

A Bicycle Plan and Program

For

Bismarck, North Dakota

Prepared By

The Mountain Bicyclists Corporation  
of Denver, Colorado

and

The City of Bismarck, North Dakota

In Cooperation With  
The U.S. Department of Transportation  
National Highway Traffic Safety Administration

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## Report Format

The flow of this report will follow, as closely as possible, the organization of the project contract. The Table of Contents is, therefore, as follows:

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## The Bismarck Bicycling Environment

The geographical size and street system of Bismarck favors bicycling for both commuter and recreational trip purposes. Several bicycle access barriers do exist and these will be discussed, but generally, one can travel conveniently and efficiently from most residential areas to commercial, employment, educational, and recreational sites. The only significant limitation to Bismarck bicycling is a climatic one. From approximately November 1st through April 1st, bicycling for most people is uncomfortable, unsafe, or impossible due to conditions of wind, snow, ice, and cold temperatures. For the remaining seven months, however, bicycling can be practiced on a regular basis.

The adoption of the recommended bikeway plan and related programs of education and safety should:

- 1) Improve the access of bicyclists to desired residential, commercial, employment, educational, and recreational sites;
- 2) Increase bicycle usage and therefore alleviate highway congestion, conserve liquid energy resources, reduce air quality problems, and improve personal health;
- 3) Create an incentive to bicycle commute to work or school on a regular basis;
- 4) Improve bicycle security through the acquisition and installation of approved bicycle parking facilities;
- 5) Contribute to bicycle safety and a reduction in bicycle accidents;
- 6) Attract federal bicycle program funding;
- 7) Provide a schedule for the implementation of bikeway projects over a specific time period;
- 8) Reduce the inconvenience and additional expense of retro-fitting streets and highways with bikeway facilities.

THE BISMARCK BIKEWAY PLAN

## The Bismarck Bikeway Plan

### Introduction

The recommended bicycle riding and parking facilities in the Bismarck Bikeway Plan resulted from two-site visits by the Mountain Bicyclists Corporation to the City of Bismarck. These two visits were made in order to ascertain the real needs and requirements of Bismarck bicyclists and their patterns of movement. In addition to investigating the existing bicycling environment, efforts were made to discover the overall attitude of Bismarck residents to bicycling and the significance and nature of Bismarck bicycle safety problems. Provisions were also included in the Plan to connect Bismarck bicycle corridors with regional bicycle destinations in both Burleigh and Morton Counties.

### Bicycle Barrier Identification

A variety of barriers currently exist within Bismarck that discourage or block continuous and safe bicycling. These barriers and their recommended solutions are as follows.

1. Railroad Tracks: This barrier very effectively limits north/south travel for motorists as well as bicyclists. All existing at-grade vehicular crossings of the Burlington Northern track facilities are rough for a bicyclist who must be careful to avoid sharp objects, deteriorating wooden planks, slippery tracks, and adjacent vehicular traffic movements. Both the Third Street and Airport Road railroad crossings should be reconstructed and paved to allow safe and smooth crossings for bicyclists.
2. Missouri River: This wide and meandering waterway represents both an attraction (historically and naturally) to bicyclists as well as an access barrier to the Mandan area. The two existing vehicular bridges-Memorial and Interstate 94- are narrow and were not designed to accommodate bicycles. Local bicycle users apparently are using the narrow, debris-strewn, deter-

iorating sidewalks of the Memorial Bridge. The sidewalk areas of this bridge should be re-paved and maintained for bicycle use. The approach areas to Memorial Bridge also will require pavement work, appropriate bicycle signs and pavement markings.

3. Interstate 94: This highway, which traverses the northern end of Bismarck, is a major bicycle barrier. It can, however, be crossed via both underpasses and overpasses at several locations. The three best bicycle crossings, at present, are Divide Avenue(overpass), Fourth Street(underpass), and Nineteenth Street(overpass). Each of these crossings, although, needs specific pavement, signing, and maintenance work done to approach areas on these crossings.
4. Major Arterial Highways: High-volume roadways create barriers to continuous bicycling. Bicycle users, in many cases, cross arterial highways in an unsafe and sometimes illegal manner. Lack of traffic control devices at bicycle route/arterial highway intersections creates a hazardous situation for both the bicyclist and the motor vehicle driver. Proposed bikeway facilities should avoid major arterial highways without sacrificing route continuity or directness. Several existing/proposed Bismarck arterial highways could accomodate bikeway facilities if the necessary right-of-way were reserved.
5. Uncompleted or Non-Existent Streets: This current development problem creates an inconvenience for bicyclists trying to reach a particular destination. As developed areas are completed, this problem will diminish. Until then, bicyclists will continue to use existing dirt paths between residential and employment, commercial, and recreational centers.
6. Gravel Roads: Many current street extensions in Bismarck exist in a gravel condition. As new commercial, residential, and industrial areas are devel-

oped, gravel streets should become paved and suitable for bicycling assuming adequate pavement width is constructed. As a bicycle riding surface, gravel is unstable, produces dust, and can cause flat tires. Therefore, most bicyclists will avoid using gravel streets which may cause them to select a more heavily traveled paved roadway.

7. Steep Grades: Few riding conditions are as discouraging to a bicyclist as steep grades. Although generally level, the street system of Bismarck does include two major steep grade areas. These are the Highland Acres area and the neighborhoods north and east of St. Mary's Cemetery. Streets in these areas frequently exceed 10% grades with several very steep grades exceeding 15% (Avenue C between 29th and 31st and Hillview Avenue for example). Bicyclists will not ride up these streets and should not be encouraged to ride down them.
8. Lack of Bicycle Parking Facilities: Without properly designed and conveniently located bicycle parking facilities, commuter and recreational bicycling is severely limited. Although these parking facilities exist at several downtown Bismarck locations, none of these facilities are properly designed or well-located. People owning well-made and relatively expensive bicycles will not ride them to specific destinations unless secure parking facilities are provided for them.
9. Narrow Streets and Roads: Several of the major paved roads in the Bismarck area contain no paved shoulders. These roads, in many cases, serve as access roads to bicycle destinations. Bicyclists, if they use these roads, must compete with motor vehicles for roadway space. This competition produces hazardous conditions for bicycle users. Upon re-pavement, these roads should be provided with paved shoulders.
10. Rosser Street Overpass: This overpass was designed to provide pedestrian

and bicycle access across the Main Avenue roadway as well as under the Burlington Northern railway facilities. This overpass/underpass facility has, however, in recent years, fallen into a state of deterioration. At the present time, it is unsafe for a bicyclist to use this facility due to pavement deterioration, pavement separation, accumulations of mud and water, encroachment of vegetation, and a complete lack of the necessary informational and warning signage.

Where these barriers exist in the proposed bikeway plan, appropriate design, construction, and maintenance actions should be undertaken to improve or correct the barrier condition.

## Evaluation of Existing Bikeway Facilities

The City of Bismarck has constructed two specific bikeway facilities in the area of the Riverwood Golf Course. The first bikeway is of the Bicycle lane design and is located on Bismarck Avenue between South Washington Street on the east and the western boundary of the Riverwood Golf Course on the west. This bicycle lane has several problems the most basic of which is the fact that the two-way lane is located on only the south side of Bismarck Avenue. This design requires the west-bound bicyclist to ride against east-bound motor vehicles. This is not a safe design because it increases the risk of a head-on collision between a bicyclist and a motor vehicle driver. Bismarck Avenue, in this area, should be re-designed to permit a five to six foot wide bicycle lane on either side of the paved right-of-way. These two lanes should then be continued on Bismarck Avenue across South Washington Street rather than suddenly terminating at South Washington Street as the one lane does at present.

This existing lane needs to be regularly maintained to eliminate over-grown foliage and accumulated gravel. Vehicles should also be prohibited from parking within the lane area.

Where the proposed lane on the north side of Bismarck Avenue crosses Bismarck to continue south on the off-street bicycle path, proper pavement striping, as well as signing, should be accomplished.

The second type of bikeway facility is the off-street bicycle path. This path begins at Bismarck Avenue and proceeds south through the woods west of the Riverwood Golf Course to the Horse Arena. This is a beautiful bicycle riding facility and appears to be well-constructed. The sight-distances on several of the pathway's curves, however, could be improved by pruning the adjacent vegetation. This action would permit bicyclists to view one another before riding through the curve area. The path also is too close to several archery target corridors which is a definite safety problem. These target areas should be re-

located further away from the path area. All target shooting should be away from the path corridor. This bicycle path would experience greater usage if it were connected on the south end to residential areas east of the Horse Arena.

### Existing Bicycle Route System

After bicycling on virtually every street within the City of Bismarck, it is the position of the Mountain Bicyclist Corporation that the majority of these roadways are safe for responsible bicycling at the present time. Bicycle safety can be improved on these roadways with specific upgrading projects such as regular street maintenance, shoulder widening and paving, and improved intersection control where appropriate.

The primary problem with the existing bicycling environment in Bismarck is the lack of adequate bicycle parking facilities at employment areas and recreation sites. Provision and promotion of these facilities should serve to encourage increased bicycle usage for both recreation and transportation purposes.

A map of suggested bicycle routes has been prepared and is included with the Bismarck Bikeway Plan. Although most all of Bismarck's roads and streets are acceptable for bicycling as they now exist, the recommended bicycle routes may serve to attract bicyclists to those transportation corridors that connect residential areas with employment, educational, and recreation sites. This map should be widely distributed throughout Bismarck to encourage bicycling in the Bismarck area.

## Bikeway Plan Development

In order to develop a balanced transportation system, it is necessary to provide safe, convenient, and regularly maintained bicycle facilities for both riding and parking. The Bismarck Bikeway Plan is based on careful on-site analysis of the existing street system. This analysis was supplemented by traffic volume data, future transportation plans, park and recreation information, educational statistics, employment site information, community development literature, and conversations with local bicycle users. From this collection of local data, a preliminary bicycle plan was developed. Refinements to this plan were made as the result of additional facility evaluation and public meeting (October 12, 1978) suggestions.

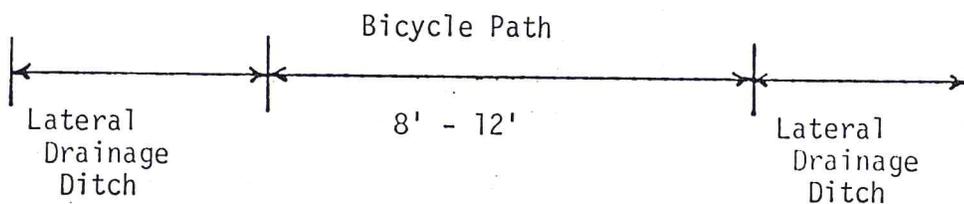
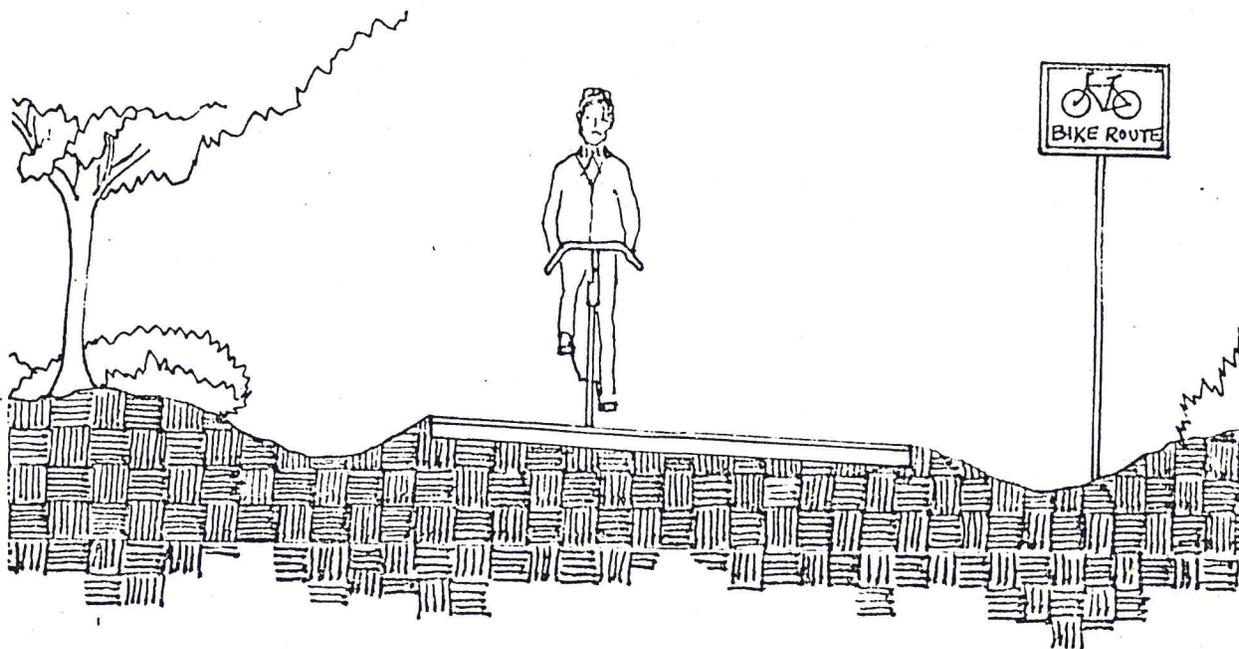
The proposed bikeway system attempts to provide bicycle access from residential areas to schools, park and recreation sites, employment centers, commercial areas, public facilities, and natural areas. The majority of the system is located on-street (89%) with the remaining percentage being located off-street (11%).

The Plan's mileage and design classification breakdown is as follows:

<u>Facility Type</u>	<u>Miles</u>	<u>%</u>
Bicycle Path	2.31	11
Bicycle Lane	4.74	23
Bicycle Route	13.50	66
Totals	20.55 miles	100%

In order to provide an understanding of the requirements for the various bikeway design classifications, the following guidelines may be used by Bismarck planners and engineers. These design guidelines will vary depending upon local topographic, climatic, financial, political, and construction considerations.

## A. Bicycle Path



### 1. General Characteristics

- This path is equally shared by pedestrians and bicyclists.
- The path's riding surface should be composed of a hard, smooth, and easily maintained material (asphalt or concrete).

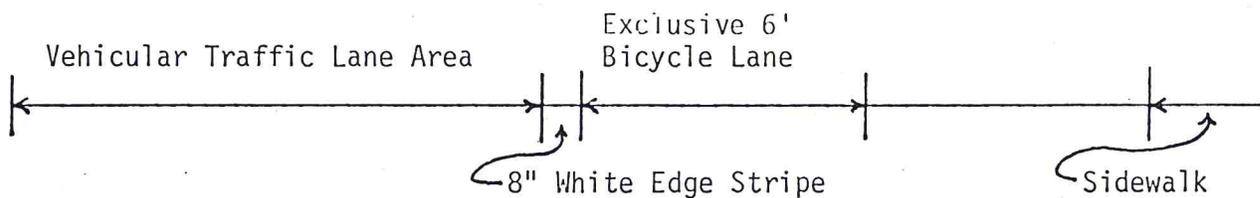
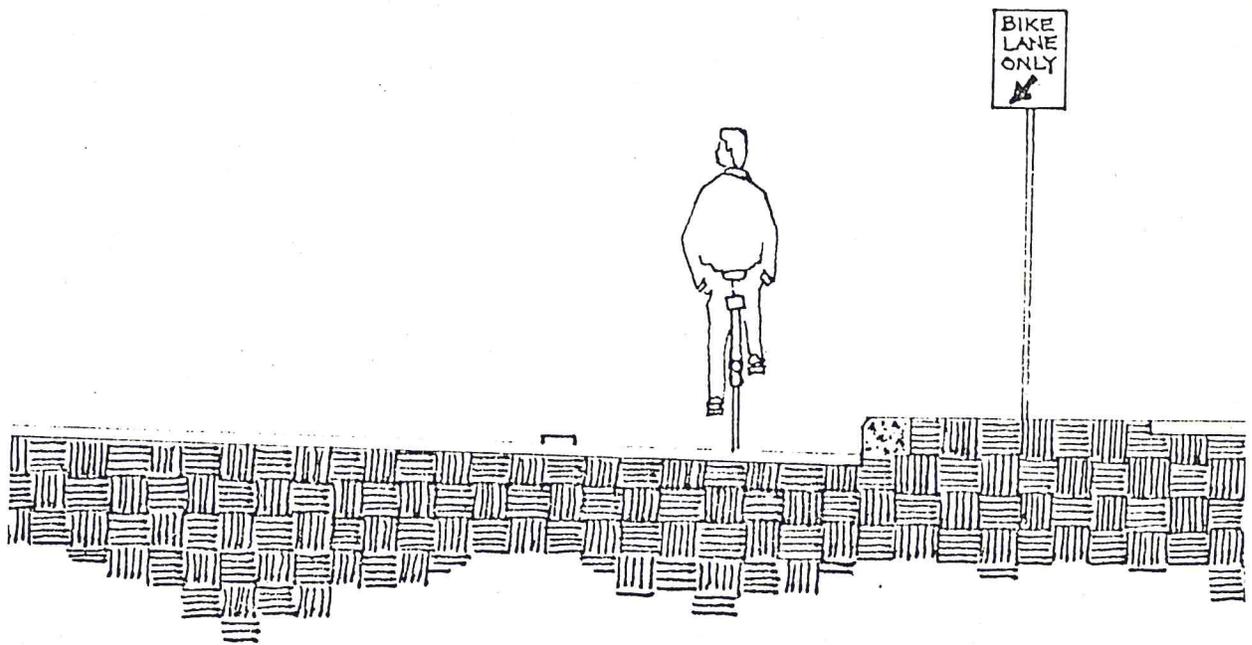
### 2. Locational Criteria

- The path is usually located in uncongested and recreational type environments.
- The path is entirely separated from vehicular roadways except at intersections with these roadways.
- A bicycle path may be located in parks, linear open spaces, in median strips, and within the right-of-way of highways, utility lines, sewer lines, floodplains, etc.

### 3. Design Problems

- The elimination of water accumulations by proper drainage is necessary in order to maintain a dry riding surface.
- Adjacent foliage should be pruned back 10 feet from each edge of the path to maintain proper and safe sight distances.
- Motorcycles, motorscooters, motorbikes, mopeds, and motor vehicles should be strictly prohibited from using the bicycle path. All bicycle paths should be adequately signed to point out this prohibition.
- Path edges should be feathered into adjacent grass areas so as to provide a smooth and safe transition.
- Bicycle paths, at intersections, should be ramped down to the roadway.

### B. Bicycle Lane



## 1. General Characteristics

- The bicycle lane parallels the motor vehicle lane.
- A bicycle lane should never be a two-way facility.
- A minimum of five feet should be allocated to the bicycle lane to allow for safe passing within the lane area.
- The bicycle lane is designated by a white line 5 to 10 inches in width.

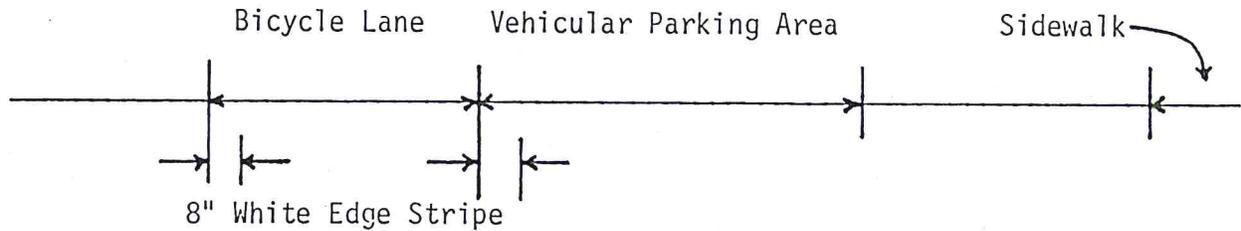
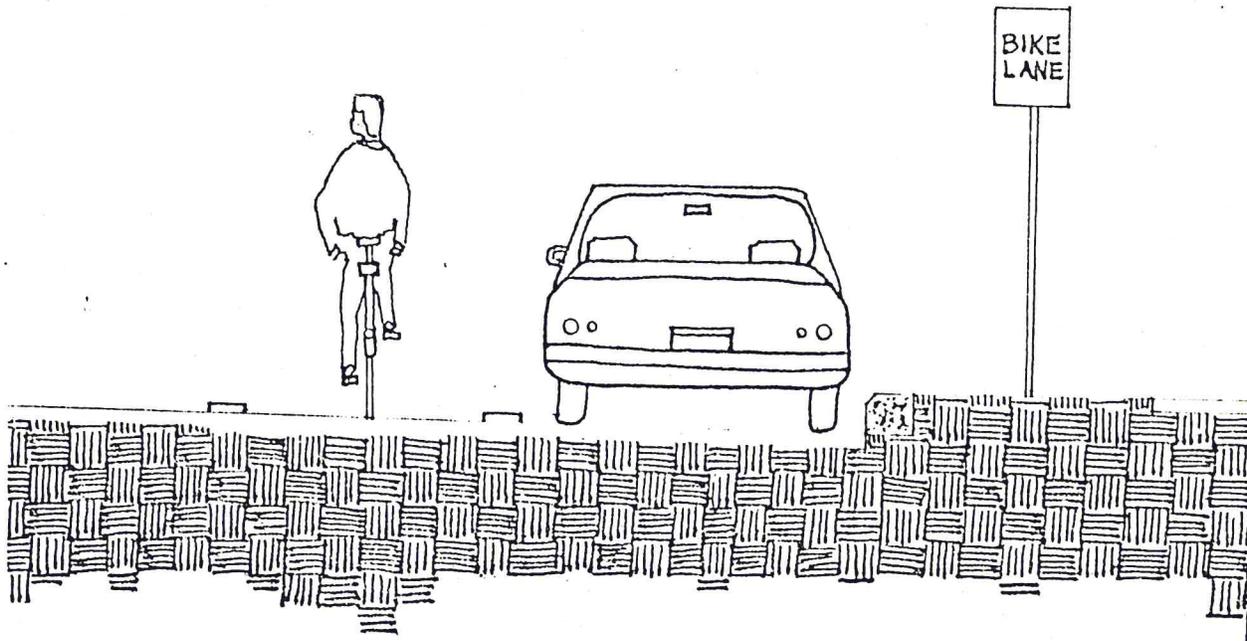
## 2. Locational Criteria

- Traffic volumes on the vehicular roadway should not exceed 4,000 vehicles per 24 hour period. This volume guideline, however, may vary according to the overall traffic volume characteristics of the community.
- Speed limit for vehicular traffic on adjacent traffic lanes should not exceed 35 m.p.h.
- The outside automobile lane prior to bicycle lane designation should be a minimum of 15 feet in width ( 10 feet for the automobile and 5 feet for the bicycle).

## 3. Design Problems

- Intersections should be carefully signed to alert motorists and direct the bicycle traffic flow.
- Bicycle lanes passing through intersections may be cross-hatched to further delineate their existence.
- Regular maintenance of the bicycle lane will prevent the accumulation of debris. This accumulation will narrow the usable riding width of the bicycle lane.
- Street drainage grates should be carefully marked or structurally modified to prevent the entrapment of a bicycle wheel.

### C. Shared Bicycle Lane



#### 1. General Characteristics

- This type of bicycle lane is located between the motor vehicle parking lane and the vehicular traffic lane.
- The same general characteristics apply to this lane design as to the normal preceding bicycle lane.

#### 2. Locational Criteria

- The bicycle lane in this case should be a minimum of five feet in width.
- The overall width of the shared automobile/bicycle lane should be a minimum of thirteen feet in width( 8 feet for the parked vehicle and 5 feet for the bicycle lane).

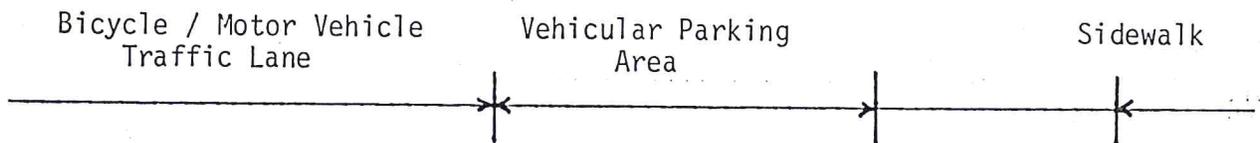
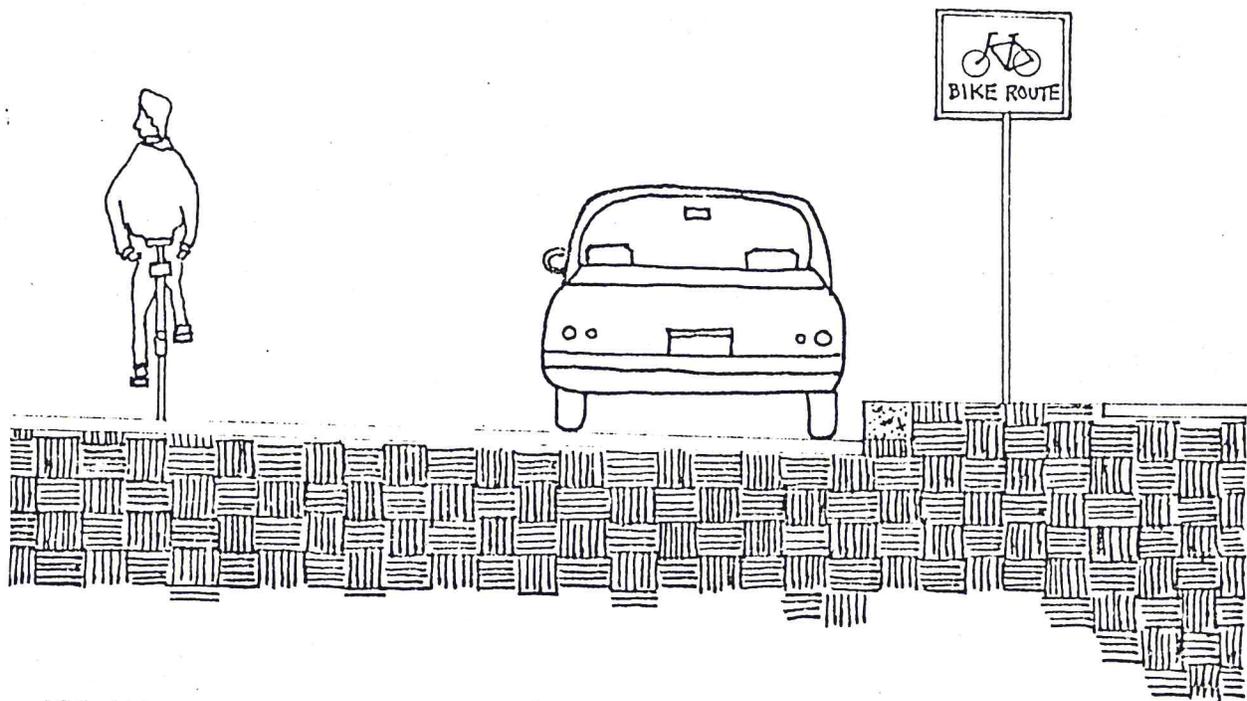
#### 3. Design Problems

- The bicycle lane in this design should be carefully and clearly inte-

grated into the intersection to minimize bicycle/automobile conflicts.

- Motor vehicle drivers should be specifically instructed through education programs to look for approaching bicyclists before opening the door of their parked vehicle.

#### D. Bicycle Route



#### 1. General Characteristics

- This type of bikeway is located on quiet, local, residential streets.
- No specific riding area is designated.
- "Bike Route" signs are posted along this type of bikeway.

#### 2. Locational Criteria

- Low traffic volumes - A maximum of 2,000 vehicles per 24 hour period.

- Low speed limit - A maximum of 30 m.p.h.
- Low truck traffic - Less than 5% of average daily traffic.
- Adequate space available in the outside lane width. This width should be a minimum of 15 feet.

### 3. Design Problems

- Intersection treatment with signing is critically important to the bicyclist's safety.
- Signing should also be provided wherever the bicycle route changes direction.

### Bismarck Bikeway Plan Facilities

The Plan's 20.55 miles of bikeways can be classified according to the recommended design type and by the projects location. The following represents a breakdown of the proposed facilities.

<u>Facility</u>	<u>Existing</u>	<u>Proposed</u>	<u>Corridor</u>	<u>From</u>	<u>To</u>	<u>Length</u>
Path	+		Park	Bismarck Avenue	Horse Arena	1.00 m
	+		Overpass	Holiday Drive	Rosser Avenue	.15
		+	Rec. Area	Arbor Avenue	Bismarck Avenue	.16
		+	Coulee-Hillcrest	Coulee Road	Schafer Street	.11
		+	Jaycee Pk.	Arikara Avenue	YMCA	.16
		+	Capitol Grounds	Fourth St.	State Museum	.12
		+	Lions Hill-side Park	The Boulevard	Avenue E	.11
		+	Atkinson Memorial Park	Porter Avenue	Braman Avenue	.11
		+	Thayer Ave.	16th St.	17th St.	.05
		+	Hay Creek	Bismarck Avenue	Rosser Avenue	.30
		+	Hay Creek	Divide Avenue	Century Avenue	.54
		+	Around Cottonwood Lake			.30

<u>Facility</u>	<u>Existing</u>	<u>Proposed</u>	<u>Corridor</u>	<u>From</u>	<u>To</u>	<u>Length</u>
		+	Open Storm Sewer Ditch	Horse Arena	Residential Area	.20
Total Bicycle Path Length						2.31 mile

Lane		+	Bismarck Ave.	Washington St.	Bicycle Path	.60
		+	Bismarck Ave.	Washington St.	Hay Creek	1.20
		+	Third St.	Bismarck Ave.	Rosser Ave.	.40
		+	Divide Ave.	Burnt Boat Road	26th Street	1.23
		+	Century Ave.	Burnt Boat Road	Hay Creek	1.31
Total Bicycle Lane Length						4.74 mile

Route		+	Fourth St.	Turnpike Ave.	Century Ave.	.22
		+	Interstate Ave.	19th St.	Century Ave.	.90
		+	Turnpike Ave.	Fourth St.	Marian Drive	.25
		+	Marian Drive	Divide Ave.	Turnpike Ave.	.20
		+	Capital Ave./ Jackson Ave.	N. Kavaney Dr.	23rd St.	.74
		+	Third St.	Turnpike Ave.	Rosser Ave.	.60
		+	Eleventh St.	Capital Ave.	Braman Ave.	.23
		+	Fourteenth St.	Capital Ave.	Thayer Ave.	.60
		+	23rd St.	Jackson Ave.	Laforest Ave.	.24
		+	Laforest Ave.	23rd St.	22nd St.	.08
		+	22nd St.	Laforest Ave.	The Boulevard	.13
		+	19th St.	Interstate Ave.	Broadway	.82
		+	Arikara Ave.	Washington St.	4th St.	.15
		+	Capital Grds.	State Museum	12th St.	.13
		+	Porter Ave.	Atkinson Mem. Pk.	19th St.	.23

<u>Facility</u>	<u>Existing</u>	<u>Proposed</u>	<u>Corridor</u>	<u>From</u>	<u>To</u>	<u>Length</u>
	+	Avenue E	19th St.		Mandan St.	.51
	+	Mandan St.	Avenue E		Avenue F	.08
	+	Avenue F	Mandan St.		Anderson St.	.14
	+	Avenue D	19th St.		26th St.	.21
	+	27th St./ Gary Avenue	Avenue D		Avenue A	.12
	+	Avenue A	Gary Avenue		Eastdale Dr.	.07
	+	Eastdale Dr.	Avenue A		Broadway	.09
	+	Broadway	Eastdale Dr.		25th Street	.19
	+	25th St.	Broadway		Thayer Avenue	.08
	+	Thayer Ave.	25th Street		10th Street	.40
	+	10th St.	Thayer Ave.		Rosser Ave.	.08
	+	Rosser Ave.	10th St.		Bell Street	.46
	+	8th St.	Avenue E		Rosser Avenue	.17
	+	Sweet Ave.	13th St.		Riverside Park Road	.61
	+	Bowen Ave.	13th St.		Airport Road	.17
	+	Airport Road	Bowen Avenue		Broadway	.12
	+	13th St.	Sweet Avenue		Boehm Drive	.08
	+	Boehm Drive	13th St.		Bismarck Ave.	.08
	+	Anderson St.	Sweet Avenue		Arbor Ave.	.09
	+	Arbor Ave.	Riverside Park Rd.	3rd St.		.24
	+	Riverside Pk. Road	Arbor Avenue		Burnt Boat Road	1.20
	+	Burnt Boat Rd.	Riverside Park Rd.	Divide Avenue		.22
	+	Tyler Parkway	Burnt Boat Road		Century Ave.	.18
	+	Edwards Ave.	Schafer Street		River Road	.24
	+	College Dr.	Ward Road		Schafer St.	.16
	+	Schafer St.	College Dr.		Edwards Ave.	.07

<u>Facility</u>	<u>Existing</u>	<u>Proposed</u>	<u>Corridor</u>	<u>From</u>	<u>To</u>	<u>Length</u>
	+		Bell Street	Sweet Avenue	Memorial Highway	.04
	+		Lake Avenue	Memorial Highway	Riverview Avenue	.02
	+		Riverview Ave.	Lake Ave.	Center Street	.13
	+		Center Street	Riverview Ave.	Holiday Drive	.03
	+		Anderson St.	Avenue F	Rosser Avenue	.20
	+		Avenue B	Anderson St.	Crescent Lane	.12
	+		Highlands Acres roads	Avenue B	Proposed bicycle path	.27
	+		Channel Dr.	Rosser Ave.	Divide Ave.	.50
	+		Streets south of Bismarck Avenue	(un-named)		.61
Total Bicycle Route Length						13.50
TOTAL PROPOSED BIKEWAY FACILITY LENGTH						20.55

### Bikeway Plan Project Priorities

Due to the composition of the Bismarck Bikeway Plan in terms of on-street vs. off-street facilities, the implementation period should not, under normal circumstances, require more than five years. The following project priorities are recommended for the total plan's development.

#### ● Short-Term (1st Year)

- A) Existing System - Publish and distribute the Bismarck Bicycle Access Map throughout the Bismarck area.
- B) Bicycle Parking Facilities - Evaluate, purchase, install, and promote the availability of bicycle parking facilities at all public park and recreation areas and employment centers. Private businesses should also be encouraged to acquire and install bicycle parking facilities.
- C) Improve the bicycle crossings over the railroad track areas at Third Street and Airport Road.
- D) Re-design Bismarck Avenue bicycle lane between South Washington Street and

existing off-street bicycle path. Two one-way lanes should be provided on each side of the existing paved roadway according to accepted design standards.

- E) To improve sight distance on the existing off-street bicycle path west of the Riverwood Golf Course, vegetation at all curve areas should be thinned out.
- F) Extend the Bismarck Avenue bicycle lanes east to Airport Road widening the paved roadway wherever necessary.
- G) Up grade and improve the Rosser Street overpass/underpass facility and approach routes. Pavement areas must be smooth and free of mud, vegetation, and accumulated debris.
- H) The River Road underpass of Memorial Bridge should be clearly marked for better visibility and the existing vegetation in the underpass area eliminated.
- I) The Fourth Street underpass of Interstate 94 should be clearly identified as a suggested bicycle access location. Underpass shoulders should be regularly maintained.
- J) The signalization and channelization design at the intersection of Interstate Avenue and U.S. 83 should be modified to allow bicyclists to cross through this intersection efficiently and safely.
- K) The approaches to the 19th Street overpass of Interstate 94 should be appropriately signed to warn motor vehicle drivers of the potential presence of bicyclists in the overpass area and to drive accordingly.
- L) Divide Avenue from Ward Road to Burnt Boat Road should be widened to permit safe bicycling on paved shoulder areas.
- M) Provide an off-street bicycle path in the neighborhood park to connect the Thayer Avenue bicycle route.

● Mid-Term (2 to 3 Years)

A) Provide the following off-street bicycle path connections:

1. From the Horse Arena east along the north side of the open storm sewer ditch to connections with the new developments west of South Washington Street.
2. From the southern termination of River Road across the Sertoma Diamonds area for connection with Bismarck Avenue bicycle lanes.
3. From Coulee Road (Highland Acres) north and west to Bismarck Junior College Campus.
4. Provide bicycle path connections to the YMCA and to the softball field area from the Arikara Avenue and Washington Street parking lot area.
5. From Fourth Street and Arikara Avenue east through the Capital Grounds to the State Museum road.

6. Extension of 19th Street through Lions Hillside Park with adjacent connection east to the 22nd Street/Boulevard intersection.

B) Provide the following on-street bicycle lane connections:

1. Along either side of Divide Avenue from Burnt Boat Road (See Short-Term L) east to its intersection with 26th Street.
2. Along either side of Third Street from Bismarck Avenue on the south to Rosser Avenue on the north.

● Long-Term (4 to 5 Years)

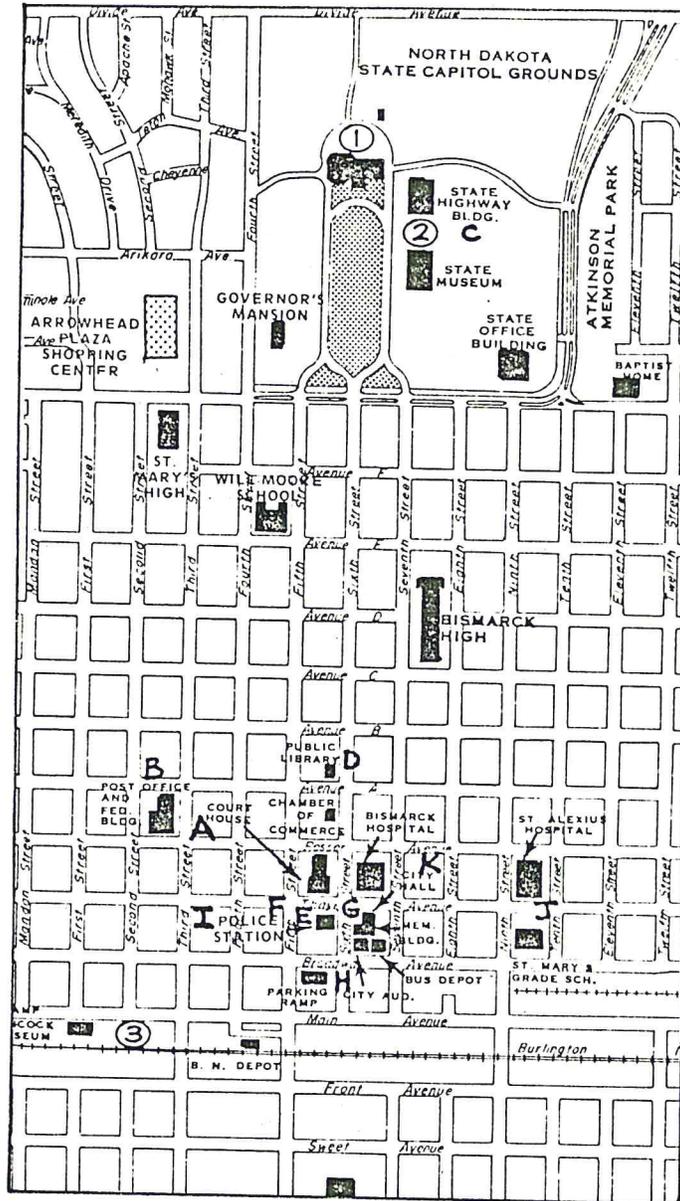
- A) Complete the necessary on and off-street facilities to provide continuous bicycle access along Hay Creek from its intersection with the Bismarck Avenue extension on the south to Century Avenue on the north.
- B) Integrate bicycle lane facilities or wide shoulders facilities into Century Avenue from Hay Creek on the east to Divide Avenue on the west.
- C) Complete bicycle lane or shoulder widening facilities on Bismarck Avenue from Hay Creek on the east to Airport Road on the west (See Short-Term F).
- D) Evaluate, according to pre-established criteria, the use of implemented bicycle facilities.

## Bicycle Parking Facilities

The lack of well-designed and properly located bicycle parking facilities throughout Bismarck represents a significant deterrent to commuter and recreational bicycling. Buildings within the public school system provide the out-dated and inefficient T-Bar bicycle rack for all levels of student bicycle users. This rack facility may be adequate for the type of bicycle ridden but should be discouraged for future acquisition.

The central business district of Bismarck was also inventoried for bicycle parking facilities. The number of bicycles parked in these facilities was noted (Tuesday, August 29, 1978, warm and sunny) as was also the location of the facility and the resulting theft potential. The following parking sites were identified although this list is probably incomplete.

<u>Location</u>	<u>Facility Type</u>	<u>Maximum Capacity</u>	<u># of Parked Bicycles*</u>	<u>Theft Potential at Location</u>
A Montana-Dakota Utilities Co.	T-Bar	12	6	High
B Court House/Post Office	T-Bar	12	2	High
C State Highway Building	T-Bar	8	2	Medium
D Public Library	T-Bar	7	0	Medium
E Police Station	Post/V-Brace	4	0	Low
F Mall Location	Post/V-Brace	4	4	Medium
G Mall Location	Post/V-Brace	4	0	Medium
H Mall Location	Post/V-Brace	6	5	Medium
I Bismarck Tribune	T-Bar	10	3	Medium
J St. Alexius Hospital	T-Bar	12	3	Medium
K University of North Dakota School of Medicine, Family Practice Center	T-Bar	6	1	Medium



To encourage commuter and recreational bicycling in Bismarck, it is necessary to provide secure bicycle parking facilities at all employment centers, office buildings, shopping centers, schools(all levels), cultural facilities, and park and recreation areas. The most favorable locations for bicycle parking facilities are in areas of high pedestrian activities. Locating these parking facilities within parking garages, behind buildings, or in alleys increases the chance for the bicycle to be stolen. To be successful, a bicycle parking facility must be designed to securely lock both wheels and the frame of the bicycle.

The following bicycle parking facility location and design criteria can serve as guidelines for facility acquisition and installation within the City of Bismarck.

● Location - The higher the pedestrian traffic around a bicycle parking facility, the less the chances are for a bicycle to be stolen or vandalized. The locations with high and low pedestrian activity are:

High Activity Areas: Central business district  
Public library main entrance  
Office building main entrances  
YMCA main entrance  
Public school main entrances  
Shopping centers-near shops and not in parking lots

Low Activity Areas : Park and recreation areas  
Alleys  
Churches  
Motor vehicle parking lots

The lower the pedestrian activity around a bicycle parking facility, the higher the security rating for the facility. A variety of parking facility types are available in the United States and can be acquired according to a pre-determined security need.

● Design - The basic design concept for a successful bicycle parking facility is that it must securely lock both the bicycle's wheels and the frame to a permanently anchored metal object. Other design considerations are:

- The locking procedure must be convenient and simple.
- The parking facility should be designed to accept a variety of bicycle types and locking mechanisms (chains, cables, and special bicycle locking devices).
- The locking operation should be possible with only a user-supplied lock.

- Construction members of the facility should have solid-welded joints, be rust and corrosion free, and not have any protruding bars.
- The facility should be architecturally consistent with the surroundings.
- The facility should be designed on a single unit basis to allow flexibility in site development.
- The facility must be permanently anchored and yet have the ability to be relocated if necessary.

The following bicycle parking facilities are designed to lock both wheels and the bicycle's frame and are currently available for acquisition in the United States.

- Rally Rack RR-200 \_\_\_\_\_ Rally Enterprises, Inc.  
Box 299  
Sonoma, California 95476
- Rally Rack RR-300 \_\_\_\_\_ Rally Enterprises, Inc.  
Box 299  
Sonoma, California 95476
- Bala Byk-Lok Rak \_\_\_\_\_ Bala Byk-Lok-Rak  
691 Parkview Circle  
Pacifica, CA 94044
- Howard Bike Lockup \_\_\_\_\_ Howard Enterprises  
1250 Wilson Way  
Stockton, CA 95205
- Park-A-Bike \_\_\_\_\_ Park-A-Bike Systems  
180 Cook Street  
Suite 111  
Denver, Colorado 80206
- Rack III \_\_\_\_\_ Rack III  
1714 Stockton Street  
San Francisco, CA 94133
- Bike Lokr (Locker-type design) \_\_\_\_\_ Bike Lockers  
P.O. Box 978  
North Highlands, CA 95660
- Bike Stable (Locker-type design) \_\_\_\_\_ Bike Stable Co.  
P.O. Box 1402  
South Bend, Indiana 46624
- Mac Cycle Vault (Locker-type design) \_\_\_\_\_ BMR Fabrications  
P.O. Box 610  
Toccoa, Georgia 30577

To promote the acquisition and installation of improved bicycle parking facilities in Bismarck as well as the recommended procedures for securing individual bicycles, a bicycle parking brochure should be developed and distributed throughout the public school system, city park and recreation facilities, central business district, and to building managers and real estate professionals. It is recommended that this brochure be developed by the Bismarck Community Development Office in collaboration with the Bismarck Police Department.

THE BICYCLE ADVISORY COMMITTEE

## Project 2

### Bicycle Advisory Committee

At the present time, there is no organization that can effectively represent the interests of both the commuter and recreational bicyclist in Bismarck. A new organization, therefore, should be created to provide assistance in a wide range of bicycle-related subjects. A suggested name for this organization is the: Bismarck Bicycling Committee (BBC). The objectives of the BBC should be:

- 1) To promote the general interest of bicycling in Bismarck;
- 2) Monitor the use of Bismarck bicycle riding and parking facilities;
- 3) Evaluate these facilities and recommend design, construction, signing, or maintenance modifications;
- 4) Serve as a forum for Bismarck bicyclists to discuss riding, parking, safety, enforcement, and education issues;
- 5) Assist city and state governments in identifying private, local, state, and federal funds for bicycle project implementation;
- 6) Assist local educators in developing and implementing effective bicycle safety curriculums on both the primary and secondary levels;
- 7) Serve on any appropriate Bismarck transportation advisory committee. This participation will permit bicycle-related projects to be integrated into both the Bismarck Transportation Plan and into other transportation projects.

### BBC Membership

Membership in the BBC should be developed on two levels. The first level will include those individuals who are appointed to the BBC by the Community Development Office. These individuals will represent specific interests in Bismarck and will be responsible for carrying out the stated (and adopted) BBC objectives. It is proposed that the following individuals be appointed to the BBC:

- 1 Bismarck Police Department
- 1 Community Development Office
- 1 Bismarck Traffic Engineering
- 1 Bismarck Public Works
- 1 Bismarck Parks and Recreation
- 1 Bismarck elementary teacher
- 1 " secondary "
- 1 " Junior College teacher

- 1 Bismarck bicycle shop owner
- 2 Local Bismarck business representatives
- 2 Local bicyclists
- 2 State Highway Department representatives (one from transportation planning and one from highway safety).

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Total Members: 15

The second level of the BBC will be a Citizens Advisory Committee (CAC). Any Bismarck resident interested in any phase of bicycling shall be eligible for membership in the CAC.

#### BBC Officers

The BBC appointed membership should elect at its first meeting the necessary officers with which to conduct all future meetings. Approved Rules of Order shall govern the proceedings of each BBC meeting.

#### BBC Meetings

The BBC should meet on a regular basis (monthly) to establish itself as an on-going and effective body. Special BBC meetings can, however, be called by the BBC President upon written request of at least five (5) BBC members.

BICYCLE SAFETY

## Project 3 Bicycle Safety Education

### Review of Bismarck Bicycle Education Materials

A review of the current bicycle education materials was conducted. Although reasonably complete, the material needs to be modified so as to place additional emphasis on bicycle road hazards and appropriate evasive maneuvers for these hazards.

The current bicycle education program is structured for a classroom environment. This approach, although useful, remains incomplete without its direct application to on-the-road riding. Children will, therefore, find it difficult to apply classroom instruction to riding techniques, operating behavior, and road sign meanings to on-the-road situations. The development of bicycle roadeo courses present artificial riding situations and are often regarded by participants as opportunities to "show-off" their bicycling skills. In addition, these roadeos are not held often enough to effectively "drive-home" bicycle safety skills.

A bicycle education program can provide many benefits to the community and to the individual bicyclist. The ultimate goal of the Bismarck bicycle education program should be to prepare careful and qualified cyclists able to enjoy the healthfulness, transportation, and recreation of bicycling. The following elements represent suggested components of a comprehensive bicycle education program for the City of Bismarck.

### Elements of a Comprehensive Bicycle Education Program

#### Pre-School

1. A coloring book focusing on bicycle safety concepts can be developed and distributed throughout Bismarck.
2. Parents should be specifically instructed to begin teaching basic bicycle safety procedures beyond the learning how to balance stage.

- Public School System: It is suggested that the Bismarck Public School System and the State Department of Public Instruction research all available local and state bicycle education programs in order to select, modify, or develop a particular program for use on the public school level. This program should consider utilizing the following recommendations:

1. A specially trained bicycle safety instructor (not a local police officer) to research, develop, present, and teach bicycle safety education in the Bismarck school system. This instructor would circulate from school to school from April 1st to November 1st of each year. Each student would be given a preassessment and postassessment to test the knowledge retention of this education course.
2. Use of the proposed North Dakota Bicycle Driver's Handbook in each grade.
3. A comprehensive index of bicycle riding situations and safety concerns should be developed into a recipe type file box for easy reference. A year-round program of bicycle safety can be developed from this file.

- Adult Bicycle Education: Whether an individual is a motor vehicle driver, a bicyclist, or both, this person needs to be educated in the rights, responsibilities, and behavior of the bicycle user. The following recommendations are made in order to educate adults in bicycle safety:

1. Development of the North Dakota Bicycle Driver's Handbook. This handbook should be distributed throughout the State to all schools, bicycle organizations, and licensed motor vehicle operators.
2. Develop a bicycle safety leaflet and send to each registered driver with the license renewal form.
3. Questions concerning the operation of a bicycle on a roadway should be incorporated into the North Dakota Driver's Examination (both written and oral).

- Police: The Bismarck Police Department should adopt policies and programs which:

1. Improve the relationship between police officers and bicyclists
2. Develop inservice training for officers to improve their understanding of bicycles and to encourage greater and more uniform enforcement of bicycle ordinances.

- State Department of Highway Safety: This Department should sponsor a daylong bicycle safety workshop for Bismarck police officers, school teachers, and local adult bicyclists. This workshop would present bicycle safety concepts, analysis of local bicycle ordinances, educational materials, and bicycle safety counseling. This format could also be adapted to teach additional instructors of bicycle safety.

- Bismarck Bicycle Accidents From 1973 - 1977: The following conclusions have resulted from an analysis of the five-year accident data for the City of Bismarck, North Dakota.

Total Accidents: From 1973 through 1977, 35 bicycle accidents were reported from within the city limits of Bismarck.

Fatalities: No fatalities resulted from these 35 accidents.

Age: The average age of those involved in these accidents over the five-year period was 11.9 years.

Sex: 77% of the bicyclists were male while 23% were female.

Date: All accidents occurred between March 1st and October 30th. June and July represented the peak months with 8 accidents each.

Time: 52% of all the accidents occurred between 5:01p.m. and 12:00 midnight. The age range during this time period was 5 to 33 years.

34% of the accidents happened between 12:01 p.m. and 5:00 p.m. The ages during this time period ranged from 5 to 16 years.

14% of the accidents happened between 8:00 a.m. and 12:00 noon. Bicyclists involved in this time period ranged in age from 3 to 10 years.

Bicycle Action: 73% of all the accidents involved bicyclists proceeding in a straight direction.

Pavement Condition: 94% of the 35 accidents occurred on dry pavement.

Injuries: Disabling Injuries (6 accidents)  
18% of the total accidents  
Ages ranged from 3 to 22  
83% were below the age of 15

Non-Disabling Injuries (13 accidents)  
38% of the total accidents  
Ages ranged from 3 to 30  
92% were below the age of 22

Possible Injuries: ( 14 accidents)  
41% of the total accidents  
Ages ranged from 3 to 50  
93% were below the age of 22

No Injuries: ( 1 accident)  
3% of the total accidents  
Age ranged from 7 to 15

97% of all reported accidents resulted in a possible, non-disabling, or disabling type of injury.

Vehicle Involvement: 97% of all the accidents involved one bicycle and one motor vehicle. Only one accident involved a single bicycle.

- Accident Data Recommendations: Over 73% of the reported bicycle accidents from 1973 through 1977 occurred to bicyclists under the age of 16. Stronger emphasis on bicycle safety education in the Bismarck school system may help to reduce these accidents. Bicycle education curriculums must include on-the-road instruction in addition to classroom instruction.

Over 23% of the reported accidents occurred to bicyclists between the ages of 16 and 30. Inclusion of specific bicycle-related information and examination questions within motor vehicle driver training courses will help to educate the adult bicyclist and motor vehicle driver in bicycle safety.

### Bismarck Bicycle Accidents

The following table represents those bicycle accidents in Bismarck from 1973 through 1977. An analysis was conducted of these accidents according to the information that was provided by the North Dakota Department of Highways. Additional information ~~x~~ on individual accident forms would provide the necessary detail in order to more accurately analyze the causes of bicycle accidents.

Bismarck Bicycle Accidents: 1973 - 1977

Year	#	Age	Sex	Date	Time	Location Type	Bicycle Action	Pavemt. Cond.	Driver Injury*	Weather	# of Bicy.	# of Vehic. Invol.
1973	1	12	M	3-1	3:25pm		Going Straight	Dry	Non-Dis.	Cloudy	1	2
	2	16	M	6-7	4:25pm	Inters.	Going Straight	Dry	Possible	Cloudy	1	2
	3	13	M	6-8	7:55pm		Going Straight	Dry	Non-Dis.	Clear	1	2
	4	7	M	6-13	10:42am			Dry	None	Clear	1	2
	5	10	M	6-25	8:45am		Turning Left	Dry	Non-Dis.	Clear	1	2
	6	13	M	7-2	4:16pm		Going Straight	Dry	Non-Dis.	Clear	1	2
	7	17	M	8-2	6:30pm		Going Straight	Dry	Non-Dis.	Clear	1	2
	8	11	F	8-21	9:25pm		Going Straight	Dry	Non-Dis.	Clear	1	2
1974	9	11	M	6-3	5:13pm		Going Straight	Dry	Possible	Cloudy	1	2
	10	5	F	7-16	9:38am		Going Straight	Dry	Possible	Clear	1	2
	11	9	M	7-16	1:56pm		Merging	Dry	Disabli.	Rain	1	2
	12	13	M	7-18	2:56pm		Going Straight	Dry	Non-Dis.	Clear	1	2
	13	6	M	7-12	3:04pm		Turning Left	Dry	Disabli.	Clear	1	2
	14	18	F	8-23	9:13pm		Going Straight	Wet	Possible	Rain	1	2
1975	15	-	M	5-3	1:10pm		Going Straight	Dry	Non-Dis.	Clear	1	2
	16	16	F	5-27	6:15pm		Going Straight	Dry	Non-Dis.	Clear	1	1
	17	5	M	6-12	6:30pm		Going Straight	Dry	Possible	Clear	1	2
	18	5	M	9-1	12:30pm		Going Straight	Dry	Non-Dis.	Clear	1	2

Bismarck Bicycle Accidents: 1973 - 1977

Year	#	Age	Sex	Date	Time	Location Type	Bicycle Action	Pavemt. Cond.	Driver Injury*	Weather	# of Bicy.	# of Vehic. Invol.
1976	19	9	M	3-31	5:25pm		Going Straight	Dry	Possible	Cloudy	1	2
	20	16	M	4-15	6:21pm		Going Straight	Dry	Possible	Clear	1	2
	21	15	M	5-7	3:20pm		Going Straight	Dry	Possible	Clear	1	2
	22	33	M	5-12	7:17pm	Inters.	Going Straight	Dry	Possible	Clear	1	2
	23	13	M	5-16	6:45pm		Going Straight	Dry	Disabli.	Clear	1	2
	24	25	F	5-23	10:21pm		Turning Right	Dry	Non-Dis.	Clear	1	2
	25	12	M	6-3	2:32pm		Other	Dry	Disabli.	Cloudy	1	2
	26	3	F	7-22	11:00am		Going Straight	Dry	Non-Dis.	Cloudy	1	2
	27	5	M	7-28	8:50pm		Turning Right	Dry	Disabli.	Clear	1	2
	28	22	F	8-24	7:58pm		Turning Left	Wet	Disabli.	Rain	1	2
1977	29	8	M	4-24	11:35am		Going Straight	Dry	Possible	Clear	1	2
	30	17	M	6-24	11:28pm		Stopped	Dry	Possible	Clear	1	2
	31	15	M	7-12	1:45pm		Going Straight	Dry	Non-Dis.	Clear	1	2
	32	7	M	8-30	5:55pm		Turning Left	Dry	Non-Dis.	Clear	1	2
	33	6	M	8-30	2:40pm		Going Straight	Dry	Possible	Clear	1	2
	34	13	F	9-1	9:00pm		Going Straight	Dry	Possible	Cloudy	1	2
	35	10	M	10-17	5:30pm	Inters.	Going Straight	Dry	Possible	Clear	1	2

\* Driver: Assumed to be the operator of the bicycle.

Reference Source: North Dakota State Highway Department, Traffic Safety Programs Division

ASSESSMENT OF LEGISLATIVE NEEDS

Recommendations To Article IX of the Bismarck Traffic Code

The following language amendments and additions are proposed for the bicycle section of the Bismarck Traffic Code. Revisions to existing language as well as new sections are indicated by underlining.

ARTICLE IX

Section 35-303     Definition of a Bicycle

Bicycle: A bicycle shall be defined as "every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices."

Section 35-304

No additions or changes.

Section 35-305

No additions or changes.

Section 35-306

No additions or changes.

Section 35-307

No additions or changes.

Section 35-308

(a) No additions or changes.

(b) No additions or changes.

(c) Riding bicycles upon or along sidewalks shall be unlawful except where said sidewalk is part of a designated bicycle route. Bicyclists shall yield the right-of-way to pedestrians on said sidewalks, and shall leave the sidewalk or dismount if necessary to yield such right-of-way.

Section 35-309

No additions or changes.

Section 35-310

No additions or changes.

Section 35-311

No additions or changes.

Section 35-312

- (a) Every person operating a bicycle upon a roadway shall ride as near to the right side of the paved roadway as practicable except when turning left and exercising due care when passing a standing vehicle or one proceeding in the same direction.
- (b) No additions or changes.
- (c) Wherever a usable and regularly maintained path for bicycles has been provided adjacent to a roadway, bicycle riders shall use such path and shall not use the roadway.

Section 35-313

No additions or changes.

Section 35-314    Speed

No person shall operate a bicycle at a speed greater than is reasonable and prudent under the conditions then existing.

Section 35-315    Emerging From Alley or Driveway

The operator of a bicycle emerging from an alley, driveway or building, shall upon approaching a sidewalk or the sidewalk area extending across any alleyway, yield the right-of-way to all pedestrians approaching on said sidewalk or sidewalk area, and upon entering the roadway shall yield the right-of-way to all vehicles on said roadway.

Section 35-316    Parking

No person shall park a bicycle upon a street other than upon the roadway against the curb or upon the sidewalk in a rack to support and securely lock the bicycle or against a building or at the curb, in such a manner as to afford the least obstruction to pedestrian traffic.

## Recommendations to the Bismarck Zoning Regulations

By establishing requirements for off-street bicycle parking within the City of Bismarck zoning regulations, bicycle users will be insured of adequate parking space at all new buildings constructed and for any new use established; at any addition or enlargement of an existing building; and at any existing building that changes occupancy.

Regulations relating to bicycle parking should include the following provisions:

- A) For residential areas having five or more dwelling units or mobile homes per building lot, a specific number of bicycle parking spaces shall be provided per dwelling unit.
- B) For dormitory, fraternity, or sorority houses, a specific number of bicycle parking spaces shall be provided per specific number of persons in residence.
- C) For non-residential areas, a specific number of bicycle parking spaces shall be provided per specific number of automobile spaces.
- D) Each bicycle parking space should comply with the following standards:
  - 1. An outside ground surface shall be treated to eliminate mud or dust.
  - 2. Each bicycle parking facility shall be anchored to eliminate easy removal.
  - 3. Each bicycle parking facility shall be designed to lock both wheels and the frame of the bicycle.
  - 4. Bicycle lockers shall be designed to prohibit unauthorized persons from removing a parked bicycle.
  - 5. If an interior building space is provided for bicycle parking, twelve square feet of floor area shall be provided for each bicycle.

These provisions are intended to serve as guidelines for local zoning regulation development. Examples of specifically adopted bicycle parking requirements in

zoning ordinances/regulations can be obtained from the following jurisdictions:

- Palo Alto, California
- Albuquerque, New Mexico
- Montgomery County, Maryland
- Arlington County, Virginia

Recommendations to Chapter 39 - 10.1 of the North Dakota Motor Vehicle Laws(1975).

The following language amendments are proposed for the bicycle section of the North Dakota Motor Vehicle Laws. Revisions to existing language is indicated by underlining.

Section 39-10.1-00

Bicycle: A bicycle shall be defined as "every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices."

Section 39-10.1-01.

No additions or changes.

Section 39-10.1-02.

No additions or changes.

Section 39-10.1-03.

No additions or changes.

Section 39-10.1-04.

No additions or changes.

Section 39-10.1-05.

1. Every person operating a bicycle upon a roadway shall ride as near to the right side of the paved roadway as practicable except when turning left and exercising due care when passing a standing vehicle or one proceeding in the same direction.
2. No additions or changes.
3. Wherever a usable and regularly maintained path for bicycles has been provided adjacent to a roadway, bicycle riders shall use such path and shall not use the roadway.
4. For the sake of uniformity and bicycle safety throughout the state, the department (of Motor Vehicles or Revenue) in cooperation with the State Department of Highways shall prepare and make available to all local jurisdictions for distribution to bicycle riders therein a digest of State regulations explaining and illustrating the rules of the road, equipment requirements, and traffic control devices that are applicable to such riders and their bicycles. Local authorities may supplement this digest with a leaflet describing any additional regulations of a local nature that are applicable within their respective jurisdictions.

Section 39-10.1-06.

No additions or changes.

Page 2

Section 39-10.1-07.

No additions or changes.

Section 39-10.1-08.

No additions or changes.

Recommendations to the North Dakota Driver's Guide of 1977 - 78.

The current North Dakota Driver's Guide is totally inadequate in communicating even the most basic of bicycle operating procedures. It is strongly recommended that a separate handbook for North Dakota bicyclists be developed. This handbook should include detailed explanations of the following elements:

- State vehicle code
- Specific bicycle road rules
- Bikeway definitions and appropriate behavior on each type of bikeway.
- Bicycle safety equipment
- Inspection and maintenance considerations
- Turning procedures at various intersection types
- Meanings of traffic signs and pavement markings
- Bicycle selection
- Identified road hazards and appropriate evasive maneuvers
- Theft prevention techniques

This state bicycle handbook should be similar to the State of Colorado Instructions For Bicyclists (attached). The development of this handbook should be coordinated with North Dakota bicycle organizations to insure their acceptance, distribution assistance, and use of this safety publication.

FUTURE

BIKEWAY PLAN AND PROGRAM

ASPECTS REQUIRING FURTHER INVESTIGATION

### Detailed Design of Proposed Bikeway Facilities

Each of the proposed bikeway facility projects in the Bismarck Bikeway Plan are discussed in general terms and represent only the first step in the planning and design phase. The specific design treatment for each of the recommended bikeway corridors should now be addressed. The design factors that are applied to each bikeway segment include width, curve radius, lateral and vertical clearances, barrier identification, street grate modification, grade analysis, signing, pavement markings, intersection controls, overpass and underpass design.

Specific types and locations for bicycle parking facilities also need to be developed in order to provide a complete system for bicyclists to use when parking or storing their bicycles for either short or long periods of time.

### Development of Specific Facility Costs

The engineering, construction, and maintenance costs for each proposed bikeway project can be developed once the design treatment for each project is specifically identified. Once the total plan cost is determined, a cost-phasing schedule for the plan implementation will then be designed.

### Development of a Sign Plan

For the proposed bikeway facilities to be used properly and safely, graphic identification and directional controls must be installed. These signs and pavement markings serve to inform and warn motorists as well as to convey to bicycle users the appropriate behavior for a specific bikeway design or riding situation. Each decision point along a bikeway corridor will require a sign or pavement marking. A sign plan for the proposed Bismarck Bikeway Plan needs to be developed.

### Implementation Strategies

Following the plan adoption process, the City of Bismarck should begin to research and identify federal, state, local, and private funding sources. The application procedures, funding cycles, and eligibility requirements for each bikeway funding program should be clearly identified. The degree of plan implementation will depend, in large part, on the public's acceptance of the plan. Efforts to promote and publicize the plan should be the responsibility of the recommended Bismarck Bicycling Committee in coordination with the appropriate city and state departments.

### Suggested Developer Guidelines For Bikeway Facilities

The City of Bismarck is currently experiencing a steady annual growth rate. The rapidly developing residential areas north, south, and east of the city's commercial area is evidence of this growth. A sound and orderly pattern of physical urban growth can be achieved through the development and consistent regulation of land development. The adoption and enforcement of subdivision regulations is one of the most positive means of actively encouraging the best use of undeveloped land areas.

One important element of subdivision regulations concerns the design of proposed streets, roads, or other ways which are, or will become extensions of already established streets. These public streets or roads should include riding facilities for bicycles or the required space for future bikeway facilities. A second important element of subdivision regulations relates to the location and design of recreation corridors within subdivision areas. Bikeways should be incorporated into these corridors to serve the recreation and transportation needs of local residents. The City of Bismarck should develop specific bikeway standards for use by subdivision developers.

### Development of Bicycle Education Program Materials

Once a preliminary bicycle education program is designed, the appropriate instructor and student materials must be then developed, reproduced, and distributed throughout the Bismarck public school system. Due to the ineffectiveness of many bicycle education materials, a significant amount of time may be required to develop these safety and education material for various age levels and bicycle user groups. Assistance by local educators and enforcement representatives will be required in order to clearly identify local bicycle education problems.