct paved two-lane roadway with turn lanes. | $0.00<br>**$36,000(T)**<br>$3,000,000(T)<br>$600,000(L) | √ | | √ | | No Comments Received |
| 13. 44th Street South (North Dakota 6 - 20th Avenue South)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Construct paved two-lane roadway with turn lanes. | $0.00<br>**$0.00**<br>$2,500,000(T)<br>$500,000(L) | √ | | | Historical/ Archeological | No Comments Received |
| 14. 29th Avenue (County 139 - County 140)<br>A. No action.<br>**B. Preserve right-of-way for a future two-lane, limited access arterial, and an interchange at I-94.** | $0.00<br>**$109,000(T)** | √ | | √ | | No Comments Received |
| 15. County 139 (ND 25 – East of Highway 83)<br>A. No action.<br>**B. Construct a bituminous overlay.** | $0.00<br>**$1,200,000(T)**<br>**$240,000(L)** | | √ | √ | | No Comments Received |
| 16. 24th Avenue (37th Street – County 139A)<br>A. No action.<br>**B. Preserve right-of-way.**<br>C. Construct as a two-lane roadway. | $0.00<br>**$0.00**<br>$1,080,000(T)<br>$216,000(L) | √ | | √ | | No Comments Received |

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| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| ***Bismarck-Mandan Region*** | | | | | | |
| 1. Northside Missouri River<br>A. No action.<br>**B. Preserve right-of-way for a future bridge connecting Burleigh 1804 with Morton 37th Street.**<br>C. Preserve right-of-way for a future bridge connecting Burleigh 57th Avenue to Morton 38th Street. | <br>$0.00<br>**$2,400,000(T)**<br>$900,000(T) | <br><br>√ | | | Right-of-Way Impacts, Relocation Impacts, Archaeological Impacts, Access Impacts | No comments received |
| 2. Southside Missouri River<br>A. No action.<br>**B. Preserve right-of-way for a future bridge connecting Burleigh 48th Avenue with Morton 46th Street.**<br>**C. Preserve right-of-way for a future bridge connecting Burleigh 48th Avenue with Morton County 138A.** | <br>$0.00<br>**$1,150,000(T)**<br>**$1,150,000(T)** | <br><br>√<br>√ | | | Right-of-Way Impacts, Relocation Impacts, Archaeological Impacts, Access Impacts | No comments received |



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|---|---|---|---|---|---|---|
| Technically Sound | | Financially Feasible | | Environmentally Sensitive | | Socially Acceptable |
| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 3. Northside Beltway Arterial | | | | | | |
| A. No action. | $0.00 | | | | Right-of-Way Impacts, Relocation Impacts, Archaeological Impacts, Access Impacts | No comments received |
| **B. Preserve right-of-way for a four-lane limited access arterial in Burleigh County.** | | | | | | |
| 1) At 57th Avenue. | $605,000(T) | | | | | |
| **2) At 71st Avenue.** | **$1,641,000(T)** | √ | | | | |
| **C. Preserve right-of-way for a four-lane, limited access arterial in Morton County.** | | | | | | |
| 1) At 38th Street. | $102,000(T) | | | | | |
| **2) At 37th Street.** | **$724,000(T)** | √ | | | | |
| 4. Southside Beltway Arterial | | | | | Right-of-Way Impacts, Relocation Impacts, Archaeological Impacts, Access Impacts | No comments received |
| A. No action. | $0.00 | | | | | |
| **B. Preserve right-of-way for a four-lane, limited access arterial in Burleigh County along 48th Avenue.** | **$912,000(T)** | √ | | | | |
| **C. Preserve right-of-way for a four-lane, limited access arterial in Morton County.** | | √ | | | | |
| 1) Along Highway 1806 and County 138. | $352,000(T) | | | | | |
| **2) One mile south of County 138 (46th Street).** | **$366,000(T)** | | | | | |
| **3) Along County 138A (47th Street).** | **$408,000(T)** | | | | | |
| 5. Eastside Beltway Arterial | | | | | Right-of-Way Impacts, Relocation Impacts, Archaeological Impacts, Access Impacts | No comments received |
| A. No action. | $0.00 | | | | | |
| **B. Preserve right-of-way for a four-lane, limited access arterial along 66th Street.** | **$1,094,000(T)** | √ | | | | |

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|---|---|---|---|---|---|---|
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| **Technical Options (Bold Represents Preferred Option)** | **Cost Total (T) Local (L)** | **Within Short Range Capability** | **Not Within Short Range Capability** | **No Impacts Noted** | **Possible Impacts Noted** | **Comments Pertaining to Social Acceptability** |
| 6. Westside Beltway Arterial | | | | | | No comments received |
| A. No action. | $0.00 | | | | Archaeological Sites Probable | |
| **B. Preserve right-of-way for a four-lane, limited access arterial.** | | | | | | |
| **1) At County 82.** | **$724,000(T)** | √ | | | | |
| 2) At North Dakota 25. | $106,000(T) | | | | | |
| 7. Memorial Bridge | | | | | | No comments received |
| A. No action. | $0.00 | | | | | |
| **B. Reconstruct as a 4-lane facility.** | **$15,000,000(T)** | √ | | √ | | |



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# Appendix 5

# Public Input

**MAILING LIST**

AMY SAKORIASSEN
CATHEDRAL AREA HISTORIC DISTRICT
603 N MANDAN ST
BISMARCK ND 58501

BAPTIST HOME INC
1100 E BOULEVARD
BISMARCK ND 58501

BISMARCK FIRE DEPARTMENT
1020 E CENTRAL AVE
BISMARCK ND 58501

BISMARCK POLICE DEPARTMENT
700 S 9TH STREET
BISMARCK ND 58504

BISMARCK STATE COLLEGE
1500 EDWARDS AVE
BISMARCK ND 58501

BISMARCK PUBLIC SCHOOLS
400 AVE E EAST
BISMARCK ND 58501

BISMARCK PARKS AND RECREATION DISTRICT
420 EAST FRONT AVE
BISMARCK ND 58504

BISMARCK MUNICIPAL AIRPORT
PO BOX 991
BISMARCK ND 58506-0991

BISMARCK-MANDAN BOARD OF REALTORS
318 W APOLLO AVE
BISMARCK ND 58501

BISMARCK-MANDAN AREA CHAMBER OF COMMERCE
2000 SCHAFER ST
BISMARCK ND
58501

BISMARCK-MANDAN CONVENTION AND VISITORS BUREAU
107 W MAIN AVE
BISMARCK ND 58501

BISMARCK-MANDAN BUILDERS EXCHANGE
805 ADOBE TRAIL
PO BOX 550
MANDAN ND 58554-0550

BNSF RAILROAD
300 1ST ST SW
MANDAN ND 58554

BOB SHANNON
DAKOTA ROUGHRIDERS MOUNTAIN BIKE CLUB
5964 LARIAT LOOP
BISMARCK ND 58501

BURLEIGH CO. SENIOR CENTER
315 N 20TH ST
BISMARCK ND 58501

BURLEIGH COUNTY SHERIFF
PO BOX 1416
BISMARCK ND 58502-1416

BURLEIGH COUNTY SENIOR CENTER
315 N 20TH ST
BISMARCK ND 58501

CARROL MEYERS
RUTH MEIERS
1800 E BROADWAY
BISMARCK ND 58501

CHARLES BISNET
PRIDE INC.
1929 N. WASHINGTON ST
BISMARCK ND 58501

CHERRY SCHMIDT
WEST CENTRAL HUMAN SERVICE CENTER
600 S 2ND ST
BISMARCK ND 58501

CHUCK STEBBINS
TRANSIT BOARD OF DIRECTOR
3111 E BROADWAY AVE
BISMARCK ND 58501

CHUCK BOSCH
TRANSIT BOARD OF DIRECTOR
PO BOX 267
MANDAN ND 58554-0267

COUNTRY WEST REAL ESTATE
1720 BURNT BOAT DR
BISMARCK ND 58501

DAVE PATIENCE
BISMARCK-MANDAN HOME BUILDERS ASSO-
CIATION
1424 W CENTURY AVE
BISMARCK ND 58501

DEB DILGER
TRANSIT BOARD OF DIRECTOR
2512 COOLIDGE AVENUE
BISMARCK ND 58501

DIANE ZAINHOFSKY
ABUSED ADULT RESOURCE CENTER
PO BOX 167
BISMARCK ND 58501

DON BRAUN
TRANSIT BOARD OF DIRECTOR
911 3RD STREET NW
MANDAN ND 58554

DUNCAN WARREN
MORTON COUNTY PARKS DEPARTMENT
210 2ND AVE NW
MANDAN ND 58554

DWIGHT REUTHER
NAUGHTON TOWNSHIP
8600 97TH AVE NE
BISMARCK ND 58501

EDGEWOOD VISTA
3495 DOMINION ST
BISMARCK ND 58501

EILEENE OLSON
TRANSIT BOARD OF DIRECTOR
1823 MAPLETON AVE. - #7
BISMARCK ND 58501

FEDERAL HIGHWAY ADMINISTRATION
1471 INTERSTATE LOOP
BISMARCK ND 58501

FORT LINCOLN STATE PARK
4480 FORT LINCOLN RD
MANDAN ND 58554

GABE BROWN
GIBBS TRUCKING
3752 106TH ST NE
BISMARCK ND 58501

GLENN LAUINGER
TRANSIT BOARD OF DIRECTOR
PO BOX 223
MANDAN 58554-0223

HARRY KOHLER
REAL ESTATE AGENT
2915 WINNIPEG DR
BISMARCK ND 58501

HIT INC
1402 2ND ST NW
MANDAN ND 58554

JANE MORROW
TRANSIT BOARD OF DIRECTOR
300 N 7TH ST
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PO BOX 517
MANDAN ND 58554-0517

JUDY VETTER
PUBLIC ADMINISTRATOR OFFICE
PO BOX 5518
BISMARCK ND 58502-5518

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1720 BURNT BOAT DR
BISMARCK ND 58501

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BISMARCK ND 58501

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MORTON CO SOCIAL SERVICE
200 2ND AVE NW
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LINCOLN ND 58504

LINCOLN POLICE DEPARTMENT
68 SANTEE RD
LINCOLN ND 58504

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2102 N WASHINGTON ST. - #3
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3014 34TH ST NW
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MANDAN PROGRESS ORGANIZATION
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MANDAN ND 58554

MANDAN PUBLIC SCHOOLS
309 COLLINS AVE
MANDAN ND 58554

MANDAN PARKS AND RECREATION DEPARTMENT
901 DIVISION ST
MANDAN ND 58554

MANDAN POLICE DEPARTMENT
205 1ST AVE NW
MANDAN ND 58554

MARK ABRAHAMSON
116 BLUEJAY AVENUE
BISMARCK ND 58501

MARK BERG
TRAFFIC AND SAFETY ADVISORY COMMITTEE
221 N 5TH ST.
PO BOX 5503
BISMARCK ND 58506-5503

MEDCENTER ONE
300 N 7TH ST
BISMARCK ND 58501

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TRANSIT BOARD OF DIRECTOR
1308 N 22ND ST
BISMARCK ND 58501

MICHAEL ANDERSON
34 CAPTAN LEACH DR
MANDAN ND 58554

MIDDAKOTA CLINIC
9TH & ROSSER
BISMARCK ND 58501

MIKE SCHNEIDER
CHAMBER OF COMMERCE TRANSPORTATION COMMITTEE
PO BOX 1675
BISMARCK ND 58502-1675

MIKE FINK
DIVISION GAS SYSTEM ENGINEER
MONTANA DAKOTA UTILITIES
PO BOX 1457
BISMARCK ND 58502-1457

MISSOURI RIVER CLUB

MISSOURI SLOPE LUTHERAN CARE CENTER
2425 HILLVIEW AVE
BISMARCK ND 58501

MISSOURI WEST RURAL WATER DISTRICT
2816 37TH ST NW
MANDAN ND 58554

MITZEL BUILDERS, INC.
936 ALBERTA AVE
BISMARCK ND 58501

MORTON COUNTY SHERIFF
205 1ST AVE NW
MANDAN ND 58554

MORTON COUNTY WATER RESOURCE BOARD
PO BOX 1176
MANDAN ND 58554-1176

MR. JOHN GRAHAM
BURLEIGH CO. SOCIAL SERVICES
415 E. ROSSER AVE
BISMARCK ND 58501

NDDOT - DAVE LEFTWICH
608 E BLVD
BISMARCK ND 58505

PAUL TRAGER
MORTON COUNTY AUDITOR
210 2ND AVE NW
MANDAN ND 58554

PINEHURST PROPERTIES
1424 W CENTURY AVE
BISMARCK ND 58501

Q&R CLINIC
222 N 7TH
BISMARCK ND 58501

RICHARD SOLBERG
APPLE CREEK TOWNSHIP
9300 APPLE CREEK RD
BISMARCK ND 58501

ROBERT GOMEZ
DAKOTA CENTER FOR INDEPENDENT LIVING
3111 E BROADWAY AVE.
BISMARCK ND 58501

ROBIN WEIR
BIS-MAN TRANSIT
3750 E ROSSER AVE
BISMARCK ND 58501

RODGER WETZEL
PO BOX 5510
BISMARCK ND 58502-5510

ROXANNE BOSSERT DIRECTOR
CHILDREN SERVICES COORD COMM
6005 2ND ST - 7B
BISMARCK ND 58504

SATLER HOMES INC
PO BOX 7218
BISMARCK ND 58502-7218

SCCI HOSPITAL-CENTRAL DAKOTAS
1000 18TH ST NW
MANAN ND 58554

SIERRA CLUB
PO BOX 776
MANDAN ND 58554-0776

ST VINCENT'S CARE CENTER
1021 N 26TH ST
BISMARCK ND 58501

ST. ALEXIUS MEDICAL CENTER
900 E BROADWAY AVE
BISMARCK ND 58501

TERRY A WOELBER
TRANSIT BOARD OF DIRECTOR
828 E TURNPIKE AVE
BISMARCK ND 58501

TOM JOHNSON
HAY CREEK TOWNSHIP BOARD
5440 MEADOWCREST ROAD
BISMARCK ND 58504

UNITED TRIBES TECHNICAL COLLEGE
3315 UNIVERSITY DR
BISMARCK ND 58504

UNIVERSITY OF MARY
7500 UNIVERSITY DR
BISMARCK ND 58505

WACHTER DEVELOPMENT
2900 N 19TH ST
BISMARCK ND 58501

WYNN REINBOLD
JOB SERVICE ND
16 N END ST
BISMARCK ND 58501

MARY ANN ANDERSON
BISMARCK EARLY CHILDHOOD EDUCATION
PROGRAM
1227 PARK AVENUE
BISMARCK ND 58504

SHANTELL MEIDINGER
PRIDE, INC. EMPLOYMENT SERVICES
2400 E BROADWAY
BISMARCK ND 58501

JANET BELTRAN
1715 N 8TH STREET #1
BISMARCK ND 58501-1828

JOB SERVICE NORTH DAKOTA
PO BOX 1635
BISMARCK ND 58502-1635

CARROL A. MEYERS
RUTH MEIERS HOSPITALITY HOUSE
PO BOX 2092
BISMARCK ND 58502

CENTURY 21 LANDMARK REALTY
114 - 2ND AVENUE NW
MANDAN ND 58554

LYLE RIPPLINGER
7907 BLEMONT LANE
BISMARCK ND 58501

CHUCK BOSCH
PO BOX 267
MANDAN ND 58554

CHUCK STEBBINS
3111 E BROADWAY AVE
BISMARCK ND 58501

DEB DILGER
2512 COOLIDGE AVENUE
BISMARCK ND 58501

DON BRAUN
911 - 3RD STREET NW
MANDAN ND 58554

EILEENE OLSON
1823 MAPLETON AVE #7
BISMARCK ND 58501

GLENN LAUINGER
PO BOX 223
MANDAN ND 58554

JANE MORROW
300 NORTH 7TH STREET
BISMARCK ND 58501

JEANNIE PEDERSEN
215 E ARBOR #107C
BISMARCK ND 58504

JOHN LOERCH
PO BOX 517
MANDAN ND 58554

JULIE HEINRICH
1720 BURNT BOAT DRIVE
BISMARCK ND 58501

MABEL DEVER
2500 VALLEY VIEW #113
BISMARCK ND 58501

MICHAEL WAGNER
1308 NORTH 22ND STREET
BISMARCK ND 58501

RODGER WETZEL
PO BOX 5510
BISMARCK ND 58502

TERRY A. WOELBER
828 EAST TURNPIKE AVE
BISMARCK ND 58501

# BISMARCK–MANDAN LONG RANGE TRANSPORTATION PLAN NEWSLETTER

## *Purpose of the Plan*

The Long Range Transportation Plan evaluates the short and long range needs of the Bismarck-Mandan area transportation system. The plan is a programming tool which guides federal, state and local officials in prioritizing projects for receiving federal transportation funds. The plan also is an integral part of the 3-C (Comprehensive, Coordinated, and Continuous) transportation planning process maintained by the Bismarck-Mandan Metropolitan Planning Organization.

## *Past Successes*

The last Long Range Transportation Plan was adopted in 1996. As a result, many important local transportation projects were funded and subsequently implemented with the goal of improving our communities' transportation system.

Some of the transportation projects that were recommended by the 1996 Long Range Transportation Plan include the following Construction and Planning Projects:

**Cities of Bismarck & Lincoln and Burleigh County**

*Construction*

- ✗ East Century Avenue
- ✗ South 3rd Street
- ✗ Signals at University Drive and 12th Street
- ✗ Signals at Rosser Avenue and 26th Street

*Planning*

- ✗ Schafer Street Corridor
- ✗ State Highway #1804
- ✗ North State Street

**City of Mandan and Morton County**

*Construction*

- ✗ Main Street
- ✗ First Street
- ✗ Old Red Trail

*Planning*

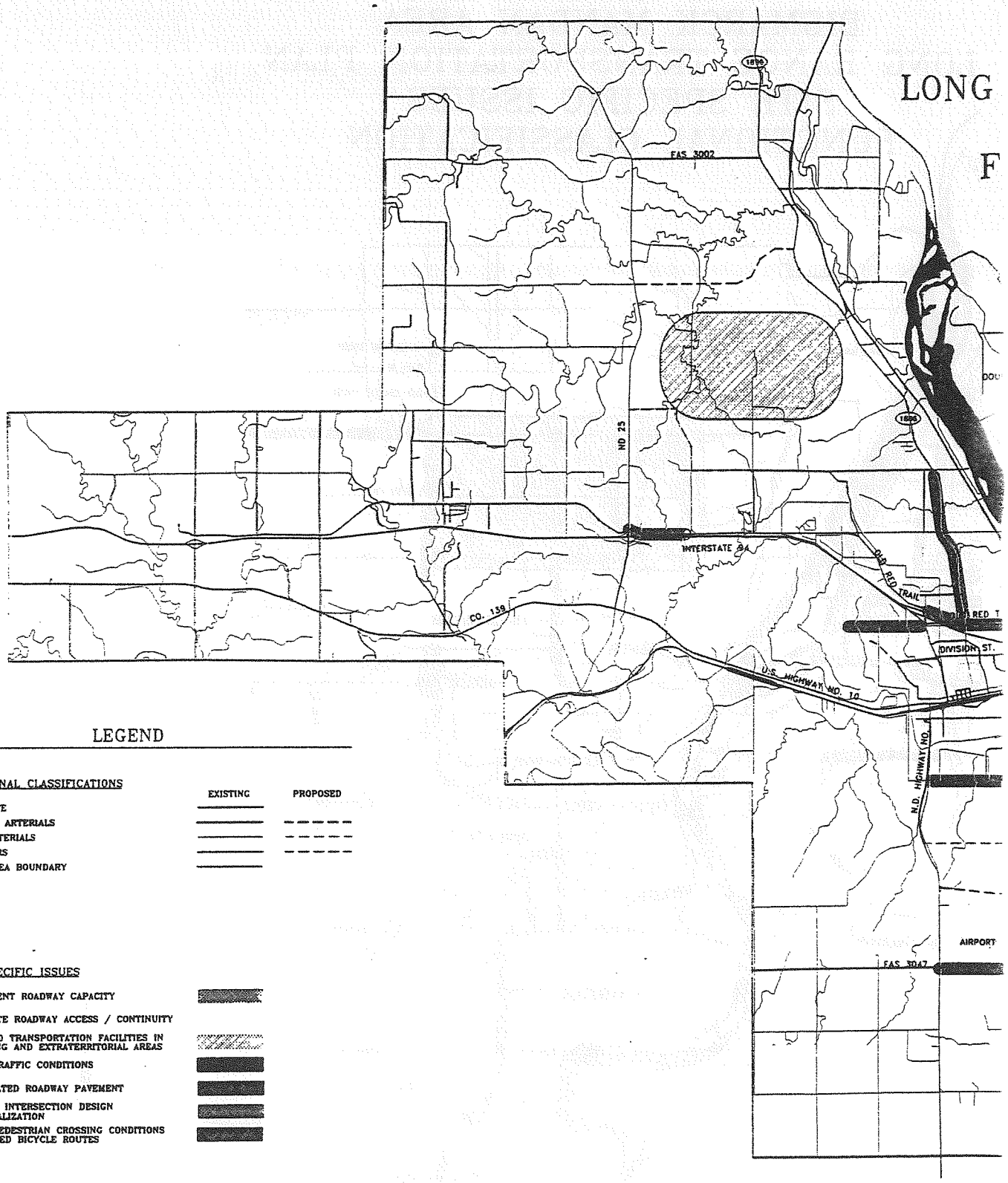
- ✗ Division Street

## *Meetings Held to Identify Issues*

During June and July 2000, issue identification meetings were held with the planning commissions and elected bodies for Burleigh and Morton Counties, and the Cities of Bismarck, Lincoln and Mandan. Key interest groups were invited to add their input at two additional meetings. All meetings were advertised in the local papers. In all, 12 meetings were attended by residents and representatives of special interest groups. The transportation issues identified at this point are illustrated on the map provided with this newsletter.

Issues were identified in each of the five local jurisdictions and were placed in the following major groupings:

- ✗ Insufficient Roadway Capacity
- ✗ Inadequate Roadway Access / Continuity
- ✗ Undefined Transportation Facilities in Developing and Extraterritorial Areas
- ✗ Unsafe Traffic Conditions
- ✗ Uncertain Transportation Project Funding
- ✗ Frequent Auto / Train Conflicts
- ✗ Deteriorated Roadway Pavement
- ✗ Deficient Intersection Design and Signalization
- ✗ Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
- ✗ Inadequate Freight Routes




## LEGEND

### FUNCTIONAL CLASSIFICATIONS

| | EXISTING | PROPOSED |
|---|---|---|
| INTERSTATE | ——— | |
| PRINCIPAL ARTERIALS | ——— | - - - - - |
| MINOR ARTERIALS | ——— | - - - - - |
| COLLECTORS | ——— | - - - - - |
| STUDY AREA BOUNDARY | ——— | |

### SITE SPECIFIC ISSUES

- INSUFFICIENT ROADWAY CAPACITY
- INADEQUATE ROADWAY ACCESS / CONTINUITY
- UNDEFINED TRANSPORTATION FACILITIES IN DEVELOPING AND EXTRATERRITORIAL AREAS
- UNSAFE TRAFFIC CONDITIONS
- DETERIORATED ROADWAY PAVEMENT
- DEFICIENT INTERSECTION DESIGN AND SIGNALIZATION
- UNSAFE PEDESTRIAN CROSSING CONDITIONS AND LIMITED BICYCLE ROUTES

### IDENTIFIED NON-SITE ISSUES

- UNCERTAIN TRANSPORTATION PROJECT FUNDING
- INADEQUATE FREIGHT ROUTES

ULTEIG Engineers inc.

ULTEIG ENGINEERS, INC. CONSULTING ENGINEERS FARGO
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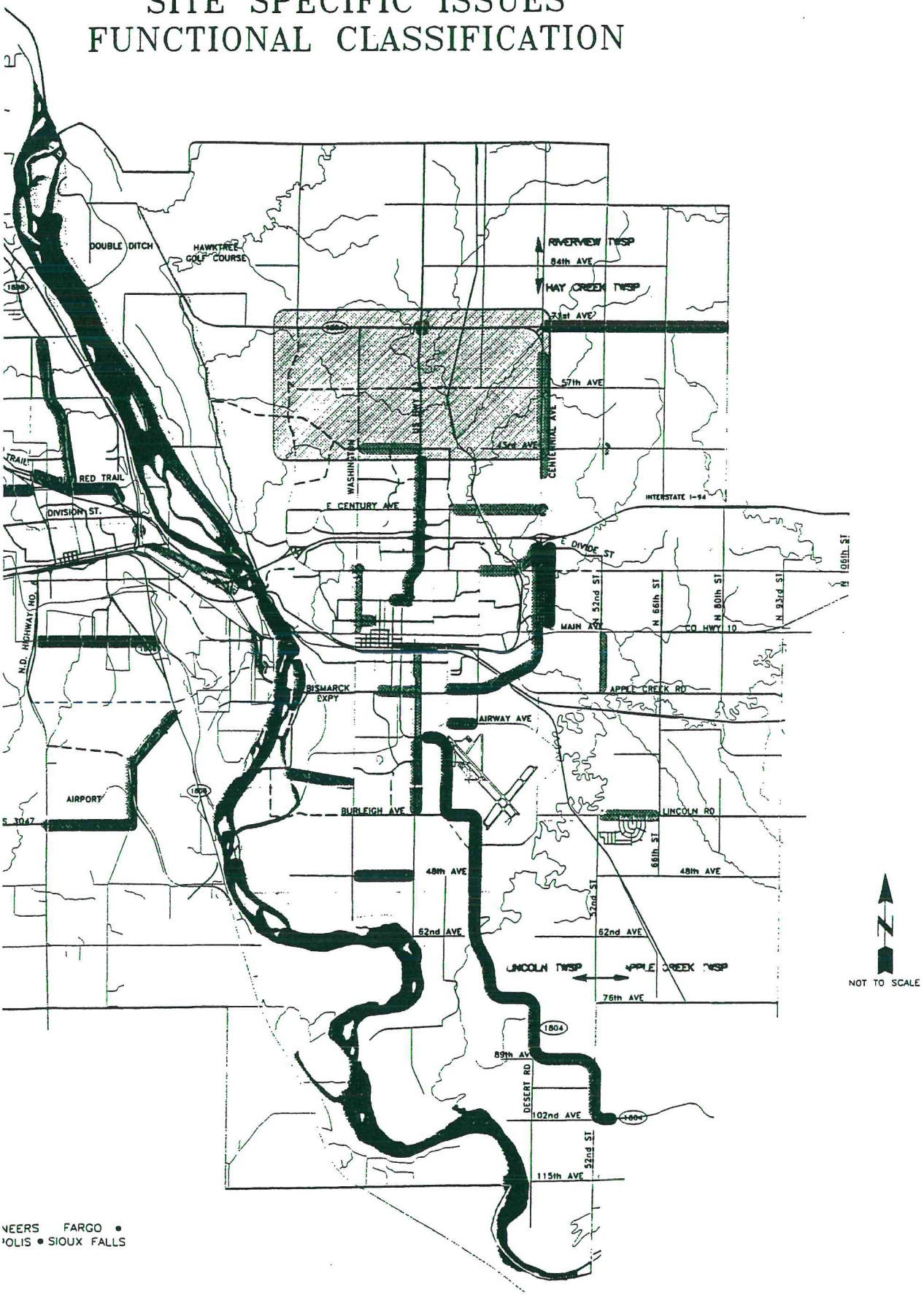
# BISMARCK MANDAN AREA
# LONG RANGE TRANSPORTATION PLAN
# SITE SPECIFIC ISSUES
# FUNCTIONAL CLASSIFICATION

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### *New Model*

An extensive effort has been undertaken to upgrade the 1996 Long Range Plan's computer model (TRANPLAN). Computer models are used to develop 20 year projections for traffic flow on City and County arterial and collector roadways. The new computer model (TP+) uses an improved graphical interface (VIPER). Special attention has been given to validate the household and employment projections which were prepared for the previous model. Modifications have been made to better reflect current conditions and any changes that have occurred since 1996. The traffic forecasts generated by this new model will play an important role in addressing capacity issues and preparing recommendations for widening streets.

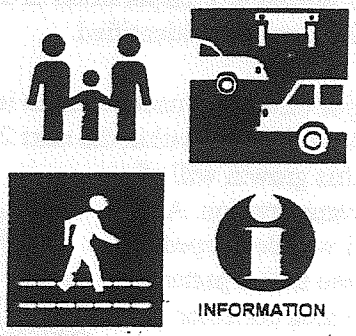
### *Accompanying Plans*

*Transit Plan*: A new transit plan is being prepared to review the existing transit system for the Bismarck-Mandan area and to consider possible changes in service. Significant input has been received pertaining to the current transit system. The transit plan will investigate possible expansion of rider markets, and alternative transit service arrangements ranging from the current door-to-door demand responsive service to fixed public bus routes.

*Land Use Plan*: Land Use Plan background information and socio-economic data analysis has been done in conjunction with analysis of City and County demographics for the new transportation model. Future growth scenarios are presently being explored with local officials. The next step is consideration of where future land uses and growth are desirable. This Land Use Plan will assist in projecting where growth will take place, and will help local staff evaluate current policy for future growth management.

### *Future Activities*

The views and opinions we have received concerning transportation issues in the Bismarck-Mandan area will play an important role in identifying plausible alternatives to address system deficiencies. Over the coming months, we will combine these views with technical analyses and input from local technical staffs in an effort to define the alternatives. Once these alternatives have been developed, they will then be evaluated to determine whether they are technically sound, financially feasible, environmentally sensitive, and socially acceptable.




### *Public Involvement Opportunities*

Your next opportunity for public input is currently scheduled for February 2001. At that time, project alternatives will be presented. All public comments received will be considered during the selection process.

This meeting will be your primary opportunity to view the alternatives being considered to address our area's transportation system needs, and to voice your opinions on which alternatives should be implemented.

The Bismarck-Mandan Area Long Range Transportation Plan is scheduled for final adoption in August 2001.

Questions or comments pertaining to this newsletter may be submitted to:

**Contact Person:** Brant P. Malsam
Ulteig Engineers, Inc.
1701 South 12th Street
Bismarck, ND 58504
701-258-6507 • FAX 701-224-1163

# BISMARCK - MANDAN
# LONG RANGE TRANSPORTATION PLAN
# NEWSLETTER
## January 2001

### *Progress Made*

Significant progress has been made to update the Long Range Transportation Plan since this effort began in March 2000. Public meetings were held in June and July 2000, during which many issues related to transportation in the Bismarck-Mandan area were identified.

A major effort was undertaken to identify where growth will occur within the next 20 years, and how this growth will affect transportation. A new model was developed to simulate traffic patterns on the area collector and arterial street systems.

The street system was further analyzed to prepare project alternatives to address the various issues raised during the review process. These alternatives include a variety of potential improvements for the Bismarck-Mandan metropolitan area.

### *Corridor Preservation*

The Long Range Transportation Plan is making a strong effort to identify roadway corridors that should be preserved from the affects of adverse development. The Plan will make recommendations on desirable right-of-way widths, access spacing, and uniform application of approved standards.

### *Beltway Arterial Alternatives*

The Long Range Transportation Plan has also proposed that a beltway around the urban area be preserved. This beltway would serve both as an urban bypass and as an access route for future tiers of development.

The beltway would require planning and eventual construction of two new bridges over the Missouri River, one on the north side of the metropolitan area and one on the south side. While the time to construct these bridges may be well into the future, the effort to preserve locations must be undertaken soon if the eventual construction is to have any chance of becoming a reality.

### *Project Alternative Highlights*

Roadway project alternative locations are shown on the map inside this newsletter. Based on the technical analysis and comments received during the issue identification process, the following listed projects were selected to highlight because of their interest to the community:

#### *Burleigh County/Bismarck/Lincoln Projects*

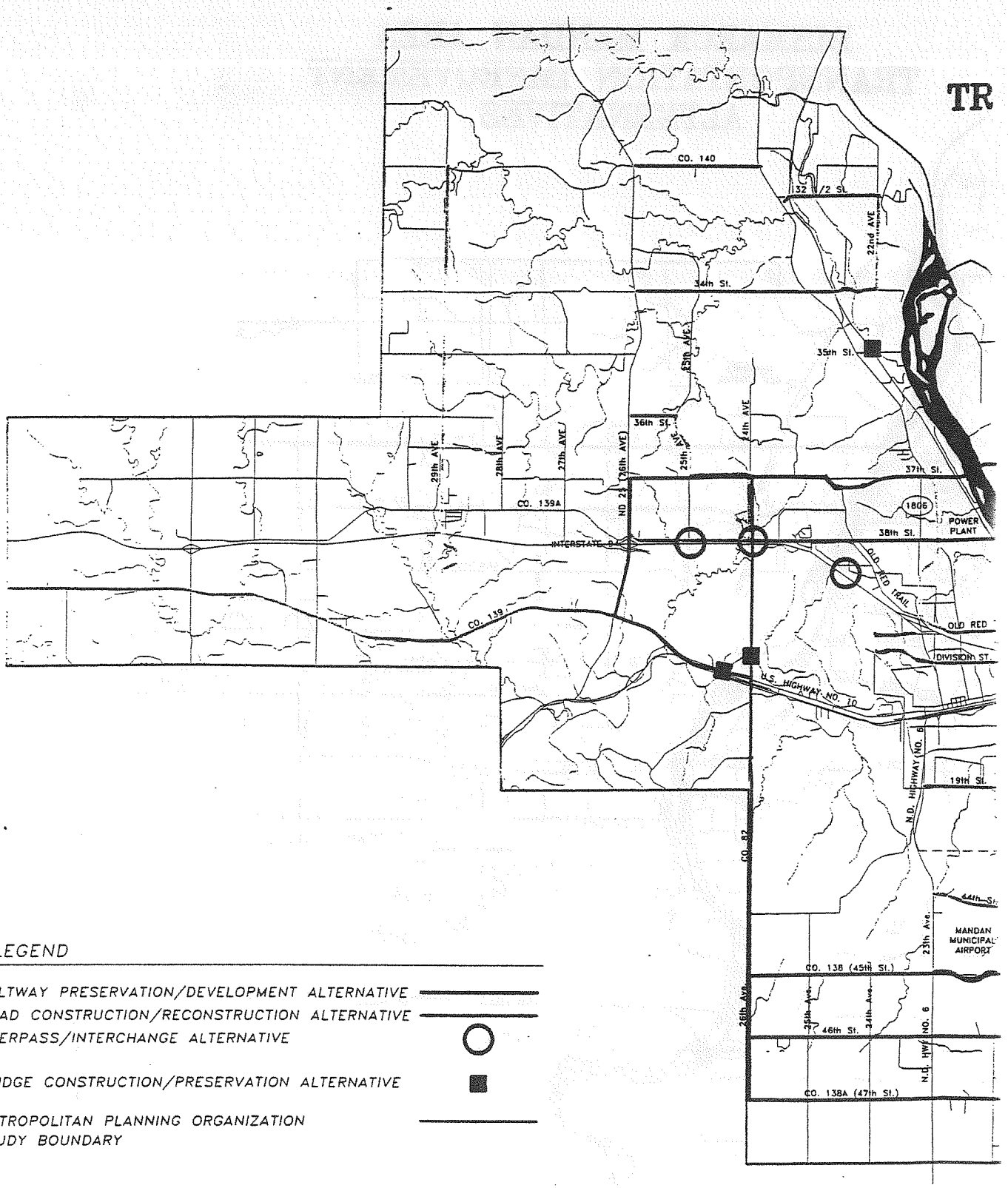
- East Century Avenue Reconstruction (19th St. - Centennial)
- Washington Street Reconstruction/Re-striping (Main Ave. - Century Ave.)
- Abandoned Rail Bed Road Construction (Airway Avenue - Lincoln Road)
- Bismarck Expressway Reconstruction (Divide Ave. - Rosser)

#### *Morton County/Mandan Projects*

- I-94 Interchange West of Mandan
- Highway #1806 Realignment to Sunset Drive Interchange.
- McKenzie Drive Extension to Highway #1806.
- County 82 Corridor Preservation and Development.

#### *Bismarck-Mandan Regional Projects*

- Northside Missouri River Bridge.
- Southside Missouri River Bridge.
- Beltway Arterial Corridor Preservation and Development.




LEGEND

BELTWAY PRESERVATION/DEVELOPMENT ALTERNATIVE

ROAD CONSTRUCTION/RECONSTRUCTION ALTERNATIVE

OVERPASS/INTERCHANGE ALTERNATIVE

BRIDGE CONSTRUCTION/PRESERVATION ALTERNATIVE

METROPOLITAN PLANNING ORGANIZATION STUDY BOUNDARY

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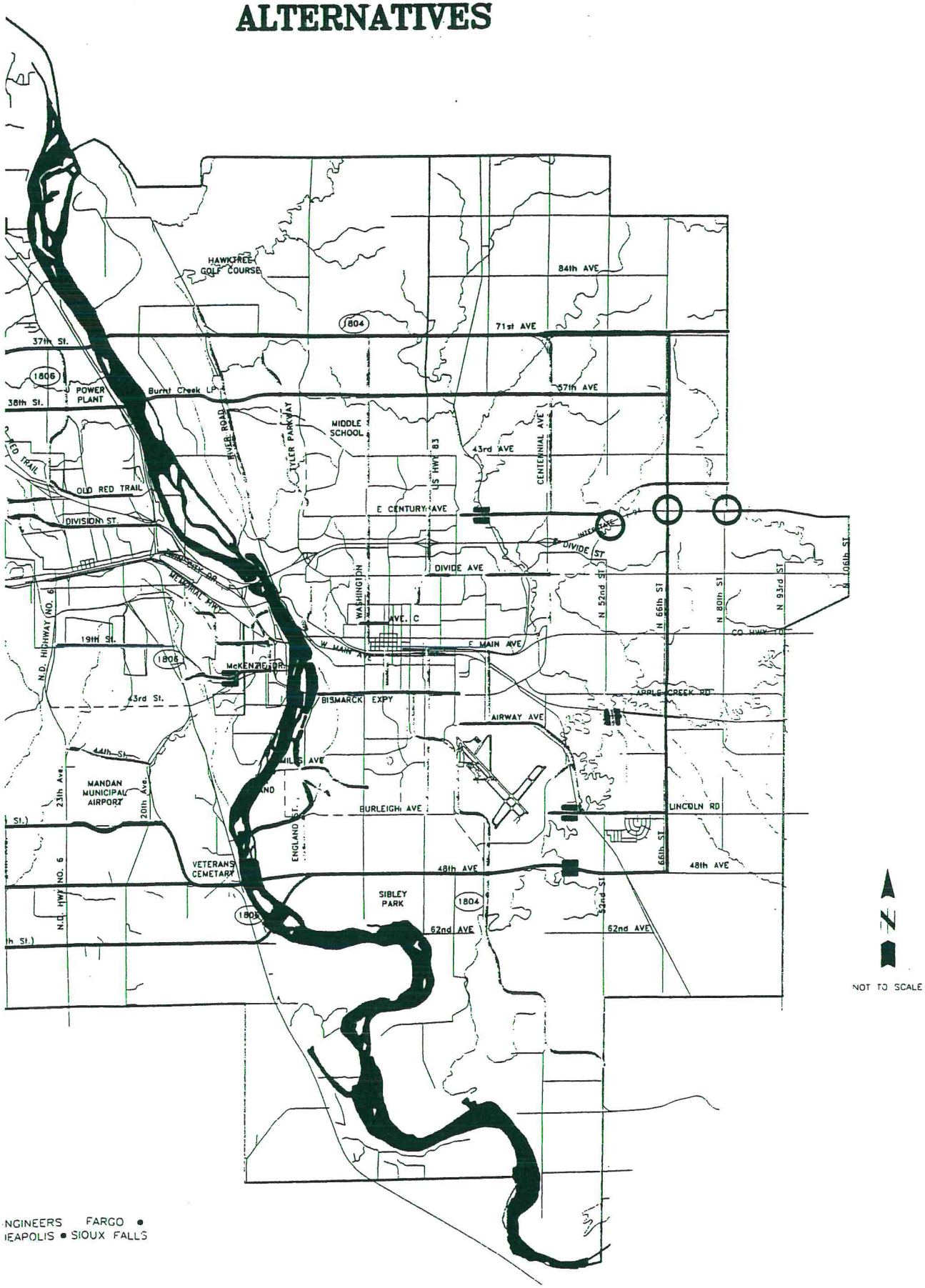
# BISMARCK MANDAN AREA TRANSPORTATION IMPROVEMENT ALTERNATIVES

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### *Bikeway Pedestrian Facilities Planning*

Significant progress has been made in recent years to develop the sidewalk and bikeway systems within the Bismarck-Mandan area. Current plans are being reviewed and new proposals are being made to further enhance these systems. Additional assistance is being provided to prioritize future projects within projected levels of available funding. These efforts are being coordinated through the City and County Parks and Recreation Departments.

### *Public Involvement Opportunities*

**NOW IS THE TIME !!!**

Now is the time to express your views to the technical staff, planning agencies and elected officials having primary responsibility in developing the long range transportation plan for the Bismarck-Mandan metropolitan area. If you have any concerns about project proposals, if you feel that some important transportation need may have been overlooked, or if you want to express your desires related to the timing or type of projects to move forward to construction, this is your greatest opportunity to impact the final outcome of this plan.

A series of public open house meetings have been scheduled to receive your input for this plan. While you may attend any or all of the meetings, you are encouraged to attend the meeting scheduled in your respective jurisdiction.

### *Bismarck-Mandan Transit Plan*

A comprehensive transit study of the Bismarck-Mandan metropolitan area is nearing completion. The Bis-Man Transit Board recently approved study recommendations that will change the way transit services are provided in the metro area.

A total of three alternate "transit service options" were explored during the course of the study. They ranged from an option leaving service virtually unchanged, with limited opportunities for general public transit service, to a limited expansion of transit services with three to five new routes serving the general public, to a moderate expansion of transit service with 10 to 12 new routes serving the general public.

The recommended "transit service option", approved by the Bis-Man Transit Board, would expand existing "demand-response" transit service by including persons dependent on transit (typically low-income individuals and children) and also provide a fixed-route service component of five routes. Demand-response service is planned to operate seven days a week/24 hours a day while fixed-route service is proposed to operate Monday through Friday, 8:00 a.m. to 5:00 p.m. and 9:00 a.m. to 3:00 p.m. on weekends.

The final study recommendations and other findings will be available for public review in early February (see transit meeting schedule below). Implementation of Study recommendations will be considered by the local governing bodies in the months and years to come.

**Public Meeting Schedule**

| | | |
|---|---|---|
| **Transportation Public Meeting** | **Mandan Planning Commission** | 5:30 p.m. on Monday, February 5, 2001, at the Mandan City Commission Room located at 205 2nd Avenue NW, Mandan, ND. |
| **Transportation Public Meeting** | **Lincoln Planning and Zoning Commission** | 7:00 p.m. on Tuesday, February 6, 2001, at the Lincoln City Commission Room located at 68 Santee Road, Lincoln, ND. |
| **Transportation Public Meeting** | **Burleigh County Planning Commission** | 5:15 p.m. on Wednesday, February 14, 2001, at the Tom Baker Meeting Room located at the City/County Building, 221 N. 5th Street, Bismarck, ND. |
| **Transportation Public Meeting** | **Bismarck Planning Commission** | 5:00 p.m. on Wednesday, February 21, 2001, at the Tom Baker Meeting Room located at the City/County Building, 221 N. 5th Street, Bismarck, ND. |
| **Transportation Public Meeting** | **Morton County Planning Commission** | 5:30 p.m. on Thursday, February 22, 2001, at the Morton County Commission Room located at 210 2nd Avenue NW, Mandan, ND. |
| **Transit Public Meeting** | **Public Meeting** | 5:30 p.m. on Tuesday, February 20, 2001 at the Tom Baker Meeting Room located at the City/County Building, 221 N. 5th Street, Bismarck, ND. |
| **Transit Public Meeting** | **Public Meeting** | 5:30 p.m. on Monday, February 26, 2001 at the Mandan City Commission Room located at 205 2nd Avenue NW, Mandan, ND. |

Questions or comments pertaining to this newsletter may be submitted to:

**Contact Person:**

Brant P. Malsam
Ulteig Engineers, Inc.
1701 South 12th Street
Bismarck, ND 58504
701-258-6507 • Fax 701-224-1163
E-mail: bmalsam@ulteig-bis.com

Steve Saunders
Bismarck-Mandan
MPO/Trans Planner
P.O. Box 5503
Bismarck, ND 58506
701-222-6449 • Fax 701-222-6450
E-mail: ssaunder@pioneer.state.nd.us

CONSULTING ENGINEERS SINCE 1944

# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
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# *MEMO*

FILE COPY

***To:*** Bismarck-Mandan Metropolitan Planning Organization

***From:*** Steve A. Grabill, P.E.

***Date:*** July 17, 2000

***Subject:*** Metropolitan Transportation Issues
Long Range Transportation Plan and Transit Plan
UEI Project № 2000-8007 and № 2000-8008

We have met with most of the local jurisdictions and held five public meetings (two more are scheduled this week) to receive input on community needs relative to transportation and transit issues. We are also supplementing this input with feedback from local technical staff so we may have a complete picture of the transportation and transit issues that should be addressed by the respective plans.

Prior to moving on the next step in the process, we wish to receive your review and concurrence on the attached lists of issues. These may be further supplemented as the planning process moves forward. However, these lists will form the basis for development of non-roadway capacity alternatives that will be evaluated within these plans.

We will be in attendance at your July 24, 2000 TAC and Policy Board meetings to receive any input you wish to provide, as well as your concurrence. Thank you for your continued involvement in the development of these important plans.

Jz

Enclosure

c: Mr. Brant Malsam
Mr. Joe Kern

# Metropolitan Transportation Issues
# Long Range Transportation Plan and Transit Plan
# UEI Project № 2000-8007 and № 2000-8008

*City of Bismarck Transportation Issues*

A. Adequate Roadway Access/Continuity
   1. Access across I-94 via 26th Street
   2. Completion of the Schafer Street Corridor
   3. Insufficient north-south corridors
   4. Insufficient access at London Avenue

B. Unsafe Traffic Conditions
   1. Excessive speeding in town
   2. Avenue C - Raymond to 3rd Street (narrow)

C. Deteriorated Roadway Pavement
   1. Complete 12th Street south of University Drive

D. Deficient Intersection Design and Signalization
   1. Improvements needed at State Street and Interstate Avenue
   2. Improvements needed at State Street and Boulevard
   3. 71st Street and ND Highway 83 Int.
   4. Washington Street and Divide

E. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
   1. Improve facilities along Bismarck Expressway
   2. Improve facilities along State Street
   3. Improve facilities near grade schools
   4. Improve facilities near Bismarck High School
   5. Improve facilities near local hospitals

F. Inadequate Truck Routes
   1. Poor use of truck routes

G. Insufficient Roadway Capacity
   1. East Century Avenue - 19th Street to Centennial Road
   2. Intersections along Bismarck Expressway Boulevard
   3. Civic Center area capacity
   4. Washington Street - Divide Avenue to Rosser
   5. 43rd Avenue - Washington Street to ND Highway 83
   6. Divide Avenue west of Bismarck Expressway

*City of Bismarck Transit Issues*

A. Transit System Too Exclusive
   1. Consider fixed route or other potential system changes
   2. Expand eligibility to meet needs of other potential users
   3. Expand system use by improving public awareness

*Burleigh County Transportation Issues*

A. Inadequate Roadway Access/Continuity
   1. Access to developments along River Road
   2. Need to develop access control policies

B. Unsafe Traffic Conditions
   1. Standards allow narrow highways in County

C. Deteriorated Roadway Pavement
   1. Complete East Century Avenue from 19th Street to Centennial Road

D. Deficient Intersection Design and Signalization
   1. Centennial Road needs a four-way stop north of I-94
   2. All traffic signals should have left turn lanes and left turn arrows

E. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
   1. Need more bikeways paralleling Missouri River
   2. Need uniform standards for continuous sidewalks

*Burleigh County Transit Issues*

A. Transit System Too Exclusive
   1. Consider fixed route or other potential system changes
   2. Expand Dial-a-Ride to one mile outside City limits
   3. Expand eligibility to meet needs of other potential users

*Lincoln Transportation Issues*

A. Inadequate Roadway Access/Continuity
   1. Access from 80th Street to I-94
   2. Indirect access to Bismarck
   3. Severe access impacts during flood conditions over Lincoln Road

B. Undefined Transportation Facilities in Developing and Extraterritorial Areas
   1. Need to develop road along old railroad grade as access to Bismarck
   2. Complete road north of stockyard
   3. Extend 52nd Street north of Lincoln Road (preservation)

C. Unsafe Traffic Conditions
   1. Airway Avenue - sharp curves, dark pavement, slippery, snow buildup where trees present
   2. Lack of turn lanes on Lincoln Road

D. Uncertain Transportation Project Funding
   1. Lincoln Road, 66th Street and Airway Avenue not on Federal Aid System
   2. 52nd Street not on future functional classification system (south of Lincoln Road)

E. Deteriorated Roadway Pavement
   1. Airway Avenue west of Sykes

F. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
   1. Pedestrian traffic across Lincoln Road to the north to future development
   2. Bicycle facilities connecting to Bismarck

*Lincoln Transit Issues*

A. Transit System Too Exclusive
   1. Expand eligibility to meet needs of other potential users
   2. Consider fixed route or other potential system changes
   3. Include City of Lincoln in service area

*Mandan Transportation Issues*

A. Inadequate Roadway Access/Continuity
   1. Need Interchange Between ND 25 and Sunset Drive
   2. Access to 46th Avenue SE/Marina Bay Area
   3. Access from Eastbound I-94 to Main Street
   4. Access to Captains Landing
   5. Access to Lohstreter Road from Division Street

B. Undefined Transportation Facilities in Developing and Extraterritorial Areas
   1. Need Another Missouri River Bridge Crossing South of Mandan
   2. Extension of Division Street

C. Unsafe Traffic Conditions
   1. 2nd Street
   2. 3rd Street
   3. 19th Street Southeast (Highway 6 - Highway 1806)
   4. Division Street

D. Deteriorated Roadway Pavements
   1. 2nd Street
   2. 3rd Street
   3. 19th Street Southeast (Highway 6 - Highway 1806)

E. Deficient Intersection Design and Signalization
   1. Insufficient Sight Distance at 1st Street and 4th Avenue

*Mandan Transit Issues*

A. Transit System Too Exclusive
   1. Expand Eligibility to Meet Needs of Other Potential Users
   2. Consider Fixed Route or Other Potential System Changes

*Morton County Transportation Issues*

A. Inadequate Roadway Access/Continuity
   1. Only one access to River Bend Area. Safety concerns from refinery for this residential area because of only one way out.
   2. Need for Collins Avenue interchange at Interstate 94
   3. Need for East-West corridor between Main Street and Interstate 94
   4. Interstate 94 Interchange between Seven Seas motel and Highway 25
   5. Additional crossing of Heart River for area east of Highway 25
   6. Additional crossings of the Missouri River both north and south
   7. Corridor Preservation as development continues south
   8. Access to Harmon Lake

B. Unsafe Traffic Conditions
   1. High mast lighting east of Bonanza is lacking

C. Deteriorated Roadway Pavement
   1. Old Red Trail between Mandan Avenue and Sunset Drive
   2. Widen 6th Avenue NW
   3. Improve Highway 1806 North of Old Red Trail
   4. Improving Frontage Road north of Interstate 94 east of Highway 25

D. Deficient Intersection Design and Signalization
   1. Extra lane east bound on Main Street to Interstate 94, provide four lanes the entire length between Mandan and Bismarck
   2. Missouri Drive at Main Street, near Bonanza
   3. McKenzie Drive and Memorial Highway
   4. Third Street and Memorial Highway
   5. Slip ramp to Interstate 94 from Eastwood Additions

*Morton County Transit Issues*

A. Transit System Too Exclusive
   1. Consider fixed route or other potential system changes, subsidies
   2. Expand eligibility to meet needs of other potential users

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ULTEIG ENGINEERS, INC.
1701 S. 12TH STREET
BISMARCK, ND 58504-6644

PHONE 701/258-6507
FAX 701/224-1163

OTHER OFFICES:
FARGO, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# MEMO

**TO:** Bismarck City Commission
File

**FROM:** Steve A. Grabill, P.E.

**DATE:** June 21, 2000

**SUBJECT:** Bismarck Planning Commission Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI #2000-8007

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On June 21, 2000, Ulteig Engineers, Inc. staff conducted a public meeting before the Bismarck Planning Commission to receive input on community needs relative to transportation and transit issues. Three residents were in attendance (see attached attendance roster).

Following introductions, Mr. Grabill explained the purposes for the Long Range Transportation and Transit Plans. An outline of the presentation is attached.

No input was received from the general public in attendance. However, significant input was received from the Bismarck Planning Commission. The following list of issues/needs was received:

*City of Bismarck Transportation Issues*

A. Adequate Roadway Access/Continuity
   1. Access across I–94 via 26th Street
   2. Completion of the Schafer Street Corridor
   3. Insufficient north-south corridors
   4. Insufficient access at London Avenue

B. Unsafe Traffic Conditions
   1. Excessive speeding in town
   2. Avenue C - Raymond to 3rd Street (narrow)

C. Deteriorated Roadway Pavement
   1. Complete 12th Street south of University Drive

D. Deficient Intersection Design and Signalization
   1. Improvements needed at State Street and Interstate Avenue
   2. Improvements needed at State Street and Boulevard
   3. 71st Street and ND Highway 83 Int.
   4. Washington Street and Divide

E. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
   1. Improve facilities along Bismarck Expressway
   2. Improve facilities along State Street
   3. Improve facilities near grade schools
   4. Improve facilities near Bismarck High School
   5. Improve facilities near local hospitals

F. Inadequate Truck Routes
   1. Poor use of truck routes

G. Insufficient Roadway Capacity
   1. East Century Avenue - 19th Street to Centennial Road
   2. Intersections along Bismarck Expressway Boulevard
   3. Civic Center Area Capacity
   4. Washington Street - Divide Avenue to Rosser
   5. 43rd Avenue - Washington Street to ND Highway 83
   6. Divide Avenue west of Bismarck Expressway

***City of Bismarck Transit Issues***

A. Transit System Too Exclusive
   1. Consider fixed route or other potential system changes
   2. Expand eligibility to meet needs of other potential users
   3. Expand system use by improving public awareness

# PLEASE PRINT

# ATTENDANCE ROSTER

**PROJECT** BISMARCK-MANDAN MPO LONG RANGE TRANSPORTATION AND TRANSIT PLAN

**MEETING LOCATION** BISMARCK CITY HALL - 221 N. 5TH STREET

**DATE/TIME** JUNE 21, 2000 – 5:15 P.M.

| Name | Representing/Title | Title | Phone | Fax |
|---|---|---|---|---|
| Steve Windish | Ulteig Engineers | | 258-6507 | |
| Bill Augustadt | Building Official | | 258-2070 | |
| Carl Hokenstad | City Planning Dept. | City Planner | 222-6447 | |
| • Dinah Roberson | | | 223-5377 | |
| • Gary Robertson | | | 223-5377 | |
| Gerry Floden | ULTEIG ENG. INC | PRES. | 701-237-3211 | |
| DAVE PATIENCE | SWENSON, HAGEN + CO, | DEVELOPMENT CONSULTANT | 223-2600 | |
| Brant Malsam | UEI | PM | 258-6507 | |
| Steve Grabill | Ulteig Engineers, Inc | PE | 701-237-3211 | |
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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

***To:*** Burleigh County Commission
File

***From:*** Steve A. Grabill, P.E.

***Date:*** June 14, 2000

***Subject:*** Burleigh County Planning Commission Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI Project № 2000-8007

On June 14, 2000, Ulteig Engineers, Inc. staff conducted a public meeting before the Burleigh County Planning Commission to receive input on community needs relative to transportation and transit issues. Six residents were in attendance (see attached attendance roster).

Following introductions, Mr. Grabill explained the purposes for the Long Range Transportation and Transit Plans. An outline of the presentation is attached.

Significant input was received from the public and the Burleigh County Planning Commission. The following list of issues/needs was received:

***Burleigh County Transportation Issues***

A. Inadequate Roadway Access/Continuity
   1. Access to developments along River Road
   2. Need to develop access control policies -

B. Unsafe Traffic Conditions
   1. Standards allow narrow highways in County

C. Deteriorated Roadway Pavement
   1. Complete East Century Avenue from 19th Street to Centennial Road

D. Deficient Intersection Design and Signalization
   1. Centennial Road needs a four-way stop north of I-94
   2. All traffic signals should have left turn lanes and left turn arrows

E. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
   1. Need more bikeways paralleling Missouri River
   2. Need uniform standards for continuous sidewalks

***Burleigh County Transit Issues***

A. Transit System Too Exclusive
   1. Consider fixed route or other potential system changes
   2. Expand Dial-a-Ride to one mile outside City limits
   3. Expand eligibility to meet needs of other potential users

jz

Attachment

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# ATTENDANCE ROSTER

**PROJECT** Bismarck/Mandan MPO LONG RANGE TRANSPORTATION AND TRANSIT STUDY

**MEETING LOCATION** Burleigh County Planning

**DATE/TIME** 06/14/00 5:15 P.M.

| Name | Representing | Title | Phone | Fax |
|---|---|---|---|---|
| Steve Windish | Ulteig Engineers | | 258-6507 | |
| Steve Grabill | Ulteig Engineers | | 701-237-3211 | |
| Rodney Breitbach | | | 701-255-3349 | |
| Lee Vogt | BRFD | | 701-224 0537 | |
| RODNEY Hochhalter | BRFD | CHIEF | 701-258-5594 | |
| Robert GRAHAM | BRFD + County Resident | | 222-2941 | |
| Mike Schnetzer | City of Bismarck | | | |
| Todd Myers | Bismarck | | 223-9578 | |
| Colby Well | Mandan | | 663-0844 | |
| Steve McCormick | Ridge at Hawktree | | 2236695 | |
| Sandy Clark | Bis-Man HomeBuilders | | 222-2400 | |
| Bill Hugelstadt | Bur. Co and City of Bismarck | Building Official | 258-2070 | |
| Brant Malsam | Ulteig Engineers | | 258-6507 | |
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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

***To:*** Lincoln City Council
File

***From:*** Steve A. Grabill, P.E.

***Date:*** June 6, 2000

***Subject:*** Lincoln Planning Commission Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI Project Nº 2000-8007

On June 6, 2000, Ulteig Engineers, Inc. staff conducted a public meeting before the Lincoln Planning Commission to receive input on community needs relative to transportation and transit issues. Two residents were in attendance (see attached attendance roster).

Following introductions, Mr. Grabill explained the purposes for the Long Range Transportation and Transit Plans. An outline of the presentation is attached.

Significant input was received from the public and the Lincoln Planning Commission. Written comments were also received from Terry Fasteen, Chairman of the Lincoln Planning and Zoning Commission. The following list of issues/needs was received:

***Lincoln Transportation Issues***

A. Inadequate Roadway Access/Continuity
   1. Access from 80th Street to I-94
   2. Indirect access to Bismarck
   3. Severe access impacts during flood conditions over Lincoln Road

B. Undefined Transportation Facilities in Developing and Extraterritorial Areas
   1. Need to develop road along old railroad grade as access to Bismarck
   2. Complete road north of stockyard
   3. Extend 52nd Street north of Lincoln Road (preservation)

C. Unsafe Traffic Conditions
   1. Airway Avenue - sharp curves, dark pavement, slippery, snow buildup where trees present
   2. Lack of turn lanes on Lincoln Road

D. Uncertain Transportation Project Funding
   1. Lincoln Road, 66th Street and Airway Avenue not on Federal Aid System
   2. 52nd Street not on future functional classification system (south of Lincoln Road)

E. Deteriorated Roadway Pavement
   1. Airway Avenue west of Sykes

F. Unsafe Pedestrian Crossing Conditions and Limited Bicycle Routes
   1. Pedestrian traffic across Lincoln Road to the north to future development
   2. Bicycle facilities connecting to Bismarck

***Lincoln Transit Issues***

A. Transit System Too Exclusive
   1. Expand eligibility to meet needs of other potential users
   2. Consider fixed route or other potential system changes
   3. Include City of Lincoln in service area

jz

Attachment

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# ATTENDANCE ROSTER

**PROJECT** Bismarck-Mandan MPO Long Range Transportation and Transit Plan

**MEETING LOCATION** Lincoln City Hall

**DATE/TIME** June 6, 2000 7:00 p.m.

| Name | Representing | Title | Phone | Fax |
|---|---|---|---|---|
| K. D. ANDERSON | ULTEIG ENG. INC. | | 258-6507 | |
| Steve Windish | Ulteig Eng. Inc. | | 258-6507 | |
| RICHARD BOLD | CITY COUNCIL | | 222-3036 | |
| Marlene Thurn | City Auditor/Administrator | City Lincoln | 2587969 | 2587969 |
| C. W. Veitz | Bldg-Inspector | | 258-9791 | |
| Steve Saunders | MPO | Trans Planner | 222-6449 | 222-6450 |
| Steve Grabill | Ulteig Engineers, Inc. | PE | (701) 237-3211 | (701) 237-3191 |
| Mike Ulmen | LINCOLN P&Z | | 258-6472 | |
| Helen Magilke | Vice-Chair Lincoln P+Z | Chairwomen | 258-3145 | |
| Carlotta Brueckel | Sec, P+Z Lincoln | Sec. | 222-1064 | 258-2857 wk fax 258-2833 wk phone |
| Janice Sachman | P+Z, Lincoln | | 258-4193 | |
| [illegible] | P+Z Lincoln | | 258-1287 | |
| Jay [illegible] | CITY COUNCIL | | 258-6395 | |
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The City of Lincoln is happy to be a part of the new urban transportation group. Our past participation has been very limited but would like to be more active if possible.

The city is continually growing larger with a demand for better access to both Bismarck and to the Interstate.

In the 16+ years we've lived in Lincoln, the road changes have done little to improve our access and if anything, have been made worse to benefit others.

The new road around the airport has slowed travel and has created new spots to trap snow. We would like to see the airport fence moved an additional 100' away from the road or something done on the airport property to keep the drifting away from the road.

We would like a more direct route to Bismarck. Possibly utilizing the old railroad grade. Yes, this would mean a couple of river crossings, but it was no big deal to curve the road round giving us additional miles with no passing zones. With all the truck traffic travel, times have increased.

If time is money, the citizens of Lincoln are on the short end. We used to be able to travel straight north of the livestock yard, but that was removed so we had to travel west and then back east to get to the same area.

We in Lincoln do not have the benefit of any state highway system for commercial access. I would think a plan to run a route from the east side of Lincoln to the north then east to the first overpass east of Bismarck with on/off ramps to the Interstate would benefit our area also.

Not only Lincoln residents would utilize this new exit. There are housing developments continually growing up east of Bismarck. Not only that but Lincoln is bigger than Menoken-McKenzie and Sterling.

With the increasing population as stated before comes the need for better transportation. Better transportation is the key to commercial and residential development.

I look forward to monthly updates to me personally if you would please do that.

Thank you.

Carlotta Boeckel

FOR Terry Fasteen
Chairman, Lincoln Planning & Zoning

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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

***To:*** File

***From:*** Steve A. Grabill, P.E.

***Date:*** June 5, 2000

***Subject:*** Mandan Planning Commission Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI Project Nº 2000-8007

On June 5, 2000, Ulteig Engineers, Inc. staff conducted a public meeting before the Mandan Planning Commission to receive input on community needs relative to transportation and transit issues. Seven residents were in attendance (see attached attendance roster).

Following introductions, Mr. Grabill explained the purposes for the Long Range Transportation and Transit Plans. An outline of the presentation is attached.

No input was received from the general public in attendance. However, significant input was received from the Mandan Planning Commission. The following list of issues/needs was received:

***Mandan Transportation Issues***

A. Inadequate Roadway Access/Continuity
   1. Need Interchange Between ND 25 and Sunset Drive
   2. Access to 46th Avenue SE/Marina Bay Area
   3. Access from Eastbound I-94 to Main Street
   4. Access to Captains Landing
   5. Access to Lohstreter Road from Division Street

B. Undefined Transportation Facilities in Developing and Extraterritorial Areas
   1. Need Another Missouri River Bridge Crossing South of Mandan
   2. Extension of Division Street

C. Unsafe Traffic Conditions
   1. 2nd Street
   2. 3rd Street
   3. 19th Street Southeast (Highway 6 - Highway 1806)
   4. Division Street

D. Deteriorated Roadway Pavements
   1. 2nd Street
   2. 3rd Street
   3. 19th Street Southeast (Highway 6 - Highway 1806)

E. Deficient Intersection Design and Signalization
   1. Insufficient Sight Distance at 1st Street and 4th Avenue

***Mandan Transit Issues***

A. Transit System Too Exclusive
   1. Expand Eligibility to Meet Needs of Other Potential Users
   2. Consider Fixed Route or Other Potential System Changes

jz

Attachments

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# ATTENDANCE ROSTER

**PROJECT** Bismarck-Mandan MPO LONG RANGE Transportation and Transit Study

**MEETING LOCATION** Mandan City Hall

**DATE/TIME** June 5, 2000 5:30 P.M.

| Name | Representing | Title | Phone | Fax |
|---|---|---|---|---|
| Steve Grabill | Ulteig Engineers | PE | 258-6507 | |
| Steve Saunders | Bismarck/Mandan MPO | Trans-Planner | 222-6449 | |
| Steve Windish | Ulteig Engineers | | 258-6507 | |
| DICK ANDERSON | ULTEIG ENGINEERS | ENG | 258-6507 | |
| • Eddie Kaufman | SELF | | 663-3244 | |
| Lori Kaufman | " | | " | |
| DAVE PATRICE | SWENSON, HAGEN & CO | | 223-2600 | |
| Doug Kucowski | Mitzel Blds | | 224-8083 | |
| • Steve Thilmony | self | | 663.4457 | |
| • DALE Mowder | SELF | | 663-5675 | |
| • Leann Cortes | Self | | 663-9176 | |
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1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

***To:*** File

***From:*** J. Steven Windish, P.E.

***Date:*** June 30, 2000

***Subject:*** Morton County Planning Commission Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI Project Nº 2000-8007

On June 29, 2000, Ulteig Engineers, Inc. staff conducted a public meeting before the Morton County Planning Commission to receive input on community needs relative to transportation and transit issues. Five residents were in attendance (see attached attendance roster).

Following introductions, Brant Malsam explained the purposes for the Long Range Transportation and Transit Plans. An outline of the presentation is attached.

Significant input was received from the public and the Morton County Planning Commission. The following list of issues/needs was received:

***Morton County Transportation Issues***

A. Inadequate Roadway Access/Continuity
   1. Only one access to River Bend
   2. Safety concerns for refinery and residential area
   3. Collins Avenue interchange at Interstate 94
   4. Need for East-West corridor between Main Street and Interstate 94
   5. Interchange between Seven Seas motel and Highway 25
   6. Additional crossing of Heart River
   7. Additional crossings of the Missouri River both north and south
   8. Corridor Preservation as development continues south
   9. Access to Harmon Lake
   10. Frontage Road north of Interstate 94 east of Highway 25

B. Unsafe Traffic Conditions
   1. High mast lighting east of Bonanza is lacking

C. Deteriorated Roadway Pavement
   1. Old Red Trail between Mandan Avenue and Collins Avenue
   2. Widen 6th Avenue NW
   3. Highway 1806 North of Old Red Trail

D. Deficient Intersection Design and Signalization
   1. Extra lane east bound on Main Street to Interstate 94, four lanes the entire length between Mandan and Bismarck
   2. Missouri Drive at Main Street, near Bonanza
   3. MacKenzie Drive and Memorial Highway
   4. Third Street and Memorial Highway
   5. Slip ramp to Interstate 94 from Eastwood Additions

***Morton County Transit Issues***

A. Transit System Too Exclusive
   1. Consider fixed route or other potential system changes, subsidies
   2. Expand eligibility to meet needs of other potential users

Attachment

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# ATTENDANCE ROSTER

**PROJECT** BISMARCK-MANDAN MPO LONG RANGE TRANSPORTATION AND TRANSIT PLAN

**MEETING LOCATION** MORTON COUNTY COMMISSION ROOM

**DATE/TIME** JUNE 29, 2000 – 5:30 P.M.

| Name | Representing/Title | Title | Phone | Fax |
|---|---|---|---|---|
| Steve Windish | Ulteig Engineers | | 258-6507 | |
| Steve Saunders | MPO | | 222-6449 | |
| Mike Kemnitz | Missouri West Water Sys | | 663-9276 | 663 2219 |
| Chuck Morman | Morton Co | | 667-3346 | 667-3362 |
| Ron Manchester | Tavan Engineering Co | | 663-6483 | 663-0923 |
| PAT WACHTER | WW RANCH | | 663-2600 | 663-2019 |
| Gregg Greenquist | Morton County | | | |
| PAUL E. TRAUGER | Morton County Auditor | | 667-3300 | 667-3453 |
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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

*To:* File

*From:* Steve A. Grabill, P.E.

*Date:* July 20, 2000

*Subject:* July 19, 2000 Special Interest Group Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI Project Nº 2000-8007

On July 19, 2000, Ulteig Engineers, Inc. staff conducted a public meeting at the Morton Council Commission Room to receive input on community needs relative to transportation and transit issues. Four special interest group representatives were in attendance (see attached attendance roster).

Steve Grabill explained the purposes for the Long Range Transportation and Transit Plans. An informal discussion period followed. The following list of issues/needs was received:

***Transit Issues***

1. User fees are too high
2. Consider fixed routes or other potential system changes, subsidies
3. Provide service to those who lose their drivers license
4. Use public transit for school busing
5. Should maintain service for night shift workers

Attachment

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# PLEASE PRINT

# ATTENDANCE ROSTER

**PROJECT** Bismarck-Mandan Long Range Transportation Plan and Transit Plan

**MEETING LOCATION** Morton County Commission Room

**DATE/TIME** July 19, 2000

| Name | Representing | Title | Phone | Fax |
|---|---|---|---|---|
| Steve Grabill | Ulteig Engineers, Inc. | Engineer | 237-3211 | 237-3191 |
| Steve Saunders | MFO | Trans Planner | 222-6444 | |
| Gail Hansen | Bis-Man Transit | Adm Asst. | 258-6817 | 258-6252 |
| Tom Little | City of Mandan | City Eng. Plann. Dir. | 667-3225 | |
| BILL BLETSKY | BURLEIGH COUNTY COUNCIL ON AGING | CHAIRMAN | 255-1181 | |
| Dennis Rohr | Police Dept | Chief | 667-3250 | |
| Greg Greenquist | Morton County Planning | Director | 667-3343 | |
| CHARLES ROSCH | MANDAN GOLDEN AGE SERVICES | PROJECT DIRECTOR | 663-6528 | 663-6171 |
| Steve Windish | Ulteig Engineers Inc | Engineer | 258-6507 | |
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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

*To:* File

*From:* Steve A. Grabill, P.E.

*Date:* July 31, 2000

*Subject:* July 20, 2000 Special Interest Group Public Meeting Summary
Bismarck-Mandan Metropolitan Area
Long Range Transportation and Transit Plans
UEI Project Nº 2000-8007

On July 20, 2000, Ulteig Engineers, Inc. staff conducted a public meeting at the Tom Baker Meeting Room to receive input on community needs relative to transportation and transit issues. Seventeen special interest group representatives were in attendance (see attached attendance roster).

Steve Grabill explained the purposes for the Long Range Transportation and Transit Plans. An informal discussion period followed. The following list of issues/needs was received:

***Transportation Issues***

1. Provide a multi-use trail from City of Lincoln to Bismarck.
2. Improve distribution of trail maps.
3. Trail Safety - Consider wider trails at high use locations.
4. Consider striped bike lanes on streets.
5. Washington Street environmental, historical and cultural issues.
6. Widen 19th Street, north of Century Avenue.
7. Need left turn lanes and arrows on two lane streets.
8. Consider restricting left turns at certain hours.
9. Improve access to Horizon Middle School.
10. Address archeological/historical concerns along future arterials and collectors south of Mandan.
11. Need audible traffic lights for sight impaired.
12. Provide turning lanes and signals at Tyler Parkway and Burnt Boat Drive.
13. Remove traffic signals at 7th Street and 9th Street intersections along Arbor Avenue.

14. Preserve corridors in developing area near Millenium School.
15. Improve access to Sattler Addition.
16. Consider possible future grade separations across railroad tracks.

***Transit Issues***

1. Extent transit coverage beyond 2 mile extraterritorial boundary.
2. Seek greater funding for transit.
3. Eliminate one day advance notice requirement.
4. Expand service for other user groups, including students, immigrants and low income people.

Attachment

ldb

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# ATTENDANCE ROSTER

**PROJECT** Bismarck - Mandan Long Range Transportation Plan and Transit Plan

**MEETING LOCATION** Tom Baker Meeting Room

**DATE/TIME** July 20, 2000

| Name | Representing | Title | Phone | Fax |
|---|---|---|---|---|
| Robin Wane | Bis-Man Transit | Dir. | 258-6801 | |
| Dwight Reuther | Susan Reuther | | 673-3117 | |
| Sandy Bonnelie | People of Bismarck | | 258-1444 | |
| Cindy Walsh | Chamber Transportation Committee Member | | 250-1405 | 223-170[illegible] |
| Mike Fink | Bismarck City Planning & Zoning | | 2245814 | 2245834 |
| Mark Berg | Bismarck City Engrng | | 222-6580 | 222 6573 |
| RODGER WETZEL | StA's / B-M Transit | Eldercare | 530-7379 | 530-7388 |
| Marie Zalli Enerson | People of Bis - Chamber Transportation | | 224-1638 | |
| Amy Sakariassen | Cathedral Area Historic District | | 258-3526 | |
| Emily Sakariassen | " | " | " | |
| Signe Snortland | " " | " | 258-5033 | |
| Marete Snortland -Banks | | | | |
| Marlene Thurn | City of Lincoln | | 2587964 | 2589[illegible] |
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**PLEASE PRINT**

# ATTENDANCE ROSTER

**PROJECT** Bismarck - Mandan Long Range Plan and Transit Plan

**MEETING LOCATION** Tom Baker Meeting Room

**DATE/TIME** July 20, 2000

| Name | Representing | Title | Phone | Fax |
|---|---|---|---|---|
| Mabel Dever | 2500 Valley View # | 113 | 258-5640 | |
| Ellen Owen | Burleigh Co. Sr. Adults | | 255-4648 | |
| Steve Sanders | MPO | Transportation Planner | 222-6449 | |
| Jon Mill | Burleigh County | Co Engr | 224-6810 | |
| Les Bossert | Citizen-at-Large | — | 222-7842 | |
| Fay Cowgill | Citizen | | 255-6334 | |
| Mike Schmidt | Kadrmas, Lee + Jackson | | 255-0076 | |
| K Hallburg | Burleigh Citizen | | 250-1714 | WK 224-8833 |
| Steve Grabill | Ulteig Engineers | | 258-6507 | |
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**BURLEIGH COUNTY**
**HIGHWAY DEPARTMENT**
2000 NORTH 52ND STREET
BISMARCK, ND 58501-7900
701-221-6870
Fax 701-221-6872

**JON R. MILL, RPE, RLS**
COUNTY
ENGINEER

**RODNEY NESS**
HIGHWAY
SUPERINTENDENT

22 January 2001

Mr. Brant P. Malsam
Ulteig Engineers, Inc.
1701 South 12th St.
Bismarck, ND 58504

RE: Trans Plan Update
Comments

Dear Mr. Malsam,

As requested, the issue identification phase of the transportation plan has been reviewed with the following results:

River Road

Pioneer Park to ND 1804, approximately 4 miles. This roadway could receive heavy river front development impact in the fairly near future. Will probably need widening and heavy overlay in the near future.

Bur-4

North Washington, Calgary Ave. north approximately 2½ miles. Entire stretch was regraded in late fall of 2000 and will be surfaced in 2001. Next improvement needed will depend on urban sprawl, but will probably consist of 4 lane from Calgary to 43rd Ave., and perhaps signal lights at the N. Washington-43rd Ave. intersection.

Bur-3

This recently paved one mile segment of 43rd Ave. NE from N. Washington Street to US 83 adequately serves current needs. The east end approaching US 83 may need profile revision to more safely approach this busy roadway.

Bur-2

This high grade 2 lane roadway has been mentioned as being deficient relative to left turn safety pockets. This 3.2 mile segment is part of a corridor allowing motorists to avoid a very congested portion of US 83. The other part of the corridor is the 2 miles of 71st Ave NE from US 83 to Centennial. So, if the Centennial portion needs left turn pocket

consideration, so does the 71st Ave NE portion of the route.

Bur-1

This 3 mile section of 71st Ave NE from Centennial to 80th St NE is old pavement that is weak, narrow, and has a rolling profile. This segment definitely needs major rebuilding and resurfacing.

BIS-12: Bur-5: and Bur-6

Corridor preservation worthwhile at these sites, since they are section lines and future arterial, but actual implementation is a long way off. Beltway corridor preservation is good planning, but only the 66th St crossing of I-94 offers the most feasible terrain for roadway construction.

B-L-3

Revision of a railroad embankment into a modern vehicle roadway is a challenging task. When most of the involved location lies in a major flood plain and flood way the task becomes very difficult. The minor convenience offered by this routing would be greatly out-weighed by time consuming and very expensive construction.

B-L-4

This section line crosses Apple Creek or a significant branch 8 times in 2 miles. The flood way and flood plain aspects of this location make a road improvement proposal very unfeasible.

B-L-1

A very heavy traveled roadway segment, old relatively narrow and weak. Jurisdiction is somewhat unclear. Last status was city of Lincoln would accept once segment is upgraded.

Bur-7

While this roadway lies in the country, it is a state highway and falls under the jurisdiction of the North Dakota Department of Transportation. Optimum location has been intensely studied. Final decision will be made be NDDOT. One possible location decision would gift 2 miles of abandoned roadway to Burleigh County.

BIS-10

This proposal is apparently intended to connect Burleigh Avenue with 48th Ave SW. While loop routing is beneficial for emergency response and road maintenance, there is small potential for development in this area. State of North Dakota Penitentiary owns most of the river frontage in the area.

BIS-11

This indicated routing encompasses really two issues. Firstly, there is a current paved connection between Mills Avenue and Burleigh Avenue, vis Smokey Lane, Trainer Lane, and Tavis Road. Geometrics on this route are quite undesirable, but would be quite costly to remedy due to close, existing residential development.

The extension of London Avenue over to Mills Avenue is a proposal I have long supported. This route connects the centroid of the Fox Island's growing development with South Washington, which has adequate room for additional traffic volumes. The City Park Administration opposes this routing on the grounds that a virgin area would be severed, and tree growth would be harmed. Fencing and an underpass would address the use restriction problem. A previously installed water line project has already destroyed all trees on the desired location.

The preceding comments have probably surfaced before and are being reiterated for the record. Please contact this office if there are any questions.

Sincerely,

Jon R Mill

Jon R. Mill, RPE & RLS.
Burleigh County Engineer

cc: Claus Lembke
County Auditor
File

CONSULTING ENGINEERS SINCE 1944

# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

***To:*** File

***From:*** Steve A. Grabill, P.E.

***Date:*** February 2001

***Subject:*** Bismarck-Mandan Long Range Transportation and Transit Plan
Project Review Meetings
UEI Project № 2000-8007

During the month of February 2001, Ulteig Engineers, Inc. staff met with the Planning Commissions and elected bodies of Bismarck, Burleigh, Lincoln, Mandan and Morton to present the preliminary project recommendations from the pre-draft transportation and transit plans. Transportation project evaluation spreadsheets were provided to the planning commissions and elected bodies in their packets for review and comment. The input received is summarized as follows:

Bismarck Planning and Zoning Commission, February 21, 2001

- ★ Preservation of new Missouri River crossings should be pursued among all local planning agencies
- ★ It is questionable whether transit ridership will be adequate to support a fixed route system.
- ★ The Long Range Transportation Plan should be considered during the review process for future developments.

Bismarck City Commission

- ★ Has the potential for east-west or north-south one-way pairs been considered? After lengthy discussion, the City Commission decided not to pursue further study of one-way pairs at this time.

- ★ 26th Street (Bismarck Expressway-Airway Avenue) and Airway Avenue (Airport Road-Yegen Road) may be needed as short range projects. After further review, these projects were moved from long range to short range projects.

Burleigh County Planning Commission

- ★ Is there right-of-way for a multi-use trail to Hoag Island?
- ★ Future Missouri River crossings are very important.
- ★ Capacity improvements to River Road may not be feasible due to right-of-way constraints. Should improvements to River Road extend into the City of Bismarck?
- ★ It is good that the Long Range Transportation Plan is addressing river crossings prior to the need for the bridges arising.

Burleigh County Commission

- ★ The proposal for an interchange at 66th Street is a logical location.

Lincoln Planning and Zoning Commission, February 6, 2001

- ★ Preservation of 52nd Street north of Lincoln Road is not realistic. Instead, a long range improvement project for 52nd Street south of Lincoln Road to 48th Avenue should be proposed.
- ★ Southern beltway would be beneficial to the City of Lincoln.

Lincoln City Council

- ★ Since the alternative to improve the abandoned railbed for a more direct connection to Airway Avenue was dropped from consideration, another alternative must be found.
- ★ Short range improvements to Lincoln Road are needed and supported.

Mandan Planning and Zoning Commission, February 5, 2001

- ★ The proposal for an interchange at 56th Avenue Northwest and preservation of an underpass at 32nd Avenue Northwest is supported.
- ★ Transit recommendations will help the elderly and low income residents.

Mandan City Commission, March 6, 2001

- ★ Project recommendations are supported.
- ★ Will realignment of 1806 to Sunset Drive interchange cause traffic congestion on Sunset Drive?

Morton County Planning Commission, February 22, 2001

- ★ A north Missouri River crossing at 38th Street crowds Mandan, whereas one near 37th Street provides more room for development.
- ★ The west side of the beltway (Co. 82) seems too far west.
- ★ Is there insufficient space to build an interchange at Collins Avenue?
- ★ Will relocating 1806 impact traffic flow on Sunset Drive?
- ★ The connection from 1806 to Collins Avenue should not be eliminated.
- ★ Will the beltway be developed as a high speed, limited access arterial?

Morton County Commission

- ★ Are there plans to widen Mandan Avenue?
- ★ The easterly extension of Division Street is needed now.

Steven Balaban
Attorney At Law
418 East Rosser Avenue, Suite 102
Bismarck, North Dakota 58501
Tel: (701) 224-0977 Fax: (701) 221-9227
E-mail: balaban@btigate.com

RECEIVED
FEB 16 2001
ULTEIG ENGINEERS
Fargo, ND

February 13, 2001

Brant P. Malsam
Ulteig Engineers, Inc
1701 South 12th Street
Bismarck, ND 58504

Steve Saunders
Bismarck-Mandan MPO/Trans Planner
P.O. Box 5503
Bismarck, ND 58506-5503

Re: Washington Street Reconstruction/Re-stripping

Dear Sirs:

My name is Steven Balaban. I represent individuals and families residing in the Cathedral Historic District, in or around the area of Washington Avenue north of Rosser Avenue.

I received a copy of the "Bismarck-Mandan Long Range Transportation Plan Newsletter," dated January 2001, from a resident of the above area. I note that a listed project alternative is that of "Washington Street Reconstruction/Re-stripping (Main Ave. – Century Ave.)." This proposed construction appears to run through the center of the above Historical District.

The City of Bismarck has, for some time, attempted or planned to attempt to widen or otherwise alter Washington Avenue through the Cathedral Historic District, in spite of the valid historical status of this neighborhood. Please be aware that the houses, trees, curtilages, fences, and many other such appurtenances to the neighborhood are all listed and registered on both National and State Historic Registries. Please also be aware that there are many intertwined, complex and significant statutes, both Federal and State, that severely restrict any change of any type to any property so listed on Historic Registries.

I understand from your newsletter that several meetings are scheduled in February, 2001, regarding proposed changes to this portion of Bismarck. Our desire is that you fully take the historical status, as well as legal and statutory restrictions, into account in your planning, and fully disclose and discuss these at your meetings. Please be aware that we strongly oppose any construction, modification, or "improvements" to the Cathedral Historic District, and wish to strenuously voice our objections to any such proposals.

Finally, if at all possible, please add my name and address, from the letterhead above, to the mailing list for the Bismarck-Mandan Long Range Transportation Plan Newsletter, as well as any other mailings you may distribute regarding any proposals involving the above subject.

Please contact me if you have any questions or concerns. Thank you.

Very truly yours,

Steven Balaban

Pc: Amy Sakariassen

February 13, 2001

To The Board of
Burleigh County Commissioners:

Sirs:

Good afternoon, my name is Terry Fasteen Chairman of the City of Lincoln Planning and Zoning Commission. I apologize for not being able to be with you in person today due to a scheduling change that has sent me to Poplar Mt. on business.

The issue of long range planning is of great concern to the City and is thankful for the ability to pass this information on to the County Commission. We passed several concerns on to the Engineers from Ulteig Engineering when they presented the proposed project layout to us at our meeting last week. We look forward to meeting with them again when they return with requested revisions.

Again I apologize for not being able to attend today but we are not always in control of our daily responsibilities.

Sincerely:

Terry Fasteen

Terry Fasteen, Chr.
Lincoln Planning and Zoning

February 13, 2001

To the Board of
Burleigh County Commissioners:

I want to thank you for the opportunity to express some of the City of Lincoln's concerns and needs associated with the Metropolitan Road Commission Study. We reviewed the Plan with representatives of Ulteig Engineering at our last Planning and Zoning Meeting, and were pleased with some of the options they presented to us.

As you well know access to the State Highway and Interstate System is a valuable asset to a community's economic growth. Currently Lincoln is one of a very Cities, perhaps the only one not connected to these road systems. The proposed plan indicates that it could potentially happen. There was a very positive reaction as you can imagine when we saw this.
Our City is unique in its development and economic base because of its proximity to Bismarck. We have approximately 700 homes and 3 businesses. As you can imagine, drawing commercial operations is tough. Our City continues to grow yearly and we do get inquires as to the availability of building sites and public services. When they learn how difficult it is to get to Lincoln from the interstate things usually end quietly. We need better traffic routes to keep improving the City growth potential

The improvement of Lincoln Road to the West would also be necessary to facilitate traffic flow. The Engineers from Ultieg mentioned that the County was interested in obtaining a 150lf. Right Of Way corridor along this road for future development. During the platting of developments along this roadway, we have always followed the existing standard of 100lf R.O.W. If the Planning Standard has changed, we will certainly pass this on to our City Engineers. We will also participate with the County Planners to obtain additional R.O.W when required. At this time, it is not feasible for the City due to current economic constraints.

Thank you again for the time spent to review our comments. The City of Lincoln would like to keep, and improve the lines of communication with the county during this and future endeavors. Scheduling permitting I look forward to visiting with the Board during the next review of this development issue.

Sincerely:

Terry Fasteen, Chrm.
Lincoln Planning and Zoning
cc. Robert Johnston, Mayor Lincoln
cc: Roger Berg, City Engineer

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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

FILE COPY

## MEMORANDUM

**TO:** Burleigh County Commission
Burleigh County Planning Commission

**FROM:** Steve A. Grabill, P.E.
Ulteig Engineers, Inc.

**DATE:** May 15, 2001

**SUBJECT:** Draft Long Range Transportation and Transit Plans
UEI Project N° 2000-8007

On May 21, 2001 I will attend the Burleigh County Commission meeting to present the draft Long Range Transportation and Transit Plans and receive your comments. We encourage you to review the Executive Summary contained in your packet and to discuss the draft plans with your staff.

We presented the draft plans to the Burleigh County Planning Commission on May 9, 2001 and received significant comments. A copy of the meeting summary is attached for your information.

It is our intention to listen and respond to all your comments. Until June 13, 2001 there is time to make changes to the plan and still meet the timeline set for approval in our contract. To better facilitate this effort, we are prepared to meet with the Burleigh County Planning Commission again in June. If it is your desire for another opportunity to discuss the plan, please let your staff know and we will attend the June Planning Commission meeting. Further, if you have any individual comments you may call me at 1-888-557-9090. Thank you for your attention to the review of these important planning documents.

Attachment

cc: Steve Saunders
Carl Hokenstad
Brant Malsam

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# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

# *MEMO*

***To:*** File

***From:*** Steve A. Grabill, P.E.

***Date:*** June 2001

***Subject:*** Bismarck-Mandan Long Range Transportation and Transit Plan
Draft Plan Review Meetings
UEI Project Nº 2000-8007

During the months of May and June 2001, Ulteig Engineers, Inc. staff met with the Planning Commission and elected bodies of Bismarck, Burleigh, Lincoln, Mandan, and Morton to present the Draft Long Range Transportation and Transit Plans for review and comment. The Planning Commission meetings were held as advertised public hearings to provide an opportunity for public input as well. Executive Summaries of the Draft Long Range Transportation and Transit Plans were distributed in Planning Commission and elected body packets. The input received is summarized as follows:

***Bismarck Planning and Zoning Commission – May 23, 2001***

- ✗ It is questionable whether there is a great demand for fixed routes.
- ✗ Transit turn-out lanes would have to be funded separately with ongoing street improvement projects.
- ✗ What is the minimum ridership for transit funding to break even?

***Bismarck City Commission – June 26, 2001***

- ✗ Meeting still pending.

***Burleigh County Planning Commission – May 9, 2001***

- ✗ Significant comments received. See attached meeting summary.

*Burleigh County Commission – May 21, 2001*

✗ A transit route should service the area of southwest Bismarck located south of Front Street and west of Washington Street.

*Lincoln Planning and Zoning Commission – June 5, 2001*

✗ Yegen road should be extended straight north of Apple Creek Road to Bismarck Expressway.

*Lincoln City Council – June 7, 2001*

✗ The Draft Long Range Transportation Plan addresses many of the City of Lincoln's needs for future connections to I-94 and the City of Bismarck.

*Mandan Planning and Zoning Commission – June 4, 2001*

✗ Transit routes operating hourly from 6:00 a.m. to 9:00 p.m. seven days a week is recommended.
✗ Transit service should extend to Roughriders and to the area north of I-94 in the vicinity of Old Red Trail.

*Mandan City Commission – June 5, 2001*

✗ Should Division Street be added to the truck route map?

*Morton County Planning Commission – May 31, 2001*

✗ Would rural residents pay the same rates for riding transit as City residents?
✗ How would corridor preservation be implemented?
✗ Would all section line roads in the County have the same right-of-way width requirements?
✗ Would homes be purchased as a result of the plan's adoption?

*Morton County Commission – June 5, 2001*

✗ Will transit ever be self-supporting?
✗ Extension of Division Street should be a high priority.

Jz

CONSULTING ENGINEERS SINCE 1944

# ULTEIG ENGINEERS, INC.

1401 OAK MANOR AVE.
FARGO, ND 58103-5245

PHONE 701-237-3211
FAX 701-237-3191

P.O. BOX 1569
FARGO, ND 58107-1569

OTHER OFFICES:

BISMARCK, ND
MINNEAPOLIS, MN
SIOUX FALLS, SD

FILE COPY

**To:** File

**From:** Steve A. Grabill, P.E.

**Date:** May 9, 2001

**Subject:** Burleigh County Planning Commission Meeting
Public Hearing Summary
Draft Long Range Transportation and Transit Plan
UEI Project No. 2000-8007

On May 9, 2001, Ulteig Engineers, Inc. staff conducted a Public Hearing before the Burleigh County Planning Commission to receive input on the draft Long Range Transportation and Transit Plans. Two residents were in attendance.

Following introductions, Mr. Grabill and Mr. Windish presented the draft Transit Plan by briefly reviewing the development process and discussing the Transit Plan's recommendations. The Planning Commission was also provided Executive Summaries of the Transit Plan in their mailed packets.

Comments received pertaining to the Transit Plan included the following:

- A transit route should extend to the joint use facility located at Bismarck Expressway and Rosser Avenue. This would allow connectivity to the rural transit providers and Greyhound. Mr. Grabill agreed to check into this suggestion.

After the discussion regarding the draft Transit Plan, Mr. Grabill and Mr. Windish presented the draft Long Range Transportation Plan's recommendations. The Planning Commission was also provided Executive Summaries of the Transportation Plan in their mailed packets.

Comments received pertaining to the Long Range Transportation Plan included the following:

- Highway 1804 and Centennial Road should be added to the Truck Route Map. Jon Mill responded that the Long Range Plan did address safety concerns along those roads through recommended project improvements. He did not feel that those routes should be designated as truck routes unless additional state funding was made available to further improve the roadway section.

- Trucks should be prohibited from traveling River Road. Mr. Grabill replied that this could be addressed through local policy and signing.

- Is roadway maintenance addressed in the financially constrained plan? Mr. Grabill responded that the currently proposed expenditure for federal dollars was directed at reconstruction projects. Since the study boundaries do not include the entire county, consideration of entire county maintenance needs and costs was beyond the scope of the Long Range Plan. However, should the county wish to select maintenance projects in lieu of reconstruction projects for use of federal funding, that change can be made.

- The existing and proposed trails map should show future trail corridors across the Grant Marsh Interstate Bridge, the Memorial Bridge, and across the future Missouri River bridges. Mr. Grabill said it had been assumed that any future bridges would have bicycle/pedestrian facilities. He agreed to add crossings at the two Missouri River bridges and to explore the concept of a crossing at the Grant March bridge.

- The Long Range Transportation Plan should consider the need for another east-west one way pair in the Bismarck downtown area, and another north-south one-way pair using 3rd Street and 4th Street between Main Street and Divide. Mr. Grabill stated that the possible addition of one-way pairs was briefly explored on a technical level and was discussed at length by the Bismarck City Commission. The recommendation from those reviews was to not pursue a new one-way pair at this time. However, the proposal for new one-way pairs will be documented in the Long Range Transportation Plan for future consideration should the City of Bismarck choose to pursue it.

- A number of minor wording changes were recommended to various paragraphs in the Long Range Transportation Plan. These changes have since been made.

With no further comments, the Public Hearing was closed.

mea/
C:\WP8\Letters\Grabill-Memo, Burleigh Cty