San Antonio--Bexar County Bicycle Mobility Plan - Long Range Plan

UWP 94-2

Prepared for: San Antonio--Bexar County
Metropolitan Planning Organization

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February 1995

TECHNICAL REPORT STANDARD PAGE

TITLE AND SUBTITLE	REPORT DATE
Bicycle Mobility Plan - Long Range Plan	February 14, 1995
AUTHOR(S) Metro Systems Engineering Bicycle Federation of America Dixie Watkins III & Associates	TYPE OF REPORT Technical
PERFORMING ORGANIZATION NAME AND ADDRESS Metro Systems Engineering Post Office Box 681116 San Antonio, TX 78268-1116	PERIOD COVERED 1994-1995
SPONSORING AGENCY NAME AND ADDRESS San Antonio--Bexar County Metropolitan Planning Organization 434 South Main, Suite 205 San Antonio, TX 78204	APPROVED BY San Antonio--Bexar County Transportation Steering Committee
SUPPLEMENTARY NOTES	APPROVAL DATE 3/27/95

ABSTRACT

In 1994, the San Antonio--Bexar County Metropolitan Planning Organization initiated a study to develop a mobility plan for bicycles as a mode of transportation. The study addressed long range bicycle facility needs in the San Antonio--Bexar County study area. This report presents overall goals and objectives for bicycle mobility planning. Current conditions for bicycling in the study area are described and needs for improvement identified. A four step bicycle mobility planning process is described. Bicycle Mobility Plan implementation policies are recommended. Funding sources are identified and the Transportation Improvement Program process is described. The importance of continued public participation in bicycle mobility planning is addressed.

RELATED REPORTS	DISTRIBUTION STATEMENT	PERMANENT FILE
None	San Antonio--Bexar County Metropolitan Planning Organization	San Antonio--Bexar County Metropolitan Planning Organization
NUMBER OF PAGES	COST OF REPORT	REPRODUCTION COSTS
136 pages + map enclosure	$75,000	

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Executive Summary

Background

In 1994, the San Antonio--Bexar County Metropolitan Planning Organization (MPO) initiated a study to develop a mobility plan for bicycles as a mode of transportation. The study addressed long range bicycle facility needs in the San Antonio--Bexar County study area.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) requires development of an overall plan for the location and design of bicycle transportation facilities as part of the Long Range Transportation Planning process in metropolitan areas. Accordingly, Bicycle Mobility Plan findings will be incorporated into the MPO's Long Range Transportation Plan for the San Antonio--Bexar County area.

An early activity in the development of the San Antonio--Bexar County Bicycle Mobility Plan was the creation of a vision for bicycling in the region. In public meetings and meetings with agency staff and user groups, participants were asked to describe their vision for the San Antonio--Bexar County study area 20 years from now. Also, surveys of both government agencies and San Antonio and Bexar County citizens were distributed to solicit comments on existing bicycle travel conditions and suggestions for improvements. A wide range of comments were generated by this process that can be summarized by the following statement:

> ***The San Antonio--Bexar County study area can be one where residents and visitors will choose to bicycle. Bicycling will be a pleasant, safe transportation alternative for trips of all kinds and for all segments of the population.***

Bicyclists

One of the basic insights necessary to developing a bicycle plan is the understanding that there are different types of bicyclists. These different types of bicyclists have different characteristics, needs, problems, and desires. Bicyclists are typically grouped into three primary categories:

Type A bicyclists: Skilled cyclists who represent approximately 20% of bicyclists and, it is estimated, ride up to 80% of all bicycle miles traveled. They tend to be highly skilled and comfortable in most traffic situations. In urban areas, Type A bicyclists are best served by provision of adequate space on the road without any special designation.

Type B bicyclists: These bicyclists represent 80% of the bicycling public who ride only 20% of the bicycling mileage. They tend to lack the confidence and skill of Type A riders and ride much shorter distances. Type B bicyclists are best served by provision of bicycle lanes on busier streets, and bicycle routes and traffic calming on neighborhood streets. Separate trails are among their favorite riding environments.

Type C bicyclists: Young bicyclists who ride very short distances but their lack of other transportation options means they often ride daily, where other types of riders may limit their bicycling to weekends. Children have all the confidence of the Type A riders but they lack either their skill or knowledge of traffic. In urban areas, Type C bicyclists are best served by provision of bicycle lanes on moderately busy streets, and particularly by bicycle routing and traffic calming on neighborhood streets. Separate trails are among their favorite riding environments.

Planning Goals and Objectives

Based on public input, guidance from the Plan Oversight Committee, and a review of existing activities by public agencies, the Bicycle Mobility Plan identifies a series of goals and objectives which will help to make the San Antonio--Bexar County area a better and safer place to bicycle. Overall goals include:

G-1 To double the percentage of trips made by bicycle in the San Antonio--Bexar County study area by 2005 and continue to increase bicycle trips through the 20-year life of the Bicycle Mobility Plan .

G-2 To reduce the number of bicycle-related traffic accidents by 10 percent by 2005 and continue to reduce bicycle accidents through the 20-year life of the plan.

G-3 To increase the awareness of bicycling as a viable transportation alternative both in the planning community and among the general public.

The Bicycle Mobility Plan adopts a dual strategy to achieve these goals. First, it identifies how all future transportation investments in the San Antonio--Bexar County study area can include appropriate facilities to promote bicycling and the safety of bicyclists. Second, the plan identifies how the existing infrastructure can be modified to improve opportunities for bicycling and make bicyclists safer. Plan objectives include:

O-1 All new transportation facilities in the San Antonio--Bexar County study area will, at a minimum, accommodate experienced cyclists.

O-2 In key bicycle corridors identified by the Bicycle Mobility Plan, transportation facilities will accommodate travel by bicycle for all types of cyclist.

O-3 The Bicycle Mobility Plan will identify strategies for accommodating bicyclists of all abilities in three key corridors in the San Antonio--Bexar County study area. Recommendations for action in each of these corridors will be made.

O-4 The Bicycle Mobility Plan will identify strategies for overcoming major barriers to bicycle travel in the San Antonio--Bexar County study area.

O-5 The Bicycle Mobility Plan will identify an appropriate leadership role for local government agencies in implementing the plan. This will include recommendations for assisting local agencies, neighborhood groups and user groups in developing future neighborhood and corridor plans for bicycling.

Current Conditions

Bicycle Mobility Planning included assessment of current levels and characteristics of bicycling activity throughout the San Antonio--Bexar County study area. This assessment included examination of demographic information provided by the 1990 Census, as well as bicycle accident information obtained from the San Antonio Municipal Health District. Bicycle sales information was also obtained from local area bicycle dealers.

There are many reasons why the level of bicycling activity in the San Antonio--Bexar County area is relatively low. Participants in public meetings and respondents to a general survey about bicycling in the study area identified problems in six key areas.

1. ***No safe places to ride***: There are few designated bicycle facilities and/or main roads have high automobile speeds and narrow travel lanes.

2. ***Poor street conditions***: Maintenance of curb lanes or shoulders where bicyclists are most likely to travel is inadequate, and there are operational challenges posed by continuous right turn lanes and high-speed merge lanes.

3. ***Low status of bicyclists***: Motorists often do not see or acknowledge the presence bicyclists and the need to share the road with them. The general lack of respect for traffic laws, shown by both motorists and bicyclists, is also seen as a major obstacle to improving safe bicycle use in the San Antonio--Bexar County area.

4. ***Lack of support facilities***: There are few places to securely park a bicycle in the downtown area and lockers and showers are seldom made available for bicycling commuters.

5. ***Land use***: Development patterns constrain bicycle travel to short trips, and minimize availability of safe travel route alternatives.

6. ***Institutional neglect***: There has been little support from the public or from government agencies for improving conditions for bicycling.

Plan Methodology

The Bicycle Mobility Plan represents only the first step in the development of a bicycle travel network for the San Antonio--Bexar County area. The plan shows how such a network of bikeways can be identified, planned, designed and implemented in the years ahead. The bicycle travel network proposed by the Bicycle Mobility Plan was developed following these steps:

Step One: Identify and understand different types of bicyclist

One of the basic insights necessary to developing a bicycle plan is the understanding that there are different types of bicyclists. These different types of bicyclists have different characteristics, needs, problems, and desires. There are three primary categories:

Type A bicyclists:	Skilled adult riders
Type B bicyclists:	Basic adult riders
Type C bicyclists:	Children

Step Two: Identify and understand different bicycle facility options

During the past thirty years, a variety of options have been developed that satisfy the needs of the above-described bicyclists. These include wide curb lanes, often provided on the busiest roads; striped bicycle lanes, generally installed on streets that serve important bicycling corridors; shoulders on rural roads; bicycle boulevards on quiet traffic calmed streets that parallel major thoroughfares; separate bicycle trails, typically found on their own rights-of-way; exclusive bicyclist/pedestrian connectors linking neighborhoods and communities; and general improvements to all streets, which improve the safety for riders wherever they travel.

Step Three: Identify key area-wide bicycle travel corridors

The purpose of this step was to identify potential bicycle travel corridors connecting neighborhoods with major attraction features or travel destinations, such as employment centers, other transportation facilities, colleges and universities, parks and other recreation facilities, libraries, museums, rivers and creeks, and lakes. People want and need to travel to and from the same origins and destinations, regardless of transportation mode. Also, most adults have a mental map of their community based on their experiences as motor vehicle operators or

passengers. Thus they tend to orient themselves by the locations of major streets and highways. Therefore, much can be predicted about where bicyclists might want to travel by examining the travel patterns of motor vehicles.

A network of proposed bicycle travel corridors in the San Antonio--Bexar County study area was developed using citizen input gathered from public meetings, surveys, and recommendations from bicycle club representatives and bicycle dealers. Within each key corridor, bicycle travel can be encouraged using existing parallel, low traffic volume streets, providing on-street bicycle accommodations on existing busy streets, or providing off-street bikeway facilities.

Step Four: Plan and design for bicycle access to specific travel corridors.

Three typical travel routes were selected for detailed evaluation and identification of possible design treatments to improve conditions for bicycling. The Woodlawn travel corridor follows streets through residential areas near Woodlawn Lake Park and is typical of a neighborhood bicycle travel route. The Museums travel corridor follows busier streets that link downtown San Antonio with recreational attractions in the Broadway/New Braunfels corridor and provides an example of an urban commuting and touring route. The Wurzbach Parkway, presently under design and development, provides an example of integrating bicycle facilities into a major arterial, as well as showing consideration of bicycle facilities during the roadway design phase. Detailed cost estimates were developed for each of these three bicycle travel corridors.

Recommended Policies for Plan Implementation

The Bicycle Mobility Plan provides a methodology for developing a network of bicycle travel facilities that will help the San Antonio--Bexar County area become a place where people choose to bicycle for transportation and recreation. Implementation of a network of facilities and routes throughout the study area over the next 20 years will depend upon the actions of the City of San Antonio, Bexar County, the Texas Department of Transportation, smaller suburban cities, developers, and citizen involvement. Accordingly, the Bicycle Mobility Plan recommends that the following implementation policies be adopted to promote development of a bicycle travel network.

The Metropolitan Planning Organization should:

A-1. Establish a standing MPO Bicycle Mobility Task Force to oversee and coordinate implementation of the Bicycle Mobility Plan.

A-2. Identify a minimum level of funding for bicycle travel improvements to the existing roadway system.

A-3. **Encourage the development of bicycle facilities in conjunction with roadway construction, reconstruction and improvement projects through the Long Range Transportation Planning and Transportation Improvement Program processes.**

A-4. **Promote uniform, state-of-the-practice bicycle facility design and implementation throughout the San Antonio--Bexar County area.**

A-5. **Develop planning tools to prioritize bicycle facility development.**

Other agencies also have important roles to play:

A-6. **The City of San Antonio and/or Bexar County should appoint or hire a full-time bicycle coordinator to coordinate and implement the development of a bicycle travel network.**

A-7. **The City of San Antonio, suburban municipalities, and Bexar County should adopt policies similar to those of the Texas Department of Transportation in which design of all roadway improvements and reconstruction, or new construction, includes consideration of inclusion of bicycle facilities.**

A-8. **The City of San Antonio and Bexar County should institute a "Bicycle Spot Improvement" program to make low-cost safety improvements to the existing roadway system.**

A-9. **The City of San Antonio should review and recommend changes to the Unified Development Code to ensure that streets and roadways built by developers incorporate adequate facilities and space for safe and efficient bicycle travel.**

A-10. **The City of San Antonio and Bexar County should review and recommend changes to local parking ordinances to ensure that a minimum level of bicycle parking is provided in all new developments.**

A-11. **The City of San Antonio should consider implementation of bicycle facility projects of the type recommended for the Woodlawn and Museums Bicycle Travel Corridors (see pages 23 and 28, respectively), and should proceed with development of the Missions Trail.**

A-12. **The Texas Department of Transportation should implement the Bicycle Mobility Plan recommendations for inclusion of bicycle accommodations on the proposed Wurzbach Parkway.**

A-13. The City of San Antonio and Bexar County should actively support promotional and safety events in the region.

A-14. VIA Transit should work with the bicycling community to establish a program to better integrate bicycling with the transit system.

A-15. Each of the agencies involved in the implementation of the Bicycle Mobility Plan should themselves become model employers for those wishing to commute by bicycle.

Making It Happen

The Bicycle Mobility Plan provides only the first step in development and implementation of a network of bicycle travel routes and facilities in the San Antonio--Bexar County area. The Bicycle Mobility Plan provides a guide to bicycle travel network development to citizen advocates of improved bicycle travel, area government officials, and transportation planners. Although the Metropolitan Planning Organization has already established a permanent Bicycle Advisory Task Force, and has allocated $15 million to new development of bicycle facilities over the next 20 years, public input will continue to be critical to providing guidance to local and state government officials on what kinds of bicycle travel facilities should be provided and where they should be provided.

Bicycle Mobility Plan - Long Range Plan

Introduction

In April 1994, the US Department of Transportation announced ambitious national goals to double the percentage of trips made by foot and bicycle in the United States, and to simultaneously reduce the number of injuries and fatalities suffered by bicyclists and pedestrians by ten percent. *The National Bicycling and Walking Study*[1], in which these goals are set, also has an action plan outlining how public agencies at all levels of government -- from the Federal to the local -- can play a part in achieving these goals.

States and Metropolitan Planning Organizations across the country are completing plans to address bicycle and pedestrian issues, in part to meet the requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA). Many of these plans are adopting the general goals of the US Department of Transportation, and refining them to reflect local priorities and realities.

The Bicycle Mobility Plan (BMP) represents the means by which the San Antonio--Bexar County Metropolitan Planning Organization (MPO) can both meet the requirements of ISTEA and work towards the goals of *The National Bicycling and Walking Study.*

Throughout this report, unless otherwise identified, the "San Antonio--Bexar County study area" or "study area" refer to the geographic area administered by the San Antonio--Bexar County MPO. This geographic area encompasses the entirety of Bexar County, plus small portions of Comal and Guadaloupe Counties extending northeast along the Interstate 35 corridor from the Bexar County line. Appendix A provides a listing of acronyms and definitions used in this report.

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[1]*The National Bicycling and Walking Study: Transportation Choices for a Changing America.* Publication No. FHWA-PD-94-023. Washington, DC: US Department of Transportation, Federal Highway Administration. 1994

Creating a Vision

The first step in the development of the San Antonio--Bexar County MPO Bicycle Mobility Plan is to create a vision for bicycling in the BMP study area. In public meetings and meetings with agency staff and user groups, people were asked to describe their vision for the San Antonio--Bexar County study area twenty years from now. A wide range of comments were generated by this process.

Among the strongest sentiments were the desire for a greater sense of community in the San Antonio--Bexar County study area, a transportation system that offers people the choice or option to bicycle, and development that builds on the strengths of the study area, particularly tourism.

> ***The San Antonio--Bexar County study area can be one where residents and visitors will choose to bicycle. Bicycling will be a pleasant, safe transportation alternative for trips of all kinds and for all segments of the population.***

A wide range of societal, environmental and infrastructural changes will be necessary before this vision can become a reality. Many of these changes have been identified in the development of the Bicycle Mobility Plan, and are also linked to goals in the *San Antonio Master Plan.*[2] Among the suggestions made in public meetings were:

- Provide safe and direct access for bicyclists to travel to work, school, and other primary destinations and generators.
- Provide a safe and accessible network of designated facilities and quiet streets suitable for bicycling throughout the BMP study area.
- Integrate bicycles into the existing transportation system.
- Improve public awareness of the benefits of bicycling.
- Improve the education of bicyclists and motorists in the BMP study area.

Based on these suggestions, guidance from the Plan Oversight Committee (POC), and a review of existing activities by public agencies in the BMP study area, the Bicycle Mobility Plan has identified a series of goals and objectives for the BMP study area which will help to make it a better and safer place to bicycle.

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[2]*San Antonio Master Plan.* San Antonio, TX: City of San Antonio, Department of Planning. December 1993.

Overall Goals

G-1 To double the percentage of trips made by bicycle in the BMP study area and continue to increase bicycle trips through the 20-year life of the mobility plan .

G-2 To reduce the number of bicycle-related traffic accidents by 10 percent by 2005 and continue to reduce bicycle accidents through the 20-year life of the plan.

G-3 To increase the awareness of bicycling as a viable transportation alternative both in the planning community and among the general public.

Objectives

The Bicycle Mobility Plan will adopt a dual strategy to achieve these goals. First, the plan will identify how all future transportation investments in the BMP study area can include appropriate facilities to promote bicycling and the safety of bicyclists. Second, the plan will identify how the existing infrastructure can be modified to improve opportunities for bicycling and make bicyclists safer.

O-1 All new transportation facilities in the BMP study area will, at a minimum, accommodate experienced cyclists.

O-2 In key bicycle corridors identified by the Bicycle Mobility Plan, transportation facilities will accommodate travel by bicycle for all types of cyclist.

The types of accommodations provided will be based on criteria developed by the Federal Highway Administration and American Association of State Highway and Transportation Officials. Details are presented in Appendix A. This approach has already been adopted by the Texas Department of Transportation.

O-3 The Bicycle Mobility Plan will identify strategies for accommodating bicyclists of all abilities in three key corridors in the BMP study area. Recommendations for action in each of these corridors will be made.

O-4 The Bicycle Mobility Plan will identify strategies for overcoming major barriers to bicycle travel in the BMP study area.

O-5 The Bicycle Mobility Plan will identify an appropriate leadership role for local government agencies in implementing the plan. This will include recommendations for assisting local agencies, neighborhood groups and user groups in developing future neighborhood and corridor plans for bicycling.

Current Conditions and Needs

There is very little information about bicycling activity in the San Antonio--Bexar County study area. According to the 1990 Census, 0.16 percent of journeys to work in the study area were made by bicycle, about half the national average for large metropolitan areas. A 1991 survey of San Antonio travel patterns revealed similar numbers for commuting trips and higher levels of trip-making by bicycle for school and other types of journeys.[3]

Over the last ten years, 2,571 bicyclists have been killed or injured in collisions with motor vehicles in BMP study area, based on police crash records. The majority of victims were under 17 years of age, with elementary school students making up the greatest proportion.[4]

These figures are useful indicators of bicycling activity in the San Antonio--Bexar County study area, but in themselves do not tell the whole story. Also, they do not address the potential that exists in the study area for increasing levels of use and improving the safety of bicyclists.

- Census data only counts journeys to work. More than 75 percent of all trips -- by all modes -- are for non-work related activities such as school, social, recreational or shopping activities. These trips are generally shorter than commute trips, making them easier to do by bicycle.

- Crash statistics only include reported collisions with motor vehicles. As many as 90 percent of bicycle-related injuries are never reported to the police as they do not involve another vehicle or are relatively minor.

- Recreational and competitive racing clubs in the region have approximately 1,000 members and organize a busy schedule of rides and events that are well attended.

- A number of major employers in the BMP study area, including USAA, VIA, and Pacificare, have their own employee bicycle clubs.

- An estimated 30,000 new bicycles were sold in Bexar County in 1993.

Despite these factors, the amount of bicycling in the BMP study area is relatively low. Participants in public meetings and respondents to a general survey about bicycling in the study area identified six key problems areas which explain this situation..

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[3]"San Antonio Travel Survey". Parsons Brinkerhoff Quade & Douglas, Inc. 1991.
[4]City of San Antonio, Metropolitan Health District, Injury Control Section. August, 1994.

1. ***No safe places to ride.*** Few designated or special bicycle facilities exist in the San Antonio--Bexar County study area and until 1994, public agencies in the study area had no plans to develop any. Main roads in the study area are busy and have high vehicle speeds and narrow travel lanes. There are few roads with shoulders, none with bicycle lanes, one poorly maintained bicycle trail (adjacent to the Mission Parkway) and some streets with wide outside lanes. Many traffic signals do not detect bicyclists (and thus do not change without a car being present) and may not allow enough time for bicyclists to clear the intersection before changing. Other routine operational difficulties identified by bicyclists include continuous right turn lanes and high-speed merging lanes. As a consequence, existing riders tend to ride outside the San Antonio city limits for recreation and do not ride for transportation purposes. Potential riders are discouraged by the poor riding conditions.

2. ***Poor street conditions.*** Even in cities with many bicycle facilities, most riding is done on ordinary roads where no special provision is made for bicyclists. Poor street maintenance, unswept shoulders, broken glass and drainage grates which trap bicycle wheels are a constant problem in the San Antonio--Bexar County study area.

3. ***Low status of bicyclists.*** The attitudes of motorists towards bicyclists in San Antonio--Bexar County study area is a major concern to existing riders. Motorists are sometimes openly hostile to bicyclists, challenging their right to be using the road and threatening them with harm. More often, motorists simply do not see or acknowledge the presence of bicyclists and do not know how to share the road with them.

   Bicyclists themselves received considerable criticism for their poor behavior, which can prompt motorists to react badly to them. The general lack of respect for traffic laws, shown by both motorists and bicyclists, is also seen as a major obstacle to improving bicyclist safety and levels of use.

4. ***Lack of support facilities.*** There are few places to securely park a bicycle in the San Antonio downtown business district and few employers provide any bicycle parking and storage, showers, or lockers. Bicycle theft is a major concern for bicyclists throughout the San Antonio--Bexar County study area.

5. ***Land use and development.*** The grid pattern of city streets found inside the Interstate 410 Loop often provide bicyclists with multiple travel route options. However, newer development patterns, typically outside the Interstate 410 Loop, feature less direct connectivity between communities and neighborhoods, and offer fewer bicycle travel route options.

6. ***Institutional neglect.*** There has been little support from the public or from government agencies for improving conditions for bicycling. While this is changing, there are still problems of coordination and consistency between agencies and no one agency is taking the lead to promote bicycling.

While this assessment of current conditions for bicycling in the study area is rather bleak, many of the problems have been dealt with in other communities in the United States, and many opportunities for bicycling have also been identified in the development of the Bicycle Mobility Plan. Facilities such as the bikeways proposed as part of the Mission Trail project can become important tourist attractions as well as providing a vital transportation link through the south San Antonio area.

One of the objectives of the Bicycle Mobility Plan is to identify how government agencies, development interests, the business community, neighborhood groups and bicyclists themselves can close the gap between the vision of a community where people choose to bicycle and the current conditions identified above.

Bicycle Mobility Planning Approach

The Bicycle Mobility Plan represents the first step in the development of a network of bicycle travel corridors for the San Antonio--Bexar County study area. The plan shows how such a network of bicycle corridors can be identified, planned, designed and implemented in the years ahead.

Step One: Identify and understand different types of bicyclists

Step Two: Identify and understand different bicycle facility options

Step Three: Identify key bicycle travel corridors within the BMP study area.

Step Four: Plan and design for bicycle access to key bicycle travel corridors

Three case studies are included in the Bicycle Mobility Plan to show how this four step process might work in practice. These case studies provide examples of how new transportation facilities can incorporate bicycle facilities, and how the existing roadway network can be modified to better accommodate bicyclists. Strategies for overcoming barriers to bicycle travel, such as freeways and major arterials, are also presented in the case studies.

Recommendations on how this planning process can be effectively integrated into the routine operating planning functions of study area transportation planning agencies are also provided.

Step One
Identify and Understand Different Types of Bicyclists

One of the basic insights necessary to developing a bicycle plan is the understanding that there are different types of bicyclists. These different types of bicyclists have different characteristics, needs, problems, and desires. There are three primary categories:

Type A bicyclists:	Skilled adult riders
Type B bicyclists:	Basic adult riders
Type C bicyclists:	Children

Type A - Skilled Adult Riders

Type A or skilled adult cyclists represent approximately 20 percent of bicyclists and ride up to 80 percent of all bicycle miles traveled. They tend to be highly skilled and comfortable in most traffic situations. They travel long distances (seldom less than five miles at a time and sometimes more than 100 miles) and can maintain high average and peak speeds.[5] Their bicycle trips often involve long commutes to work and lengthy recreational and fitness rides.

In urban areas, Type A bicyclists are best served by provision of adequate space on the road without any special designation. In rural areas, they prefer wide smoothly-paved shoulders.

Type B - Basic Adult Riders

These bicyclists make up much of the 80 percent of the bicycling public who ride only 20 percent of the bicycling mileage. They tend to lack the confidence and skill of Type A riders and ride much shorter distances. Average trip lengths are much closer to two miles.[6] Their bicycling trips often involve rides to a nearby store or park, exercise jaunts around the neighborhood, and family outings of one to two miles.

In urban areas, Type B bicyclists are best served by provision of bicycle lanes on busier streets and designated bicycle routes and traffic calming techniques on neighborhood streets. Bicycle trails that are separated from streets are among their favorite riding environments. Although Type B riders do not often ride in rural areas, they can be found riding in small towns that line some rural highways.

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[5]*The National Bicycling and Walking Study: Transportation Choices for a Changing America.* US Department of Transportation, Federal Highway Administration. Publication No. FHWA-PD-94-023. 1994.
[6]Ibid.

Type C - Children

Young bicyclists ride very short distances. Their lack of other transportation options means they often ride daily, where other types of riders may limit their bicycling to weekends. Children have all the confidence of the Type A riders, but they lack either the skill or judgment of traffic conditions. Trip lengths tend to be very short, often averaging well below two miles, and they ride for a variety of utilitarian purposes (to school, the store, friends' homes), as well as for recreation.[7]

In urban areas, Type C bicyclists are best served by provision of bicycle lanes on moderately busy streets, and particularly by bicycle routing and traffic calming on neighborhood streets. Separate trails are among their favorite riding environments. While they aren't often found riding in rural areas, they may be found riding in small towns that line some rural highways. This is particularly true near schools.

[7]Ibid.

Step Two
Identify and Understand Different Bicycle Facility Options

During the past thirty years, a variety of options have been developed that satisfy the needs of the above-described bicyclists. These include wide curb lanes, striped bicycle lanes, shoulders on rural roads, bicycle boulevards, separate bicycle trails, exclusive bicycle/pedestrian connectors, and general improvements to all streets, which serve to improve the safety for riders wherever they travel.

The following chart describes how some of the basic options can be used to satisfy the different bicycling publics. While these ratings reflect commonly held beliefs about the facilities, it is important to determine local desires and needs through a well-conducted public involvement process. In the following section, these facility options will be described in more detail.

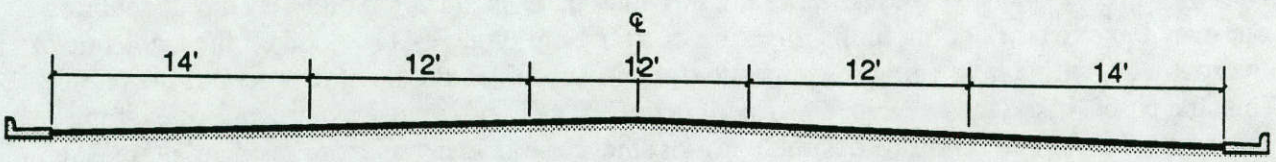
Bicyclist Type	*Wide Curb Lanes*	*Bicycle Lanes*	*Paved Shoulders*	*Bicycle Boulevards*	*Bicycle Trails*	*Exclusive Bicycle/ Pedestrian Connectors*	*General Improvements*
Type A	3	2	3	2	1	1	3
Type B	1	2	2	3	3	3	2
Type C	1	2	2	3	3	3	2

1= Low preference 2=Medium preference 3=High preference

Historically, a variety of somewhat confusing and, occasionally, contradictory terms were used to describe bicycle facility options. Early typing systems, some using numbers, as well as combinations of numbers and letters have fallen into disuse and have been replaced by the following simple descriptive terms.

Wide Curb Lanes

A wide curb lane is an outside through lane to which extra space has been allocated. Typically, such lanes are between 14 feet and 15 feet wide (not including the gutter pan). This additional space allows motorists and bicyclists to share a travel lane more easily than would a standard 12-foot lane. Indeed, 14 feet is usually enough to allow a motorist to pass a cyclist without either coming too close to the rider or having to cross over into another lane.



Cross-section of a typical 5-lane road with wide curb lanes.

In general, wide curb lanes are applied on arterial and collector streets where traffic volumes require bicyclists to share lane space with many motorists in the course of their journeys. To differentiate between the application of wide curb lane solutions and bicycle lane solutions, the former tend to be used in more complex traffic settings where it would be difficult to apply a bicycle lane approach and users tend to be the more skilled Type A riders. Quiet residential streets are seldom considered candidates for curb lane widening. In fact, few residential streets are even channeled to begin with.

When a wide curb lane reaches an intersection, space allocation depends on channelization. If there are right-turn-only lanes, for example, the extra space would be added to the right-most through lane, rather than to the turn lane. In this manner, through bicyclists would be encouraged to use the proper lane for their destination.

In summary, the basic purpose of a wide curb lane is to provide extra space for bicyclists and motorists to share. There is no marking separating the two types of users.

Bicycle Lanes

Bicycle lanes are portions of the roadway reserved for the preferential use of bicyclists. While various approaches have been used to separate bicyclists from other traffic, experience has shown that, for most situations, the best approach is simply to stripe a lane. Physical barriers tend to trap debris, restrict bicycle movement, and encourage conflicts at intersections. For this reason, most current literature (e.g., the AASHTO *Guide for the Development of Bicycle Facilities*[8]) recommend against using barriers like curbs to designate bicycle lanes.

In most communities, bicycle lanes are provided on either arterial or collector streets that serve popular bicycling destinations like schools, universities, parks, and shopping districts. They are seldom provided on quiet residential streets because low levels of motor vehicle traffic are not seen as significant threats to bicyclists. Additionally, the likelihood of significant numbers of bicyclists using such a street would tend to be low. Likewise, bicycle lanes are not typically provided on major high-volume arterial streets with many lanes, complex intersections, and high traffic speeds. However, a large number of potential candidate streets fall between these two extremes and can make excellent candidates for bicycle lanes.

Bicycle lanes are typically striped between the outside travel lane and the curb. If there is curbside parallel parking, the bicycle lane is placed on the traffic side of the parking. On two-way streets, one-way bicycle lanes are provided on each side. On one-way street couplets, one-way bicycle lanes going in the direction of traffic are typically provided on the right side of the roadway, with a lane going the opposite direction provided on the other street of the couplet. In some cases, bike lanes have been striped on the left side of a one-way street. For example, this type of treatment might be desirable if most bicycle traffic enters from residential areas on the left and leaves to the left.

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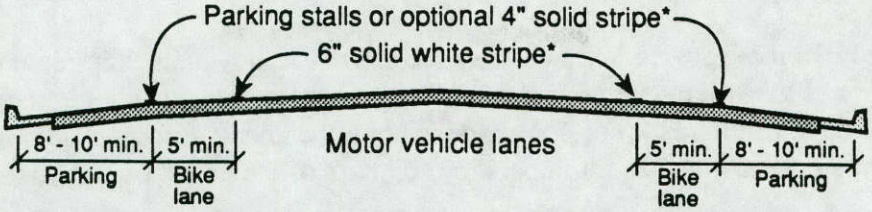
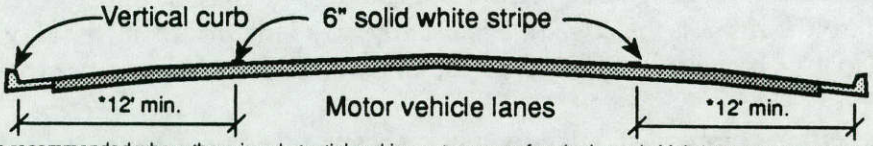
[8]*Guide for the Development of Bicycle Facilities*. Washington, DC: American Association of State Highway and Transportation Officials. August 1991.



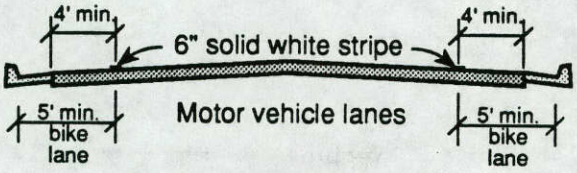
* The optional solid white stripe may be advisable where stalls are unnecessary (because parking is light) but there is concern that motorists may misconstrue the bike lane to be a traffic lane.

(1) Striped parking

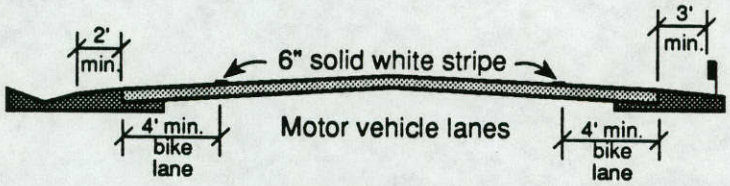


*13' is recommended where there is substantial parking or turnover of parked cars is high (e.g., commercial areas).

(2) Parking permitted without parking stripe or stall



(3) Parking prohibited



(4) Typical roadway in outlying areas parking restricted

Bicycle lanes provided for different types of roadway conditions.

One primary purpose of providing bicycle lanes is to give less experienced bicyclists the sense that they have a legitimate place to ride. Often, Type B and C riders fear motor vehicle traffic and bicycle lanes help mitigate those fears. Research currently under way at Northwestern University's Traffic Institute shows this pattern very clearly. Type B and C riders reported an increased willingness to ride particular streets when bicycle lanes were installed.

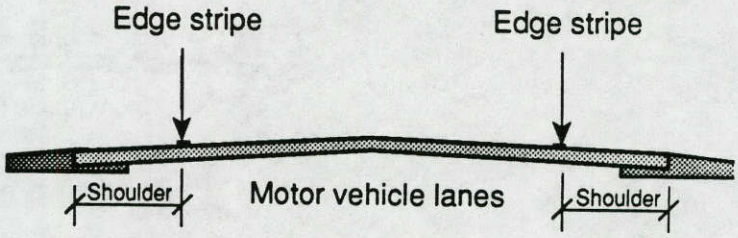
In addition, provision of bicycle lanes can reserve space for bicyclists that might otherwise disappear as a road is re-channeled. This often happens on roadways where there is extra space left at the right edge of the road, but that space is not allocated to any specific purpose. In such a situation, bicycle lanes can act as reminders to motorists of the needs of bicyclists.

Paved Shoulders

Typically, shoulders are level surfaces immediately adjacent to a roadway's travel lanes. While shoulders are often provided for motorist safety and roadway maintenance reasons, shoulders paved to the same standard as the adjacent roadway will often be used by bicyclists. This is particularly true in rural areas where traffic speeds are high and truck traffic common. While any space at all to the right of the edge line is usually welcome by bicyclists, shoulders at least 4 feet wide tend to give bicyclists a greater degree of comfort than do narrower shoulders.

Unfortunately, certain common shoulder conditions can reduce their benefits for bicyclists. Rumble strips, raised pavement markings, disjunctions between the roadway and shoulder, and rough pavement surfaces can all make shoulders unridable or hazardous. In areas where bicycling is encouraged, the benefits of such features are weighed seriously against their impacts on bicyclists.

Provision of shoulders can provide substantial benefits for bicyclists, particularly in rural or semi-rural areas. Shoulders can provide refuges from fast traffic. In addition, several studies have shown that shoulders can reduce the incidence of motorists' crashes from running off the-road, plus reduce highway maintenance costs.



Shoulders provided on a typical roadway.

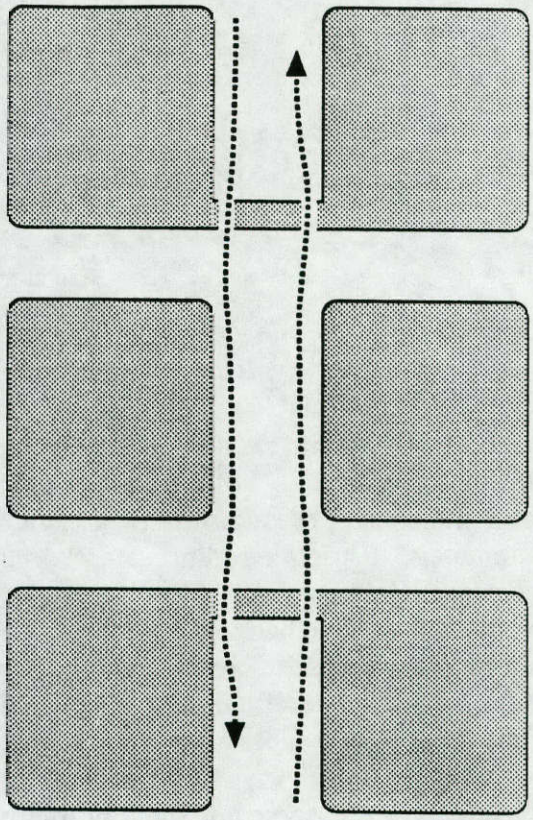
Bicycle Boulevards

The term "bicycle boulevard" came from experimental bicycle facility design treatments performed in other communities with grid residential patterns. This type of residential pattern is found in many San Antonio neighborhoods, e.g., the Woodlawn Lake and neighborhood. A bicycle boulevard is a modification made to residential streets that parallel heavily traveled arterials. The idea is to install barriers, diverters, and other devices to discourage through motor vehicle traffic yet still allow easy passage for bicyclists. This type of modification often causes bicyclists to shift their travel patterns to use bicycle boulevards instead of nearby arterial streets.

There are numerous ways to create a bicycle boulevard. The diagram on the next page shows one approach. Another is to use intersection diverters that force motorists to turn right or left after one block of travel. While bicyclists often appreciate the installation of bicycle boulevards, it is important to coordinate such projects with the neighborhood involved. Some cities only install bicycle boulevards in conjunction with traffic calming at the request of local residents.

Many residents come to appreciate the benefits of traffic calmed bicycle boulevards, once they understand the idea and have seen one in operation. In some communities, residents have improved their properties once the impacts of through auto traffic were removed and their neighborhoods once again became quiet refuges.

In summary, the purposes of a bicycle boulevard are two-fold: (1) to provide bicyclists with a continuous low-volume alternative through a major travel corridor; and (2) to provide neighborhoods relief from the impacts of through motor vehicle traffic using residential streets as "by-passes."

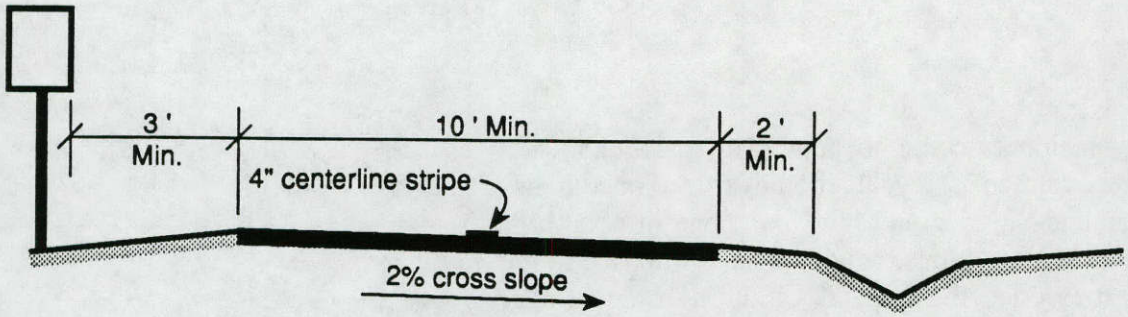


A bicycle boulevard that includes street closures to stop through motor vehicle traffic, but let bicyclists through.

Bicycle Trails

Bicycle trails or paths are separate facilities intended for the exclusive use of bicyclists. Typically, they exist on their own rights-of-way, possibly using a non-transportation corridor, like a river flood plan, utility easement, abandoned railroad right-of-way, or linear park. In some cases, they use the right-of-way of an existing road; however, in such cases they are separated from the road by either distance or a physical barrier. Provision of a trail within an interstate corridor would be an example of such a facility adjacent to a road.

Generally, however, use of a road right-of-way for trail construction is considered undesirable. This is particularly true of surface streets in urbanized areas, where the trail's integrity would likely be compromised by cross streets and driveways. The following diagram shows a typical section of a bicycle trail.



Typical width and clearances for an independent bicycle trail.

As a rule, while bicycle trails are separated from motor vehicle traffic, they often serve other non-motorized users. For instance, pedestrians are often found on bicycle trails, particularly those trails near pedestrian traffic generators like residential areas, schools, or neighborhood commercial districts. Additional users may include rollerbladers, skaters, and joggers, as well as the occasional equestrian. For this reason, bicycle trails are often considered "mixed-use" trails and designers have had to learn how to reduce conflicts between trail users. In some communities, separate bicycle and pedestrian trails are included in the same corridor. In others, trail user ordinances are used to clarify the right-of-way rules on mixed-use paths. In still others, some users (e.g., rollerbladers and skaters) are banned from the paths.

Bicycle trails can serve a number of important functions. First, they can help bicyclists get to previously inaccessible destinations. For instance, a trail could provide bicyclists with a legal alternative to reach a park served only by an interstate highway. In addition, trails can provide low-stress alternatives to high-stress roads. For instance, a trail could be used to help school students avoid a major high-volume arterial street on their way to school.

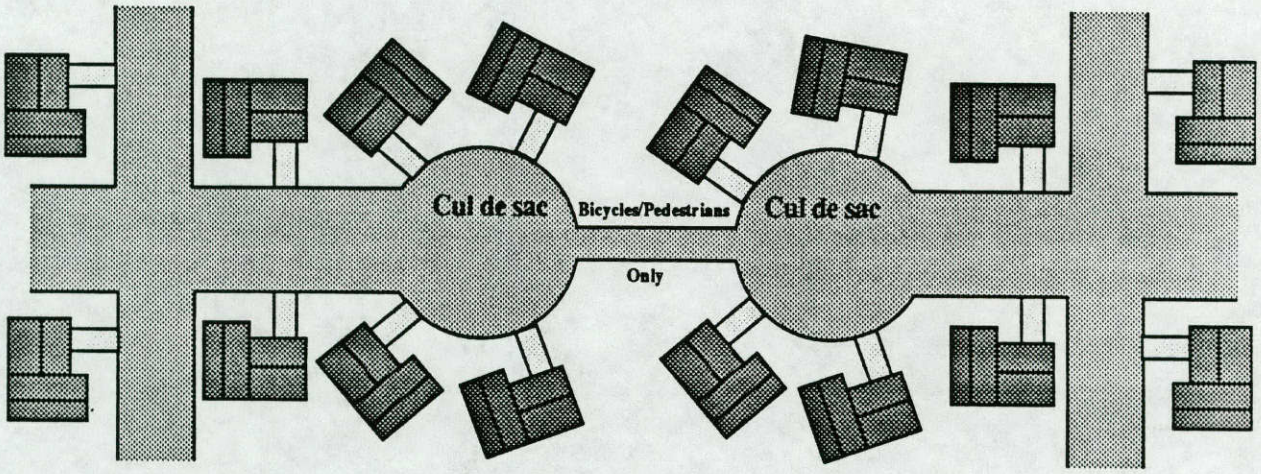
Further, a trail could encourage casual riders to try bicycling in a non-threatening setting. Many people who would not ordinarily think of riding the arterial and collector street network would welcome the chance to ride several miles on a trail system. Once they have found how easy and enjoyable bicycling can be, they may be enticed to ride for other purposes and to other destinations.

Finally, well-located trails can provide recreational opportunities near people's homes. The Texas Outdoor Recreation Plan (1990) suggests that bicycling is one of the most popular forms of outdoor recreation among Texans, only exceeded by walking. When asked why they don't participate in outdoor recreation more often, 31 percent of respondents said that desirable outdoor recreation areas were "too far away."

Exclusive Bicycle/Pedestrian Connectors

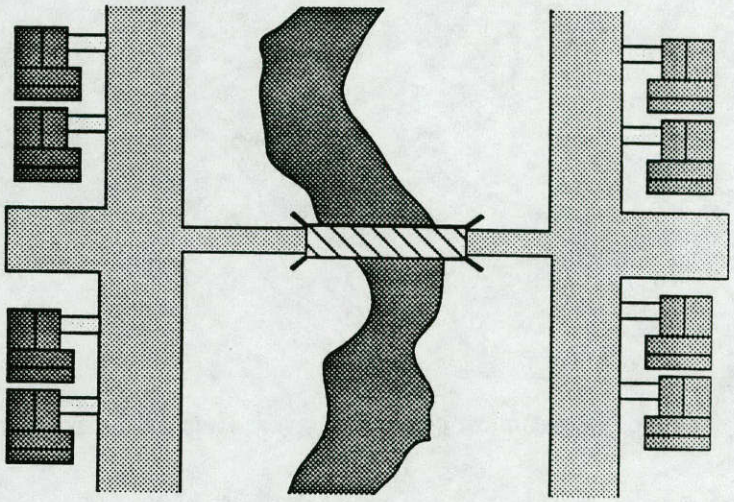
Development and drainage patterns within the San Antonio--Bexar County study area provide opportunities to connect neighborhoods and communities using transportation facilities developed exclusively for the use of bicyclists and pedestrians. Many San Antonio neighborhoods, both inside and outside the Interstate 410 Loop, are separated from one another by drainage easements, railroads, and major expressways, with limited roadway crossings.

Residential development patterns in many neighborhoods outside the Interstate 410 Loop include neighboring cul-de-sacs in which backyard neighbors, who are separated perhaps by 100 linear feet, may have to drive much further to visit one another by automobile. An example of a connector between cul-de-sacs, intended for use only by bicyclists and pedestrians, is illustrated below.



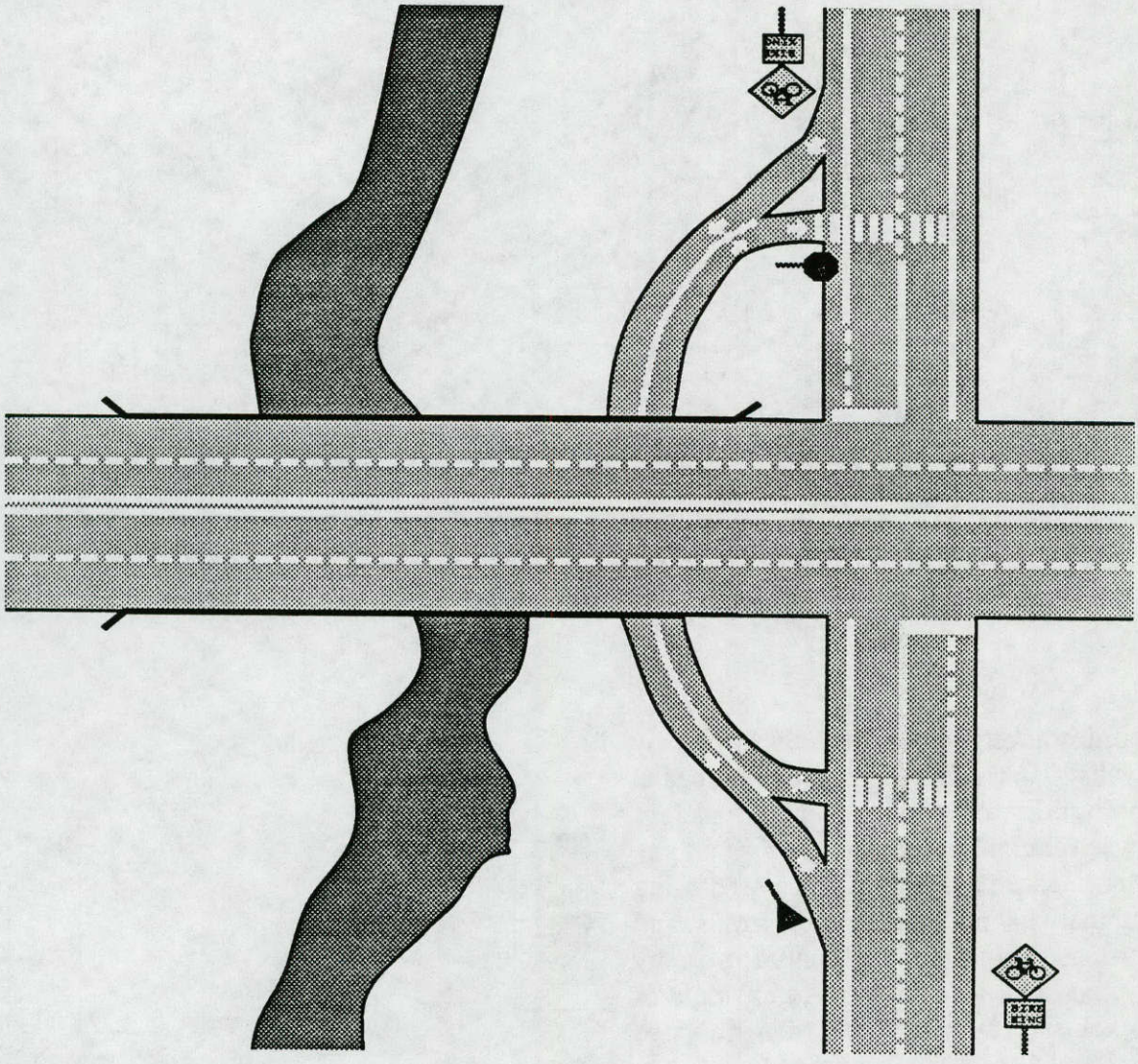
Exclusive bicycle/pedestrian connector between cul-de-sacs.

Facilities developed exclusively for use by bicyclists and pedestrians provide special opportunities for more convenient linkages between neighborhoods. For example, drainage easements might be crossed using combinations of short bicycle trails and light-load bridges intended only for use by bicyclists and pedestrians. An example of an exclusive bicyclist/pedestrian drainage crossing is illustrated at right.



Bicycle/pedestrian connector across a drainage easement.

Drainage easements themselves provide opportunities for developing bicyclist and pedestrian linkages across major thoroughfares or expressways. In San Antonio, drainage easements include at least 13 feet of right-of-way above the 100 foot flood level. This width is sufficient for developing bicycle paths, with sufficient width often available under roadway structures as well. Use of a drainage easement to cross a major arterial is illustrated below.



Bicycle/pedestrian connector using a drainage easement to bypass a major arterial roadway.

Other types of linear easements may also provide bicycle/pedestrian connectors between neighborhoods. For example, one of the proposed bicycle network travel corridors follows the Southern Pacific Railroad line which parallels Interstate 10 from downtown San Antonio northwest to the Fiesta Texas outside of the 1604 Loop. Sufficient right-of-way exists on that railway corridor to develop a "rail-with-trail", providing an intermodal transportation corridor which carries trains, as well as non-motorized traffic.

Similarly, closed streets may provide bicyclist/pedestrian linkages between neighborhoods, or more scenic and safe travel-ways through neighborhoods. For example, Voelcker Lane, a closed street, generally follows the Salado Creek drainage between Blanco Road and George Road in a San Antonio neighborhood just southeast of Shavano Park. There is public interest in this street being converted for use by bicyclists and pedestrians. There is also public interest in temporarily closing several connected streets to provide bicycling and pedestrian routes during weekend days, or part of a weekend day, and holidays.

General Improvements

Since bicyclists can be found using almost any road, basic improvements to the street system, in general, can result in improved bicycle travel throughout a community, as well as reduced risk of bicycling crashes. Typical improvements include replacing parallel bar drainage grates with bicycle-safe models; regularly sweeping debris from the right edge of the road; making traffic signals work for bicycles; eliminating hazardous potholes and cracks; cutting back sight obstructions at intersections; and correcting dangerous railroad crossing surfaces.

Each of these problems has at least one good solution that works for bicyclists. In general, however, they are simply applications—perhaps with slight modifications—of what public works or streets departments have been doing for years; such things as fixing potholes, making signals work, and cutting back fences at intersections.

The change is more one of attitude on the part of public officials: realizing that bicycle traffic matters and that making these efforts is worthwhile. Typically, the mechanisms are already in place for making general improvements for bicyclists. In most jurisdictions, citizen complaints about potholes help agencies identify pavement problems. Similarly, small changes in design standards can replace bicycle-unfriendly features, such as drainage grates, with their bicycle-friendly counterparts over time.

In general, then, the purpose of making overall improvements to the street system is to eliminate unnecessary bicycling hazards or problems. This can reduce the number of bicycle crashes and help agencies reduce their potential liability for such crashes.

Step Three
Identify Key Study Area Bicycle Travel Corridors

The purpose of this step is to identify potential bicycle travel corridors connecting neighborhoods with major attractions or travel destinations, such as employment centers, other transportation modes, colleges and universities, parks and other recreation facilities, libraries, museums, rivers, creeks, and lakes. People want and need to travel to and from the same origins and destinations, regardless of transportation mode. Also, most adults have a mental map of their community based on their experiences as motor vehicle operators or passengers. Thus they tend to orient themselves by the locations of major streets and highways. Therefore much can be predicted about where bicyclists might want to travel by examining the travel patterns of motor vehicles.

A network of proposed bicycle travel corridors in the San Antonio--Bexar County study area was developed using citizen input gathered from public meetings, and recommendations from bicycle club representatives and bicycle dealers. This network of proposed bicycle travel corridors is presented in the map enclosed in the back cover of this report. Highlighted lines on the map represent one half mile wide bicycle travel corridors which are centrally aligned along the center lines of the streets they follow on the map. Actual development of a specific bicycle route within a travel corridor might involve using parallel low traffic volume streets, providing on-street bicycle accommodations on existing busy streets, or providing off-street bikeway facilities.

Selection of key study area bicycle travel corridors was based on the following criteria:

- Safety to bicyclists and motorists alike who must share the travel corridors. For example, low(er) traffic volume corridors, which parallel major thoroughfares, were favored over using the major thoroughfares themselves.

- Destinations and attractions accessible from the potential travel corridors, including employment centers, colleges and universities, parks and other recreation facilities, libraries, museums, rivers and creeks, and lakes.

- Connectivity to other bicycle travel corridors or other modes of transportation.

- Use of corridors that take advantage of existing roadway features, such as existing wide shoulders or planned roadway improvements.

An additional opportunity for development of bicycle routes in the San Antonio--Bexar County study area are its numerous neighborhood organizations and homeowners' associations. Through neighborhood association initiatives, low traffic volume routes might be selected and designated within individual neighborhood areas. Many of San Antonio's residential subdivisions are separated by drainage easements or other linear barriers, such as expressways, railroads, or utility easements, which can be crossed using connector facilities designated for exclusive usage by bicyclists and pedestrians. Examples of accommodations for these bicycle/pedestrian connectors were provided in the previous section of this report. Eventually, longer bicycle travel corridors, predominantly following neighborhood streets, may evolve as more and more adjacent neighborhood bicyclist/pedestrian connectors are developed.

Step Four
Select Bicycle Travel Corridor Design Treatments

Three bicycle travel corridors were selected as examples of how prospective travel corridors are evaluated and how possible design treatments are identified to encourage their use by bicyclists. These three examples are intended to be used as case studies which show how bicycle travel can be encouraged and improved in different situations. Their inclusion in this report is not intended to prioritize their implementation above other bicycle travel improvement projects in the study area.

The Woodlawn Bicycle Travel Corridor, presented as Case Study 1, is representative of a-neighborhood bicycle travel route. This neighborhood route includes streets not included in the functional class roadways typically managed by the San Antonio--Bexar County MPO. Case Study 2, the Museums Bicycle Travel Corridor, provides an example of an urbanized commuting and recreational route. The Wurzbach Parkway Bicycle Travel Corridor, presented in Case Study 3, shows how bicycle facilities can be integrated into a major thoroughfare route, as well as showing consideration of bicycle facilities during the roadway design phase. Design and construction of the Wurzbach Parkway is expected to continue over the next five years.

Planning elements considered in identification of potential design treatments for these corridors included the following:

- ***Location***. This element identifies the termini of the proposed bicycle travel corridor, as well as the neighborhoods and other designated districts through which the corridor passes. A map of each proposed bicycle travel corridor is presented.

- ***Existing Roadway Characteristics***. This element identifies the physical characteristics and conditions of streets and roads included in each design corridor. These characteristics include street/road name, length (in miles) of each street or road segment, number of travel lanes, on-street parking provisions, pavement condition, and posted speed limits.

- ***Attractions.*** This planning element identifies key travel destinations for bicyclists within each design corridor, including schools, employment centers, colleges and universities, parks and other recreation facilities, libraries, museums, rivers and creeks, and lakes.

- ***Daily Traffic Counts***. Daily traffic counts (vehicles per day) are typically available only for some streets within or nearby each design corridor. These traffic counts can assist with determining where heavy traffic congestion might occur within each design corridor, as well as identifying busy intersections. However, design treatments should not be formulated only from secondary data sources--field inspections and observations of existing traffic conditions within prospective design corridors are also important to the assessment of existing traffic conditions.

- ***Potential Barriers***. This element identifies existing potential barriers to bicycle travel within each prospective corridor. Travel barriers may include heavy traffic conditions, conflicts with curbside parking, expressways, railroad crossings, or drainage easements. Barriers often require design of special accommodations or connectors to enable bicycle travel around them.

Case Study 1 - Woodlawn Bicycle Travel Corridor

Location. The Woodlawn Bicycle Travel Corridor, presented in Map 1 on the following page, follows existing neighborhood streets which pass through parts of the Donaldson Terrace, Jefferson Terrace, Monticello Park, Woodlawn Park and Woodlawn Terrace neighborhoods within the City of San Antonio. Many of these streets are not included in the functional class roadways typically managed by the San Antonio--Bexar County MPO. The west end of this bicycle travel corridor is at Longfellow Junior School, at the intersection of Quill and Zachry Drive. The east end of the corridor follows existing streets around Woodlawn Lake. Bicycle facilities should be bi-directional throughout the proposed travel route, with the exception of one design treatment alternative which proposes bicycle travel in only one direction around Woodlawn Lake.

Existing Roadway Characteristics. Existing characteristics and conditions of street segments included in the proposed travel route are presented in the table on page 25.

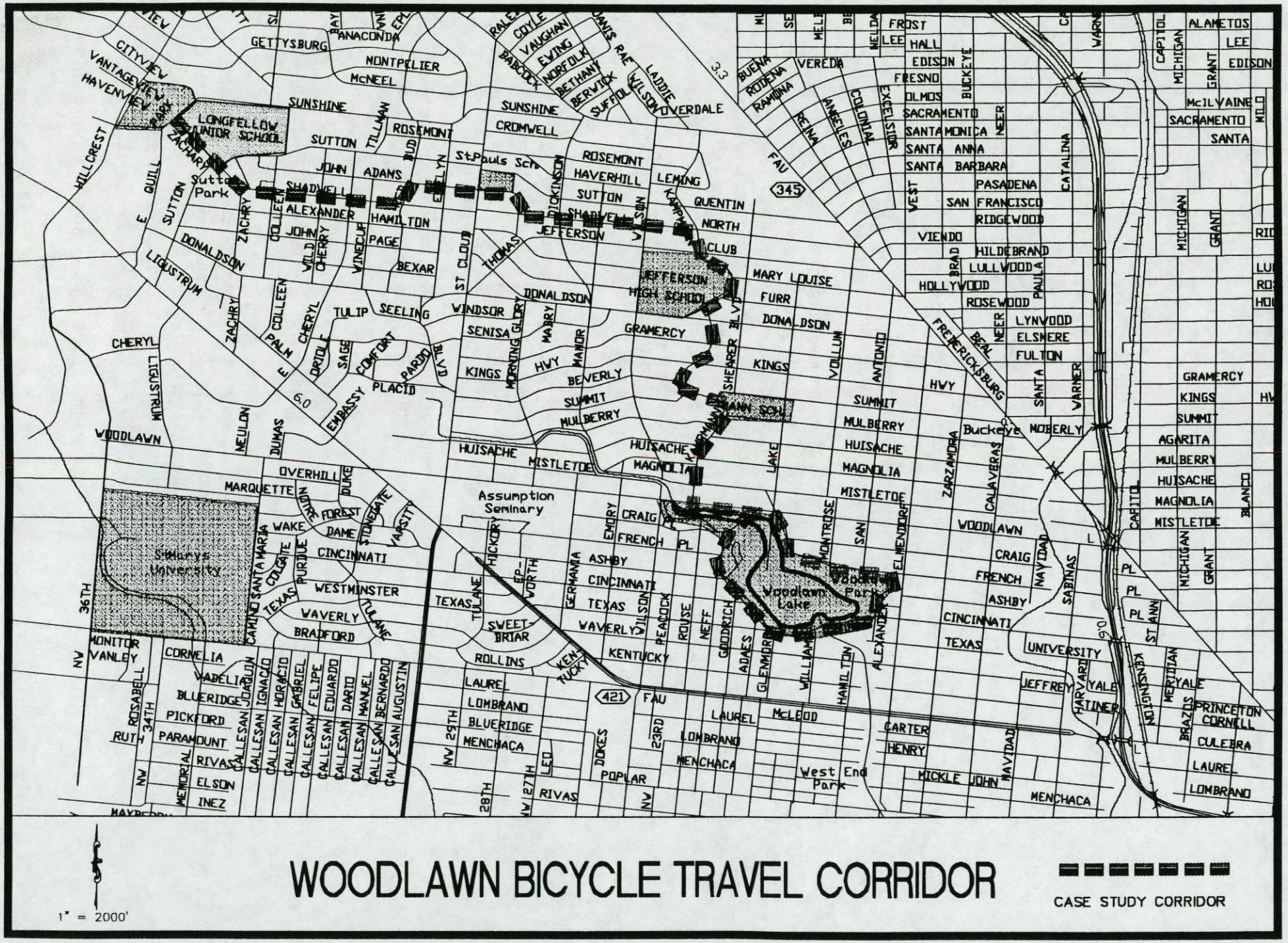
Attractions. The Woodlawn Bicycle Travel Corridor passes by several public recreation and education facilities. Public recreation areas located along the proposed corridor include Lee's Creek , Zachry, Monticello and Woodlawn Parks. Educational facilities that will be served directly by this corridor include Longfellow Junior School, St. Paul's School, Mann Middle School, and Thomas Jefferson High School.

The Woodlawn Bicycle Travel Corridor also intersects with two other study area corridors proposed for bicycle travel. The eastern segment of Shadwell Drive, on the Woodlawn corridor, intersects, at Wilson Street, with a proposed north-south bicycle travel corridor between Crossroads Mall and Kelly Air Force Base. This north-south corridor intersects with Apache Creek Park, which has received public support as a destination for a bicycle route south from Woodlawn Park through the Prospect Hills neighborhood. In addition, Woodlawn Avenue is proposed as part of an east-west bicycle travel corridor between McCullough Avenue and Ingram Park Mall. These intersecting bicycle travel corridors are shown in the Proposed Bicycle Travel Corridors map enclosed in the back cover of this report.

Daily Traffic Counts[9]. Daily traffic counts (c. 1990) for the proposed Woodlawn Bikeway corridor are available only for Woodlawn Avenue (9,640 vehicles per day), Josephine Tobin Drive South (8,510 vehicles per day) and Josephine Tobin Drive North (1800 vehicles per day at the intersection with Woodlawn Avenue.) Daily traffic counts on other nearby neighborhood streets are:

Street Name	Daily Traffic Counts (vehicles per day)
Sunshine	4,200
Donaldson	4,620
Thomas Jefferson	2,290
Club	4,450
St. Cloud	16,660

[9]"1990 Traffic Map". San Antonio Urban Transportation Study of Bexar County. Sheet I. State Department of Highways and Public Transportation, Austin, TX.


WOODLAWN BICYCLE TRAVEL CORRIDOR
CASE STUDY CORRIDOR
1" = 2000'
LONGFELLOW JUNIOR SCHOOL
Sutton Park
St Pauls Sch
JEFFERSON HIGH SCHOOL
Assumption Seminary
St Mary's University
Woodlawn Lake
Woodlawn Park
West End Park
Mann Sch
GETTYSBURG
MONTPELIER
McNEEL
SUNSHINE
CROMWELL
ROSEMONT
HAVERHILL
SUTTON
SHADWELL
JEFFERSON
QUENTIN
NORTH
CLUB
MARY LOUISE
FURR
DONALDSON
GRAMERCY
KINGS
BEVERLY
SUMMIT
MULBERRY
HUISACHE
MAGNOLIA
MISTLETOE
WOODLAWN
OVERHILL
MARQUETTE
WAKE
DAME
CINCINNATI
WESTMINSTER
WAVERLY
BRADFORD
CRAIG
FRENCH PL
ASHBY
CINCINNATI
TEXAS
WAVERLY
KENTUCKY
ROLLINS
SWEET-BRIAR
LAUREL
LOMBRANO
BLUERIDGE
MENCHACA
RIVAS
POPLAR
McLEOD
CARTER
HENRY
MICKLE JOHN
MENCHACA
UNIVERSITY
JEFFREY
HARVARD
YALE
TINER
PRINCETON
CORNELL
CULEBRA
LAUREL
LOMBRANO
MONITOR
VANLEY
CORNELIA
VADELIA
BLUERIDGE
PICKFORD
PARAMOUNT
RIVAS
ELSON
INEZ
CALLESAN JOAQUIN
CALLESAN IGNACIO
CALLESAN HORACIO
CALLESAN GABRIEL
CALLESAN FELIPE
CALLESAN EDUARDO
CALLESAN DARIO
CALLESAN MANUEL
CALLESAN BERNARDO
CALLESAN AUGUSTIN
ROSABELL
RUTH
MEMORIAL
34TH
36TH
28TH
29TH
27TH
23RD
NW
FAU
345
421
3.3
6.0
6.9

Woodlawn Bicycle Travel Corridor - Present Roadway Characteristics

Street/Road Name	Segment Length (miles)	No. of Travel Lanes	Parking	Pavement Condition	Posted Speed Limit (mph)
Zachry Drive	0.30	2	Parking both sides	Adequate	30
Shadwell Drive	0.50	2	Parking both sides	Adequate	30
Red Bud Drive	0.10	2	Parking both sides	Adequate	30
John Adams Drive	0.30	2	Student loading zone both sides b/t St. Cloud and Williford	Adequate	30
Shadwell Drive	0.40	2	Parking both sides	Rough	30
North Drive	0.10	2	Parking both sides	Adequate	30
Kampmann Boulevard	1.25	2	Parking both sides	Adequate	30
Woodlawn Avenue	0.25	2	Parking on residential frontage only	Adequate	35
Circuit of Woodlawn Lake including:	1.50				
• Josephine Tobin Drive North		1+	No parking intermittently	Rough	30
• Alexander Avenue		1+	No parking intermittently	Rough	30
• Josephine Tobin Drive South		1-2	No parking intermittently	Rough	35 (Alexander to Cincinnati)
Total Length:	**4.70**				

Potential Barriers. Potential barriers to bicycle travel along the proposed Woodlawn Bicycle Travel Corridor include the following:

- St. Cloud Road is a fairly busy north-south street which intersects the Woodlawn Bicycle Travel Corridor at John Adams. However, the intersection of St. Cloud Road and John Adams is signalized.
- John Adams is one-way only, from east to west, from Williford to St. Cloud Road.
- Woodlawn Avenue, from Kampmann Boulevard to Josephine Tobin Drive, may be busy during peak hours.
- On-street curbside parking is permitted along most of the proposed bikeway, however it is only lightly to moderately used, except around Woodlawn Park where curbside parking can be heavy.

Proposed Design Treatments. Because the proposed Woodlawn Bicycle Travel Corridor follows neighborhood streets on which traffic volumes are relatively light, design treatments necessary to better accommodate bicycle travel are minimal. Design treatments to be considered include the following:

- Bicycle route signs should be posted for both directions of travel along the bikeway corridor. Intervals between signs may vary, but each successive sign should be just within line of sight from the sign before it. Also, the Federal Highway Administration (FHWA) recommends that signs not only show direction of travel, but include destination information to attractions along the route such as schools, parks, shopping centers, etc. The FHWA also identifies these advantages of bikeway signs:

  > Signs and pavement markings for bicycle facilities will encourage increased use. In addition to obvious traffic operations benefits, signs and pavement markings have the effect of "advertising" bicycle use. This helps legitimize the presence of bicycles in the eyes of motorists and potential bicyclists.[10]

- The direction of travel for automobiles on John Adams, between its intersections with St. Cloud Road and Williford, is one-way only from east to west. To accommodate through bicycle travel along John Adams in both directions, signs designating No Entry Except Bicycle Traffic should be posted. These signs, which permit contra-flow travel only for bicycles, should be posted at the intersections of John Adams with St. Cloud Road and Williford.

- Because of higher daily traffic volumes on Woodlawn Avenue, relative to other streets in the proposed Woodlawn Bicycle Travel Corridor, bicycle lanes should be striped outside of existing parking lanes on both sides of Woodlawn Avenue between the intersections with Kampmann Boulevard and Josephine Tobin Drive North. The recommended width for one-way bicycle lanes is 5 feet, with 4 feet being the minimum accepted width. Two-way bicycle lanes on one side of a two-way street are not recommended.[11] Combined parking and bicycle lane configurations are illustrated in Appendix B.

- Bicycle lane striping is also recommended for the circuit around Woodlawn Lake. Because Josephine Tobin Drive North, Alexander, and parts of Josephine Tobin Drive South contain less than two travel lanes with curbside parking permitted, bicycle lane stripes should be provided on only one side of these streets, along the Woodlawn Park frontage, creating one-way only bicycle travel clockwise around the park. Also, curbside parking should be permitted only on the opposite side of the streets from the single direction bicycle lanes around Woodlawn Park. An example of a bicycle lane configuration, in which curbside automobile parking is prohibited, is illustrated in Appendix B.

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[10]*Selecting Roadway Design Treatments to Accommodate Bicycles*. US Department of Transportation, Federal Highway Administration. Publication No. FHWA-RD-92-073. January 1994.

[11]*Guide for the Development of Bicycle Facilities*. American Association of State Highway and Transportation Officials (AASHTO), AASHTO Task Force on Geometric Design. August 1991.

- Pavement resurfacing is recommended for all rough pavement surfaces in the bikeway travel corridor.

Proposed design treatments and estimated costs are summarized in the table below.

Street/Road Name	Length (Miles)	Proposed design treatments	Estimated Cost ($)
Zachry Drive	0.3	Post bikeway signs in both directions.	1,020
Shadwell Drive	0.5	Post bikeway signs in both directions. Resurface rough pavement sections.	1,700 30,000
Red Bud Drive	0.1	Post bikeway signs in both directions.	340
John Adams Drive	0.3	Post bikeway signs in both directions. Post NO ENTRY EXCEPT BICYCLES signs between St. Cloud and Williford. Provide 4 feet min. width bike lane striping on both sides of John Adams adjacent to St. Paul's School and continuing through intersection with St. Cloud.	1,020 1,020 1,300
Shadwell Drive	0.4	Post bikeway signs in both directions.	1,360
North Drive	0.1	Post bikeway signs in both directions.	340
Kampmann Boulevard	1.25	Post bikeway signs in both directions.	4,420
Woodlawn Avenue	0.25	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides of Woodlawn Ave., outside of parking lanes, between Kampmann Boulevard and Josephine Tobin Drive North	850 3,430
Circuit of Woodlawn Lake including:		Post bikeway signs in direction of bicycle route around Woodlawn Park.	2,890
• Josephine Tobin Drive North	0.5	Provide 4 feet min. width bike lane striping on park frontage only. Resurface rough pavement sections.	3,430 15,000
• Alexander Avenue	0.15	Provide 4 feet min. width bike lane striping on park frontage only.. Resurface rough pavement sections.	1,030 4,500
• Josephine Tobin Drive South	1.0	Provide 4 feet min. width bike lane striping on park frontage only..	6,860
Throughout Corridor	4.7	Recondition rough bicycle travel surfaces	30,000
		Total Estimated Cost	**$110,510**

Case Study 2 - Museums Bicycle Travel Corridor

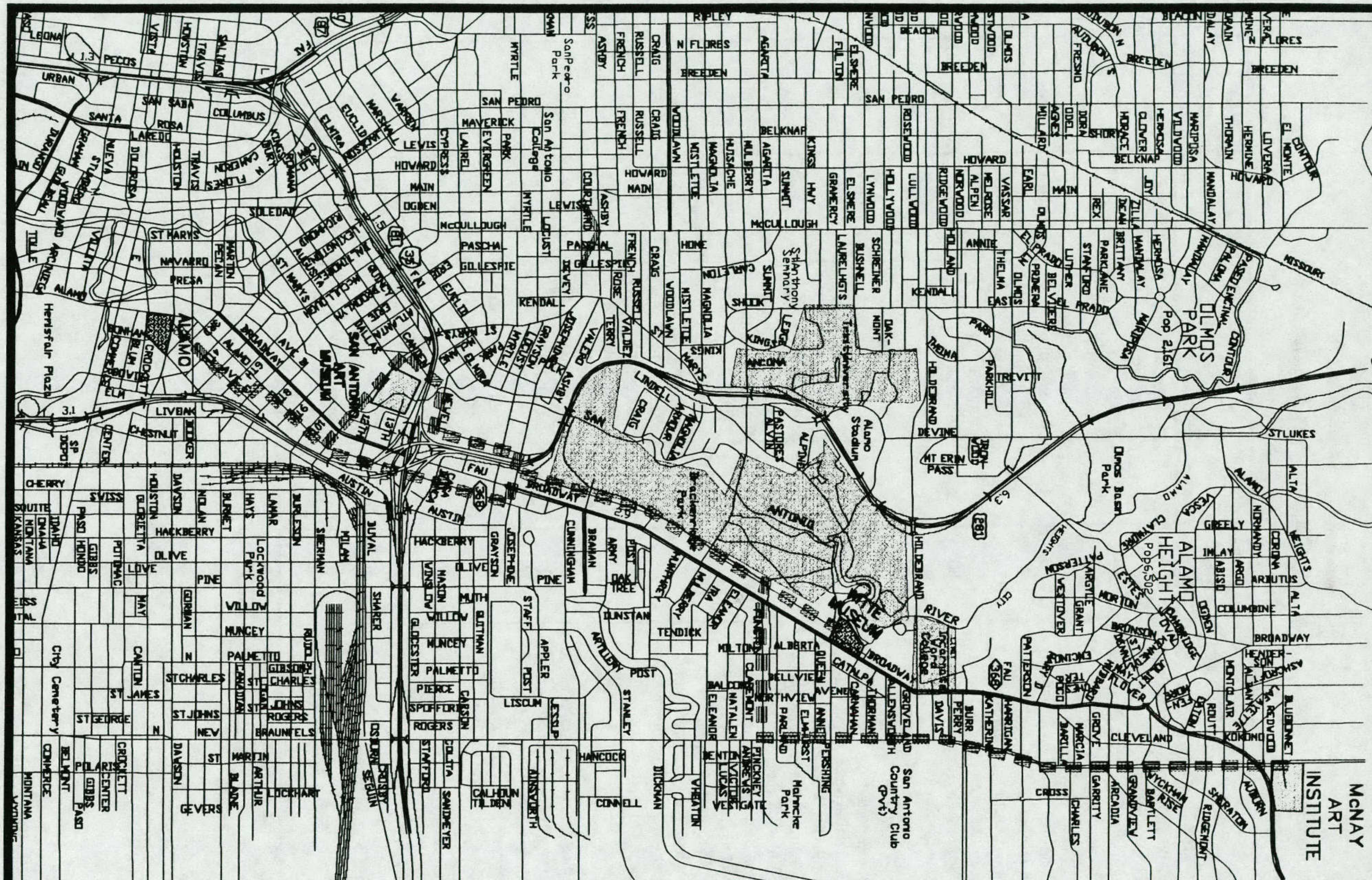
Location. The proposed Museums Bicycle Travel Corridor, presented in Map 2, follows existing city streets and potentially provides access for commuters living near the Broadway corridor to and from the City of San Antonio downtown business district, as well as access by both tourists and recreationists to several cultural and recreational attractions along the Broadway corridor. This bicycle travel corridor passes through the suburban cities of Alamo Heights and Terrell Hills, as well as parts of the Downtown, Tobin Hill and Terrell Heights neighborhoods within the City of San Antonio. In addition, this travel corridor passes within a few city blocks of the west side of Fort Sam Houston.

The north end of the Museums Bicycle Travel Corridor is proposed to be at the McNay Art Institute, just north of the intersection of Austin Highway and New Braunfels Road. Two branches are proposed for the southern end of the Museums Bicycle Travel Corridor. One branch crosses Broadway, along Josephine Street, from Avenue B to North Alamo Street, continues south on North Alamo Street to Brooklyn Avenue, goes east on Brooklyn Avenue one block to Avenue E, then follows Avenue E south to the Alamo. The second branch continues on Avenue B south of Josephine Street to Newell Street, then passes under the Pan American Expressway (I-35) along Camden Street to the intersection of Camden Street with North St. Mary's Street and Jones Avenue. This branch of the Museums Bicycle Travel Corridor will follow Jones Avenue past the San Antonio Museum of Art to North Alamo Street. Bicycle facilities should be bi-directional throughout the proposed route, with the exception of the Avenues A and B one-way couplet between Josephine and Newell Streets.

Existing Roadway Characteristics. Existing characteristics and conditions of street segments included in the proposed travel route are presented in the table on the following page.

Attractions. The Museums Bicycle Travel Corridor links several public recreation, cultural, and education facilities. Public recreation areas located in or near the proposed travel corridor include Maverick and Brackenridge Parks, San Antonio Botanical Gardens and Lucille Halsell Conservatory, and Lions Field and Recreation Center. Other attractions include the Alamo and Alamo Plaza, San Antonio Museum of Art, Witte Museum, Pioneer Trail Drivers and Texas Rangers Museum, and McNay Art Institute. Educational facilities that are served directly by this corridor include Central Catholic High School, Lamar Elementary School, and Incarnate Word College.

Public facilities accessible from or near the Museums Bicycle Travel Corridor include Fort Sam Houston, City of San Antonio Parks and Recreation Department headquarters, and the Terrell Hills City Hall. The Museum Bicycle Travel Corridor also provides near or direct access to numerous commercial business establishments in the Broadway corridor, as well as the San Antonio downtown business district, including the Rivercenter Mall.



MUSEUM BICYCLE TRAVEL CORRIDOR

CASE STUDY CORRIDOR

1" = 2500'

Museums Bicycle Travel Corridor - Present Roadway Characteristics

Street/Road Name	Segment Length (miles)	No. of Travel Lanes	Parking	Pavement Condition	Posted Speed Limit (mph)
New Braunfels Road south from. McNay Museum	1.90	2	Not posted; none observed	Adequate	30
Funston west from New Braunfels to Avenue B	0.50	2	Parking on residential frontage only	Adequate	30
Brackenridge Circle b/t Broadway and Avenue B	0.10	1+	Not posted; no accommodation	Rough	Not posted
Avenue B north from Funston to Witte Museum	0.25	1+	No parking intermittently	Rough	30
Avenue B south from Funston to Josephine Street	1.00	1+	No parking intermittently	Rough	30
Avenue A south from Josephine Street to Newell Street	0.30	2	No parking intermittently	Varies	30
Avenue B north from Newell Street to Josephine Street (including Newell Street under US 281).	0.40	2	Not posted; no accommodation	Rough	30
Newell Street west from Avenue A to Camden Street	0.10	2	Not posted; no accommodation	Adequate	30
Camden Street west from Newell Street to Jones Avenue	0.20	2	No parking both sides	Rough	30
Jones Avenue southeast from Camden Street to North Alamo Street (passing the San Antonio Museum of Art)	0.50	2	No parking both sides b/t Camden & Broadway. Parking both sides b/t Broadway & N. Alamo	Adequate	30
Josephine Street east from Avenue B to North Alamo Street	0.50	2	No parking posted south side only	Adequate	30
North Alamo Street south from Josephine Street to Brooklyn Street	1.10	2	No parking posted east side only to Jones. Parking both sides to Brooklyn	Rough	30
Brooklyn Street east to Avenue E	0.10	2	Parking on both sides	Rough	30
Avenue E south to the Alamo	0.40	2	Parking on both sides to Travis St.; then east side only to the Alamo.	Varies	30
Total Length:	**7.35**				

The Museums Bicycle Travel Corridor also intersects with six other corridors proposed for bicycle travel that are shown in the Proposed Bicycle Travel Corridors map enclosed in the back cover of this report. The northern end of Museums Bicycle Travel Corridor links with the proposed North New Braunfels/ Nacogdoches corridor at the McNay Institute of Art. Just south of the McNay, the Museums Bicycle Travel Corridor intersects with the west end of the Rittman Road bicycle travel corridor. Further south on Avenue B, the Museums Bicycle Travel Corridor intersects with the Mulberry Street bicycle travel corridor. Also, the Fort Sam Houston corridor is linked to the Museums Bicycle Travel Corridor along Josephine Street from either the Alamo Street or Avenue A/B branches. From the Alamo Street branch, the Museums Bicycle Travel Corridor is linked to a network of bicycle travel corridors proposed for the San Antonio downtown business district, shown in Map 1. From the Avenue A/B branch, the Museums Bicycle Travel Corridor is linked to improvements to North St. Mary's, proposed by the Tobin Hill Neighborhood Association, to provide pedestrian and bicycle facilities.

Daily Traffic Counts.[12] Daily traffic counts (c. 1990) for the proposed Museums Bicycle Travel Corridor were available only for North New Braunfels Road (10,040 vehicles per day), Josephine Street (9,910 vehicles per day), Camden Street (2,420 vehicles per day), North Alamo Street (1,620 vehicles per day), Brooklyn (3,770 vehicles per day) and Avenue E (3,440 vehicles per day.) The relatively low daily traffic volumes experienced by these and other streets proposed for the Museums Bicycle Travel Corridor make it an attractive corridor for bicycle travel considering the high daily traffic volumes of other streets in or intersecting with the Broadway corridor, e.g., Broadway itself (23,350 vehicles per day) and Hildebrand Avenue at Broadway (27,160 vehicles per day).

Potential Barriers. Potential barriers to safe bicycle travel along the proposed Museums Bicycle Travel Corridor include the following:

- The intersection of North New Braunfels Road and Austin Highway, just south of the McNay Art Institute, is busy with numerous turning movements. However, this intersection is signalized. Also, a drainage grate across the southbound lanes on North New Braunfels Road, immediately north of its intersection with Austin Highway, may be slippery for bicyclists riding in wet weather.

- Although North New Braunfels Road is designated as having only one travel lane in each direction, the travel lanes have sufficient width to allow motorists to travel side-by-side.

- The crossing of Broadway Avenue from Funston Street to Brackenridge Circle is not directly aligned. However, the intersection is signalized.

- There is presently no travel surface linking Avenue B north of Lions Field with Avenue B south of Lions Field.

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[12]"1990 Traffic Map". San Antonio Urban Transportation Study of Bexar County. Sheets J and Z. State Department of Highways and Public Transportation, Austin, TX.

- The intersection of Avenues A and B with Josephine also includes an entry ramp for US 281 northbound with right turns from Josephine Street onto the ramp crossing both way travel along Avenue B.

- The intersection of Camden Street with North St. Mary's Street and Jones Avenue requires numerous turning movements, with left turns from Camden Street onto Jones Avenue requiring bicyclists to cross northbound traffic on St. Mary's Street. However, this intersection is also signalized, but with no left turn signals.

- Several low volume railroad crossings occur along the proposed Museums Bicycle Route. None of these crossings are equipped with crossing gates or signals. The locations of the railroad crossings include:

  + Grade crossing on Avenue B between Josephine and Newell.
  + Grade crossing on Avenue A between Josephine and Newell.
  + Grade crossing on Newell between Avenue A and Camden.
  + Grade entering north side of Jones between Camden and San Antonio Museum of Art and continuing east in the center of Jones across North Alamo.

- Head-in parking provided on Avenue B between Lions Field and Josephine Street is a potential problem. Also, this section of Avenue B is often partially blocked by tractor-trailers deliveries to the Butter Krust bread bakery just north of the intersection of Avenue B and Josephine.

Proposed Bicycle Travel Corridor Design Treatments. The Museums Bicycle Travel Corridor includes a wide variety of roadway cross-sections and configurations. Accordingly, design treatments for accommodation of bicycle travel vary within the route corridor. Recommended design treatments include the following:

- Bicycle route signs should be posted for both directions of travel throughout the bikeway corridor. Intervals between signs may vary, but the "next" sign should be just within line of sight from the sign before it. Also, the Federal Highway Administration (FHWA) recommends that signs not only show direction of travel, but include destination information as well.[13]

- Because of higher daily traffic volumes on North New Braunfels Road, relative to other streets in the Museums Bicycle Route, and tendency of motorists to treat North New Braunfels as a four-lane rather than two-lane roadway, 5-foot wide bicycle lanes should be striped on both sides of North New Braunfels between the McNay Art Institute and the intersection with Funston Street. Provision of these bike lanes will help channelize automotive traffic into the two travel lanes intended for this part of North New Braunfels. The impacts of this channelization on motor vehicle congestion should be monitored.

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[13]*Selecting Roadway Design Treatments to Accommodate Bicycles.* US Department of Transportation, Federal Highway Administration. Publication No. FHWA-RD-92-073. January 1994.

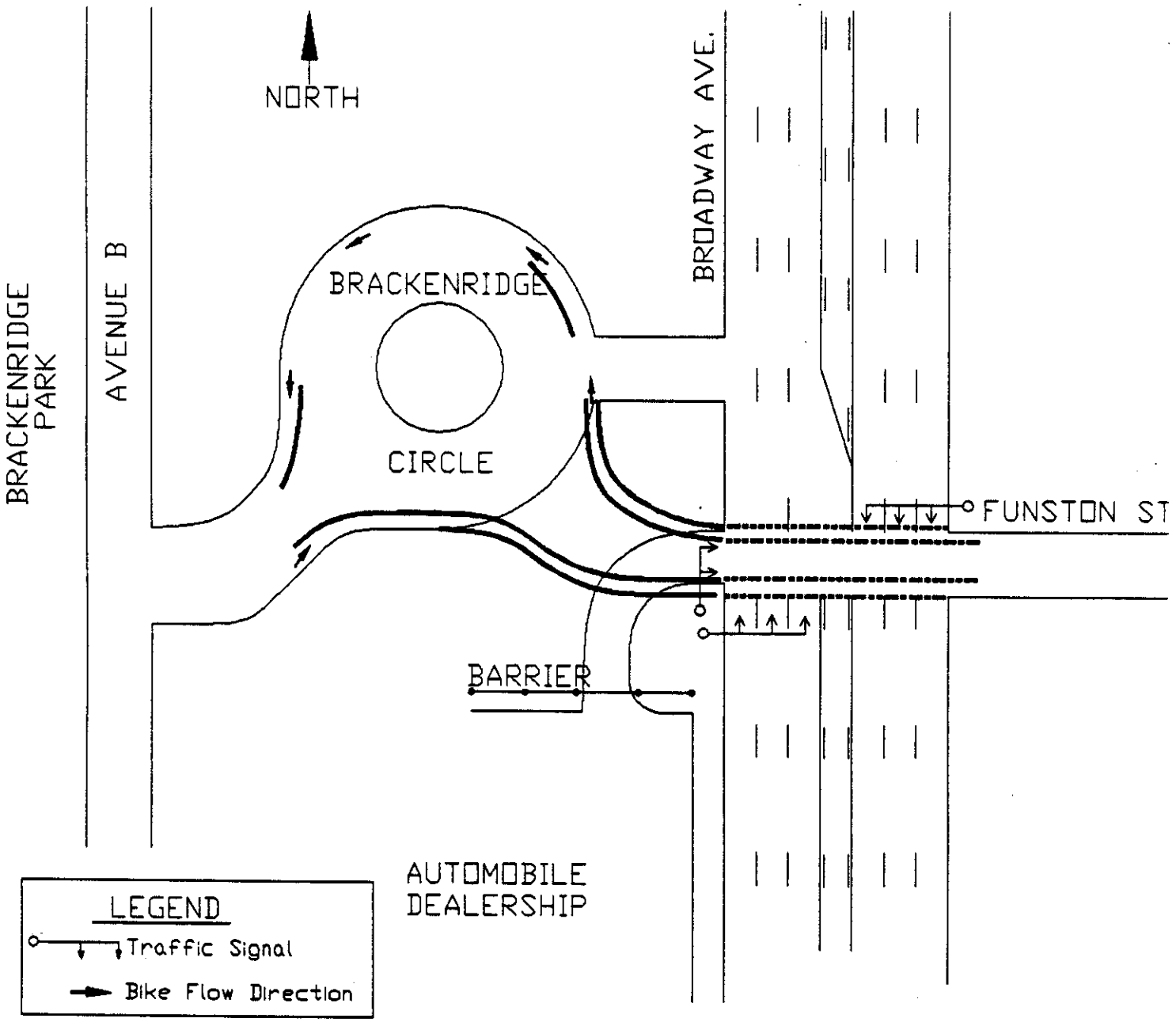
- Although the intersection of Funston Street and Broadway is signalized, the west end of Funston is not aligned across Broadway with the entrance to Brackenridge Circle which in turn provides access to Avenue B. However, there is an unused paved driveway, which is aligned with Funston across Broadway into an automobile dealership which could be used in conjunction with a short separated right-of-way bicycle path to provide bicycle access to Brackenridge Circle without having to travel along Broadway. An illustration of this proposed design treatment is presented on the following page.

- Pavement resurfacing is recommended for all rough pavement surfaces in the proposed Museums Bicycle Route.

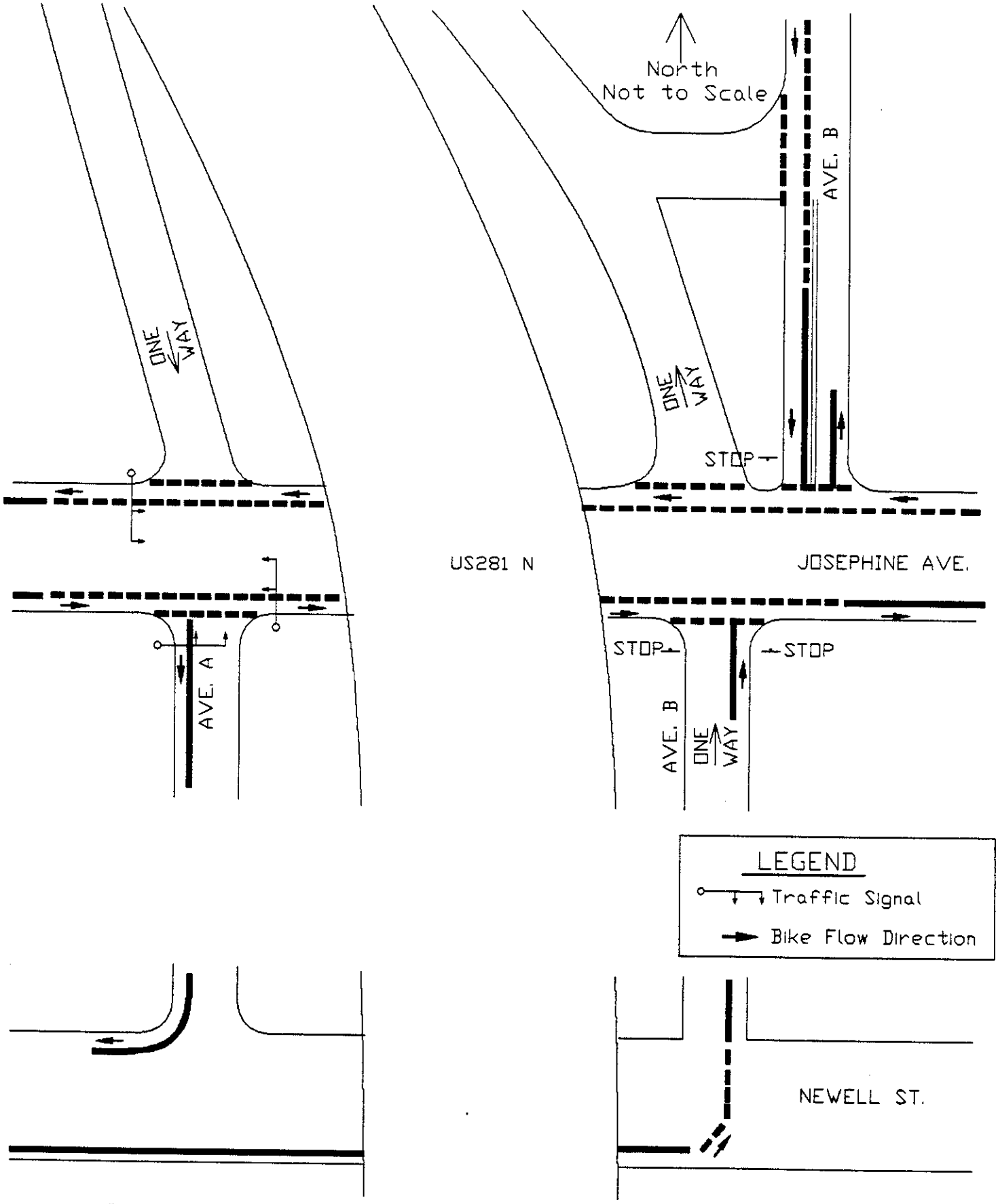
- A separated right-of-way bicycle/pedestrian path is required to link Avenue B north of Lions Field with Avenue B south of Lions Field. This bicycle path is intended for two-way travel behind the Lions Field Recreation Center. This path should be 10 feet wide, with a minimum of 2-foot width graded area adjacent to both sides of the pavement surface.[14]

- Special considerations for bikeway signs and crossings must be applied to the Avenues A and B one-way pair between Josephine and Newell Streets. Avenue B is two-way north of its intersection with Josephine Street, but is one-way northbound south of the Josephine Street intersection. Southbound travel by bicyclists, on the Avenue A/B branch south of Josephine Street, is accomplished by following Josephine Street west from Avenue B, under the elevated deck for US 281, then turning left to follow Avenue A south to Newell Street. However, this leg of the bikeway is complicated by having to cross a northbound entry ramp onto US 281 from Josephine Street. The return trip from Newell Street to Josephine Street is accomplished by following Newell Street east from Camden Street, under the US 281 elevated deck, then turning left to follow Avenue B north to Josephine Street. The Avenue A/B bicycle route "interchange" is illustrated on page 35.

[14]*Guide for the Development of Bicycle Facilities.* American Association of State Highway and Transportation Officials (AASHTO), AASHTO Task Force on Geometric Design. August 1991.



SCHEMATIC OF MUSEUM ROUTE CROSSING AT FUNSTON ST.



SCHEMATIC OF JOSEPHINE AVE. INTERSECTIONS
AT AVENUE A AND AVENUE B

- Railroad grade crossings should ideally be at right angle to the rails to prevent bicyclists' front wheels from being trapped in the flangeway, causing loss of steering control. Also roadway approaches should be at the elevation as the rails. AASHTO also recommends that where

  > the crossing angle is less than approximately 45 degrees, consideration should be given to widening the outside lane, shoulder, or bicycle lane to allow bicyclists room to cross the tracks at a right angle. Where this is not possible, commercially available compressible flangeway filters can enhance bicycle safety.[15]

  Pavement improvements should be made as required to assure that pavement surfaces are at the same elevation as rails. Also, at the railroad entry onto the north side of Jones, the bicycle lane should be sufficiently wide to allow bicyclists to cross the rails at a right angle.

- Because of downtown traffic patterns on Jones Avenue, 4-foot wide (minimum) bicycle lanes should be striped on both sides from Camden Street to North Alamo Street. Bicycle lane striping should be provided between the travel lane and parking lane where parking lanes are provided.

- Similarly, because of downtown traffic patterns, 4-foot wide (minimum) bicycle lanes should be striped on both sides of this streets from Josephine Street to Brooklyn Avenue, on Brooklyn Avenue from North Alamo Street to Avenue E, and on Avenue E from Brooklyn Avenue to the Alamo. Bicycle lane striping should be provided outside of parking lanes where parking lanes are provided.

- Four-foot wide (minimum) bicycle lanes should be striped on both sides of Josephine Street from North Alamo Street west to the intersection with Avenue A. Bicycle lane striping should be provided outside of parking lanes where parking lanes are provided.

Proposed design treatments and estimated costs are summarized in the table on the following pages.

[15] Ibid.

Street/Road Name	Length (Miles)	Proposed design treatments	Estimated Cost ($)
New Braunfels Road south from. McNay Museum	1.9	Post bikeway signs in both directions. Provide 5 feet min. width bike lane striping on both sides.	6,800 13,040
Funston west from New Braunfels to Avenue B	0.5	Post bikeway signs in both directions.	850
Brackenridge Circle b/t Broadway and Avenue B	0.1	Post bikeway signs counter-clockwise around circle. Provide bicycle lane crossing stripes from Funston across Broadway to separated connector to Brackenridge Circle. Provide separated right-of-way connector from intersection of Funston & Broadway to Brackenridge Circle.	340 660 3,500 3,000
Avenue B north from Funston to Witte Museum	0.25	Post bikeway signs in both directions.	510
Avenue B south from Funston to Josephine Street	1.0	Post bikeway signs in both directions. Provide separated right-of-way bicycle/pedestrian path across Lions Field, at least 10 feet wide w/ 2 feet grade on each side.	3,570 31,250
Avenue A south from Josephine Street to Newell Street	0.3	Post bikeway signs southbound only. Improve railroad crossing as needed. Provide bicycle accommodations as shown above for intersection with Josephine, Avenue B and US 281.	510 -- 3,620 12,000
Avenue B north from Newell Street to Josephine Street (including Newell Street under US 281).	0.4	Post bikeway signs northbound only on Avenue B. Improve railroad crossing as needed. Provide bicycle accommodations as shown above for intersection with Josephine, Avenue A and US 281.	680 -- 4,300 12,000
Newell Street west from Avenue A to Camden Street	0.1	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides. Improve railroad crossing as needed.	340 1,375 --
Camden Street west from Newell Street to Jones Avenue	0.2	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides.	680 2,745 5,000
Jones Avenue southeast from Camden Street to North Alamo Street (passing the San Antonio Museum of Art)	0.5	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides. Improve railroad grade entry as needed.	850 6,865 --
Josephine Street east from Avenue B to North Alamo Street	0.5	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides.	1,870 6,865
North Alamo Street south from Josephine Street to Brooklyn Street	1.1	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides. Improve railroad crossing as needed.	3,910 15,100 -- 33,000

Street/Road Name	Length (Miles)	Proposed design treatments	Estimated Cost ($)
Brooklyn Street east to Avenue E	0.1	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides.	340 1,055 3,000
Avenue E south to the Alamo	0.4	Post bikeway signs in both directions. Provide 4 feet min. width bike lane striping on both sides.	1,360 5,490 12,000
Throughout proposed bicycle route	7.35	Resurface rough pavement sections for bicycle travel surfaces only.	42,750
		Total Estimated Cost	**$238,225**

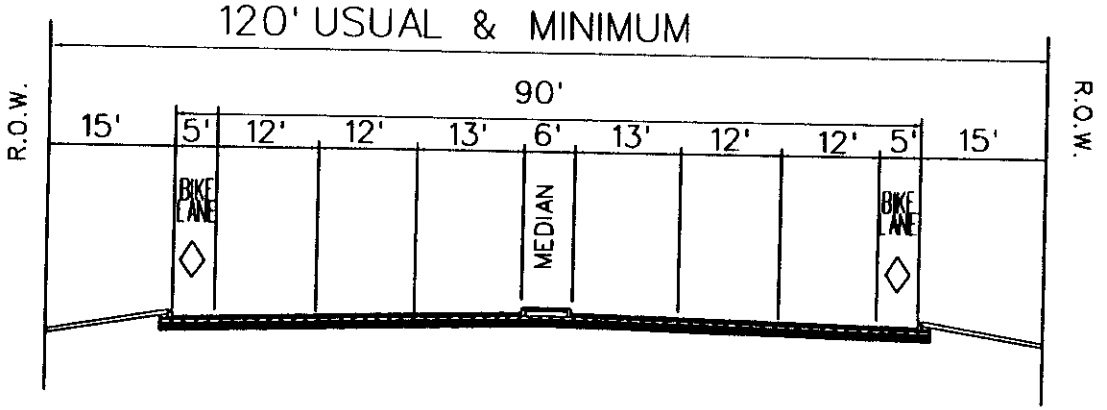
Case Study 3 - Wurzbach Parkway Bicycle Travel Corridor

Location. The Wurzbach Parkway, which is presently in the design phase or under construction at its easternmost end, will provide a controlled access suburban traffic corridor between the east end of Wurzbach Avenue and the Interstate 35 interchange with O'Connor Road. This parkway, as presently proposed by the Texas Department of Transportation (TxDOT), will be divided with three travel lanes on each side of the median. At interchanges, the outside lane functions as an auxiliary lane for traffic exiting to or entering from cross-streets. Schematic cross-sections for typical parkway segments between and at separated grade intersections, including proposed bicycle lanes, are shown on the following pages.

The length of the Wurzbach Parkway will be approximately 11 miles. Grade separated intersections are presently planned at Thousand Oaks, Perrin-Beitel, Nacogdoches, Wetmore, Starcrest, Jones-Maltzberger Road, US 281, West Avenue and Blanco Road. At-grade intersections are planned for O'Connor, Northwest Military, and Lockhill-Selma. TxDOT has recommended that bicycle lanes should be included in the proposed alignment for Wurzbach Parkway from Wurzbach Avenue to Perrin-Beitel, as shown by the dashed band on the enclosed map in the back cover of this report.

Attractions. The Wurzbach Parkway is intended to provide a much needed east-west corridor in north San Antonio, which will run approximately midway between and roughly parallel to the Interstate 410 Loop and Loop 1604. Provision of bicycle facilities along the Wurzbach Parkway will provide bicyclists with east-west access between north side neighborhoods, as well as access to key north-south travel corridors.

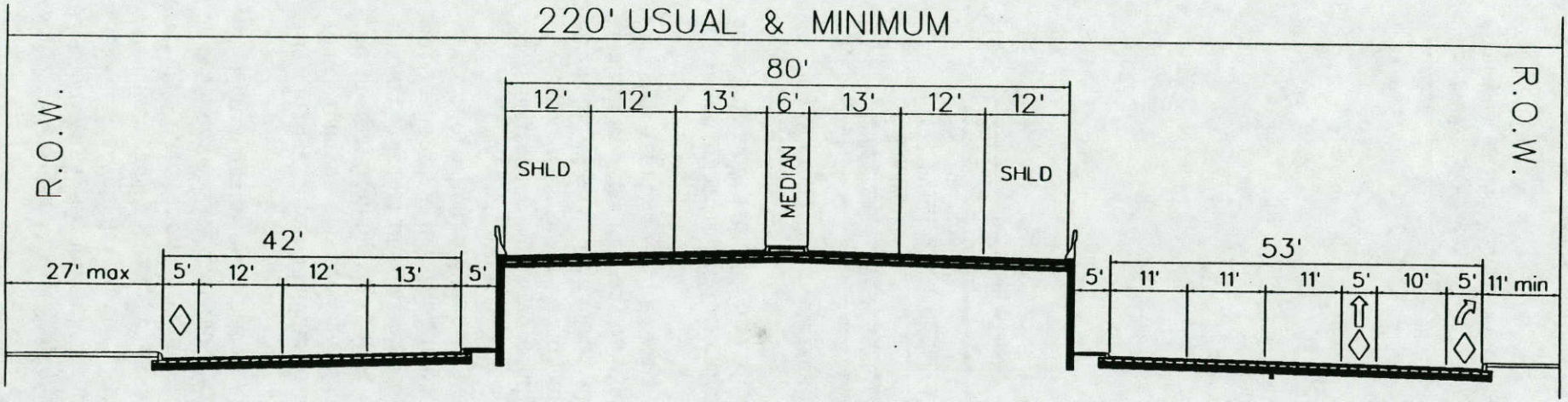
The Wurzbach Parkway also intersects with five other study area corridors proposed for bicycle travel. From west to east, intersections with other proposed bicycle travel corridors will be at Northwest Military, Blanco Road, West Avenue, Jones-Maltzberger, and Nacogdoches. The proposed Wurzbach Parkway alignment follows the southern boundary of McAllister Park along the existing Starcrest Road alignment. McAllister Park contains a 1.2 mile paved bicycle trail loop linking other park activity areas.



PROPOSED REVISION TO TYPICAL SECTION WURZBACH PARKWAY

R.O.W. WIDTH 120' MIN.

LOCKHILL SELMA TO PERRIN BEITEL



PROPOSED REVISION TO TYPICAL SECTION WURZBACH PARKWAY

R.O.W. WIDTH 220' MIN.

LOCKHILL SELMA TO PERRIN BEITEL

Proposed Bicycle Route Design Treatments for Wurzbach Parkway. The design speed for the Wurzbach Parkway is 45 mph with Annual Average Daily Traffic (AADT) expected to be greater than 10,000 vehicles per day. TxDOT congestion model projections for the year 2015 are 6,750 vehicles/lane/day between Lockhill-Selma and US 281, and in the vicinity of the Thousand Oaks intersection. Accordingly, design treatments for accommodation of bicycle travel on the Wurzbach Parkway must provide adequate separation between bicyclists and motorists. Design treatments to be considered include the following:

- Bicycle route signs should be posted for both directions of travel throughout the bicycle route. Intervals between signs may vary, but each successive sign should be just within line of sight from the sign before it. Also, the Federal Highway Administration (FHWA) recommends that signs not only show direction of travel, but include destination information as well.[16] In addition, bicycle route signs should be provided on cross streets intersecting with the Wurzbach Parkway.

- Each intersection on the proposed Wurzbach Parkway is expected to present a unique set of design challenges and treatments. In general accommodations should be provided to enable bicyclists to continue travel on the Parkway through each intersection, provide safe exit from the Parkway onto intersecting streets, and provide safe entry onto the Parkway from intersecting streets.

- If a new entrance to McAllister Park from the Wurzbach Parkway is provided, accommodations for bicyclists should incorporated into the entrance design.

Estimated costs of proposed bicycle facilities for the Wurzbach Parkway are as follows:

Proposed Accommodations	Estimated Cost
Bikeway signing	27,200
Additional roadway width to accommodate bikeway	1,100,000
Bike lane striping	66,600
Total Estimated Cost	**$1,193,800**

[16] *Selecting Roadway Design Treatments to Accommodate Bicycles.* US Department of Transportation, Federal Highway Administration. Publication No. FHWA-RD-92-073. January 1994.

Bicycle Mobility Plan Implementation Policies

The Bicycle Mobility Plan provides a methodology for developing a network of bicycle routes in the San Antonio--Bexar County study area that will help it become a place where people choose to bicycle for transportation and recreation. Implementation of a network of facilities and routes throughout the study area over the next 20 years will depend upon the actions of the City of San Antonio, Bexar County, the Texas Department of Transportation, a number of smaller suburban cities, development community, and citizen involvement.

Metropolitan Planning Organizations (MPO) Actions

The San Antonio -- Bexar County MPO should assume a leadership role in promoting implementation of a bicycle route network, using the approaches developed in the Bicycle Mobility Plan. The following actions are recommended.

A-1. Establish a standing Bicycle Mobility Task Force to oversee and coordinate implementation of the Bicycle Mobility Plan.

Membership in the Bicycle Mobility Task Force should be based on the Plan Oversight Committee, which was created to oversee the development of the Bicycle Mobility Plan. There should be increased representation of bicycle user groups, bicycle shop owners, and the health community. Also, representation from law enforcement agencies which have bicycle patrol units, such as the City of San Antonio Police Department and the Bexar County Sheriff's Department, is desirable.

A-2. Identify a minimum level of funding for bicycle improvements to the existing roadway system.

At least $15 million over the next 20 years should be made available to City and County agencies to implement projects and programs that improve the existing roadway system for bicyclists. Eligible projects may include those of the type outlined for the Woodlawn and Museums Bicycle Travel Corridors. Eligible programs may also include those recommended in Actions 6 and 7 below. This fund is not intended for facilities that are included in new and reconstructed transportation facilities, such as those proposed for the Wurzbach Parkway.

A-3. Encourage the development of bicycle facilities in conjunction with roadway construction, reconstruction and improvement projects through the Transportation Improvement Program process.

The criteria used by the MPO to rank projects for inclusion in the annual Transportation Improvement Program (TIP) should be amended to include those projects and programs which incorporate improvements for bicyclists. In many communities, projects in the TIP, that include planning for multi-modal uses, are given higher priorities in the ranking process.

A-4. Promote uniform, state-of-the-practice facility design and implementation throughout the San Antonio--Bexar County study area.

The MPO should ensure that facilities developed as part of the bikeway network conform to current guidelines and standards. The AASHTO *Guide for the Development of Bicycle Facilities* and FHWA *Selecting Roadway Design Treatments to Accommodate Bicyclists* should be adopted as minimum guidelines to follow. The MPO should also provide opportunities for planners, engineers, developers and consultants in the study area to receive ongoing training in the development of bicycle facilities.

A-5. Develop planning tools to prioritize bicycle facility development.

The MPO should use information collected for the ISTEA Management Systems to rate the suitability of roadways throughout the San Antonio--Bexar County metropolitan area for bicycling, based on the facility selection criteria developed for the Bicycle Mobility Plan. The ISTEA Management Systems include those for pavement, transit, safety, intermodal transportation, bridge, and congestion management. The resulting maps and analyses should be used to identify key gaps in the existing network of suitable routes for bicyclists, which can in turn be used to prioritize bicycle facility development in these areas.

Other Agency Actions

A-6. The City of San Antonio and/or Bexar County should appoint or hire a full-time bicycle coordinator to coordinate and implement the development of a bicycle travel network.

A full-time bicycle coordinator is an essential element to the successful implementation of a bicycle route network in the San Antonio--Bexar County study area. The coordinator position should be located in the City of San Antonio or Bexar County Departments of Public Works.

A-7. The City of San Antonio, suburban municipalities, and Bexar County should adopt policies similar to those of the Texas Department of Transportation in which design of all roadway improvements and reconstruction, or new construction, includes consideration of inclusion of bicycle facilities.

A-8. The City of San Antonio and Bexar County should institute a "Bicycle Spot Improvement" program to make low-cost safety improvements to the existing roadway system.

The City of San Antonio and Bexar County should set aside at least $50,000 per year to respond to safety and operational problems identified by bicyclists and other roadway users. Similar programs around the country have been very effective in improving surface conditions, providing low-cost improvements such as bicycle parking racks and fixing missing signs, lane stripes and other traffic control devices. Such programs have been very popular with bicycle user groups and have helped develop more cooperative relationships between public agencies and citizens. An example of a spot improvement request form is presented on the facing page.

A-9. The City of San Antonio and other incorporated municipalities should review and recommend changes to the Unified Development Code to ensure that streets and roadways built by developers incorporate adequate facilities and space for safe and efficient bicycle travel.

A-10. The City of San Antonio, other incorporated municipalities, and Bexar County should review and recommend changes to local parking ordinances to ensure that a minimum level of bicycle parking is provided in all new developments.

A-11. The City of San Antonio should consider implementation of bicycle facility projects of the type recommended for the Woodlawn and Museums Bicycle Travel Corridors (see pages 23 and 28, respectively), and should proceed with development of the Missions Trail.

Implementation of the Mission Trails project should take place during the 20-year development period addressed by the Long Range Transportation Plan. Bicycle facility projects, of the types described for the Woodlawn Lake and Museums Bicycle Routes, should likewise be implemented during the 1995-2015 development period. In addition, there is public support for closure of connecting streets in San Antonio, on weekend days or part of a weekend day, to provide an on-street facility exclusively for bicyclists and pedestrians.

A-12. The Texas Department of Transportation should implement the recommendations for inclusion of bicycle facilities of the type proposed for the Wurzbach Parkway alignment.

SEATTLE'S BIKE SPOT IMPROVEMENT PROGRAM

SAMPLE BICYCLING IMPROVEMENT POSTCARD

On page 5 of this Action Kit, we describe Seattle's **Bike Spot Improvement Program** which aids the City's bicycle program in locating and rectifying small-scale bicycling problems. We heartily recommend you work to get such a program going in your community!

A **Bike Spot Program** can be inexpensive to implement but its value can be significant. As Michael Dornfeld, former bicycle program planner for the City of Seattle and currently the Washington State bicycle coordinator, says "Instead of letters lambasting decision-makers for lack of action on bicycle issues, Seattle officials have received letters of thanks and praise for the bicycle program...the bike spot program has solved problems and provided better and safer access for many bicyclists."

Each year, the bicycle program prints cards like the sample shown below and distributes them to local bike shops, libraries, city service centers, and bike clubs. Approximately 150 are returned to the program each year. Simple requests, like filling potholes or sweeping, are handled on a routine basis. More complicated requests, like bike lane striping or extensions to the trail system, are prioritized based on their potential to improve safety, bike use, or continuity of the bikeway system.

To put this postcard idea to work in your community, start by making an appointment with your mayor or public works director. Take along a copy of this card in order to give a clear picture of what you want to see happen. Describe how such a program can help local government better meet the needs of its bicycling constituents. Will it work? There's certainly a good chance and it's a positive approach to working with government officials!

CITIZEN BICYCLING IMPROVEMENT REQUEST

CITY OF SEATTLE BICYCLE PROGRAM

The Bike Spot program makes low cost improvements to enhance bicycle safety and access. We do maintenance work, signs and striping, and small construction jobs. Almost anything is possible!

LOCATION: Roadway Name _____

Landmarks (cross street, # of feet from curb, address). Be specific! _____

_____

_____

DESCRIPTION OF PROBLEM: (What is it and why is it a problem) _____

_____

_____

Where did you get this form? _____

REPORTED BY: Name _____ Day Phone _____

Address _____ Zip _____ Date _____

SAMPLE CARD

Return to: Seattle Engineering Department Bicycle Program, Rm. #612, Municipal Bldg., Seattle WA 98104

For further information, contact the Bicycle Program staff at 625-5177

A-13. The City of San Antonio and Bexar County should actively support promotional and safety events in the study area.

To help overcome the low status of bicyclists and bicycling in the San Antonio--Bexar County study area, the City of San Antonio and Bexar County should support the work of the San Antonio Wheelmen and Alamo Area Bicycle Coalition to promote bicycle events, such as Bike to Work Week. The City and County should also develop and/or provide safety literature and promotional information about bicycling for bicyclists and motorists. Tourist information developed by the City and County should include information about the opportunities for bicycling and tips for bicyclists and motorists on how to safely coexist. There is public support for an implementation of an "Adopt a Bike Route" which would provide maintenance of bicycle routes by volunteer organizations.

A-14. VIA Transit should work with the bicycling community to establish a program to better integrate bicycling with the transit system.

VIA Transit and the bicycle community should work together to identify opportunities to better integrate these two transportation modes in the following key areas:

a) bicycle access and parking at all transit facilities
b) provision of racks to carry bikes on certain key bus routes
c) on a trial basis, allowing bicycle access to dedicated bus and right-turn lanes

A-15. Each of the agencies involved in the implementation of the Bicycle Mobility Plan should themselves become model employers for those wishing to commute by bicycle.

As part of the effort to reduce air pollution from single occupant commuting trips, each of the agencies involved in implementing parts of the Bicycle Mobility Plan should encourage their own employees to bicycle to and from work, and during the course of work, by providing a range of services, facilities and incentives such as:

a) secure bicycle parking
b) access to shower, changing and locker facilities
c) free and preferential car parking on a limited number of days when bicycling may not be feasible because of bad weather or other constraints
d) ride-matching and route-finding services
e) other incentives at least equal to those offered to ridesharers

Bicycle Facility Project Funding

ISTEA Funding Sources[17]

The Intermodal Surface Transportation Efficiency Act (ISTEA) legislation makes substantial sums of money available to State and local jurisdictions to construct facilities and to develop programs and materials for promoting bicycling and walking. While funding is available, however, individual States and local jurisdictions are not required to use the funds for pedestrian and bicycle projects. ISTEA provides a total of $122 billion for highways under Title 23, approximately half of which can be flexed to transit, bicyclist, or pedestrian programs.

Specific sources of funding for bicycling and walking projects or programs include the National Highway System (NHS) funds, Surface Transportation Program (STP) funds including set-aside Transportation Enhancement Activities (TEA) allocations, Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds, Federal Lands Highway funds, Scenic Byways Program funds, and the National Recreational Trails fund, as well as Section 402 and Federal Transit Funding. These funding sources are described below. It is important to note that within each of these categories, bicyclist and pedestrian needs must compete with other highway/motorized projects for funding.

- ***National Highway System (NHS) Funds*** may be used to construct bicycle transportation facilities and pedestrian walkways on land adjacent to any highway on the National Highway System (other than the Interstate System).

- ***Surface Transportation Program (STP) Funds*** may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or nonconstruction projects (such as brochures, public service announcements, and route maps) related to safe bicycle use. Ten percent of STP funds are used for "Transportation Enhancements" which include the provision of facilities for bicyclists and pedestrians.

- ***Congestion Mitigation and Air Quality Improvement (CMAQ) Program Funds*** may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or nonconstruction projects (such as brochures, public service announcements, and route maps) related to safe bicycle use. However, these funds are available only in metropolitan areas listed as non-attainment areas for air quality.

- ***Federal Lands Highway Funds*** may be used to construct pedestrian walkways and bicycle transportation facilities in conjunction with roads, highways, and parkways at the discretion of the department charged with the administration of such funds.

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[17]*The National Bicycling and Walking Study: Transportation Choices for a Changing America.* Publication No. FHWA-PD-94-023. Washington, DC: US Department of Transportation, Federal Highway Administration. 1994.

- ***Scenic Byways Program Funds*** may be used to construct facilities along scenic highways for the use of pedestrians and bicyclists. Presently, there are no designated "Scenic Byways" in the BMP study area.

- ***National Recreational Trails Fund*** moneys may be used for a variety of recreational trails programs to benefit bicyclists, pedestrians, and other nonmotorized and motorized users. Projects must be consistent with a Statewide Comprehensive Outdoor Recreation Plan required by the Land and Water Conservation Fund Act.

- ***Section 402 Funding*** Pedestrian and bicyclist safety remain priority areas for highway safety program funding. Title II, Section 2002, of the ISTEA addresses State and community highway safety grant program funds. The priority status of safety programs for pedestrians and bicyclists expedites the approval process for these safety efforts.

- ***Federal Transit Funding title III, Section 25 of ISTEA***, continues to allow transit funds to be used for bicycle and pedestrian access to transit facilities, to provide shelters and parking facilities for bicycles in or around transit facilities, or to install racks or other equipment for transporting bicycles on transit vehicles.

The San Antonio--Bexar County urbanized area is an attainment area, i.e., is in compliance with national ambient air quality standards set forth by the Clean Air Act. Federal funding of transportation activities in non-attainment areas is dependent on local implementation of various Transportation Control Measures (TCMs) specified in the Clean Air Act. Bicycling and walking improvements, both construction and non-construction, are approved TCMs for reducing emissions to help bring ozone and carbon monoxide nonattainment areas into air quality compliance. The Congestion Mitigation and Air Quality (CMAQ) Improvement Program provides additional resources for transportation projects and programs that are listed as TCMs in the Clean Air Act, that are included in the SIP (State air quality Implementation Plan), or that will have air quality benefits or be likely to contribute toward attainment of a national ambient air quality standard. While the program is aimed at States with non-attainment areas, every State will receive at least 0.5 percent of each year's apportionment. States without non-attainment areas may spend the funds on eligible activities in the Surface Transportation Program.

The US Department of Transportation and the Environmental Protection Agency have agreed that a wide range of bicycling and pedestrian projects and programs meet eligibility requirements for CMAQ funds. These include the construction of bicyclist and pedestrian facilities, non-construction projects related to safe bicycle use, and State bicycle and pedestrian coordinator positions for promoting and facilitating the increased use of non-motorized modes of transportation. Also eligible are public education, promotional, and safety programs for using such facilities.

Long Range Transportation Plan

Prior to being included in the Transportation Improvement Program (TIP) process, described below, prospective federally assisted transportation projects must be addressed by the Long Range Transportation Plan (LRP) developed by the San Antonio--Bexar County MPO. The LRP allocates $15 million of Surface Transportation Program--Metro Mobility (STP-MM) funds for bicycle transportation projects over the next 20 years.

Transportation Improvement Program[18]

The Transportation Improvement Program (TIP) is a funding program of federally assisted transportation projects that will be implemented over a three-year period. Any projects not included in the approved TIP are ineligible to receive federal transportation assistance. The TIP shows priorities by grouping all projects in the one to three year time frame, and makes realistic estimates of costs and revenues for the program period. In addition, the TIP identifies additional projects to be considered in the next four-to-ten year period.

The development of the TIP does not end the planning process. Once the TIP is prepared, the process must continue so that the following year's projects and programs can be selected and coordinated. The continuing process is designed to ensure coordination with existing study area plans and programs to avoid duplication, and planning inconsistencies.

Development and update of the TIP proactively involves citizens, affected public agencies, public transportation agency representatives, private transportation providers, and other interested parties. Annual notices are sent to local neighborhood organizations, community groups, public agencies, and other interested parties, to solicit prospective projects to improve transportation within the study area. In order for projects to be considered for placement in the TIP, a written request must be made by the agency which will have responsibility for carrying out the project if accepted. The written request must be submitted to the MPO prior to the designated annual deadline.

Once projects have been submitted to the MPO, the Technical Advisory Committee (TAC) reviews the proposed projects. Bicycle facility projects will also be reviewed by the MPO Bicycle Advisory Task Force. The MPO also hosts public meetings to solicit comments on proposed projects being considered for inclusion in the TIP. Following presentation of proposed projects to citizens at public meetings, the TAC prepares a draft of the TIP for consideration by the Transportation Steering Committee (TSC). Following receipt of TSC comments, revisions to the draft TIP and public comments are presented at a TSC workshop. Final revisions to the TIP are applied and submitted for adoption by the TSC.

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[18]"FY 1995-97 Transportation Improvement Program - San Antonio--Bexar County Metropolitan Area". San Antonio, TX: San Antonio--Bexar County Metropolitan Planning Organization. October 1, 1994.

Projects selected for the TIP are based on evaluation of each project's 1990 TxDOT average daily traffic (ADT) counts, projected year 2015 ADT's, right-of-way availability, congestion relief provided, increase in safety, contribution to the entire transportation system, and comments received from the public and TSC. Projects selected for the TIP are in compliance with the Long Range Plan. Selected bicycle projects must also be in compliance with the Bicycle Mobility Plan.

After receiving local approval, the TIP is forwarded to TxDOT, where it is again reviewed for inclusion in the Statewide Transportation Improvement Program (STIP). At the conclusion of a statewide public hearing and approval by the Texas Transportation Commission, the STIP is forwarded to the Federal Highway Administration and Federal Transit Administration.

Making It Happen
Public Participation in Bicycle Mobility Plan Implementation

The Bicycle Mobility Plan provides only the first step in development and implementation of a network of bicycle travel routes and facilities in the San Antonio--Bexar County area. The Bicycle Mobility Plan provides, to citizen advocates of improved bicycle travel, area government officials, and transportation planners, a guide to bicycle travel network development. Although the Metropolitan Planning Organization has already established a permanent Bicycle Advisory Task Force, and has allocated $15 million, through the TIP, to new development of bicycle facilities over the next 20 years, public input will continue to be critical to providing guidance to local and state government officials on what kinds of bicycle travel facilities should be provided and where they should be provided.

San Antonio -- Bexar County
Bicycle Mobility Plan - Long Range Plan

Appendix A
Glossary of Abbreviations

Abbreviation	Definition
AASHTO	American Association of State Highway & Transportation Officials
ADT	Average Daily Traffic
BMP	Bicycle Mobility Plan
CMAQ	Congestion Management and Air Quality
FHWA	Federal Highway Administration
FY	Fiscal Year
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
LRP	Long Range Transportation Plan
MPO	San Antonio--Bexar County Metropolitan Planning Organization
NHS	National Highway System
POC	Plan Oversight Committee
SIP	State air quality Improvement Plan
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
STP-MM	Surface Transportation Program--Metro Mobility
TAC	MPO Technical Advisory Committee
TCM	Transportation Control Measure
TEA	Transportation Enhancement Activities
TIP	Transportation Improvement Program
TSC	MPO Transportation Steering Committee
TxDOT	Texas Department of Transportation

San Antonio -- Bexar County
Bicycle Mobility Plan - Long Range Plan

Appendix B
Bicycle Mobility Performance Criteria

Appendix B

Bicycle Mobility Performance Criteria

Introduction

Appendix B describes, in some detail, bicycle facility types and their appropriate uses, suggestions for appropriate route and facility type selection criteria for bicycle improvements, and how streets can be made safer for bicyclists.

Much of the following discussion is based on the AASHTO *Guide for the Development of Bicycle Facilities* and the FHWA research report, "The Effects of Bicycle Accommodation on Bicycle/Motor Vehicle Safety and Traffic Operations" (1992).

On-Road Facility Design

Bicycle lanes

Bicycle lanes should conform to the AASHTO *Guide for the Development of Bicycle Facilities* (1991). The following are basic points that should be followed. Circumstances may require deviating from these requirements in some special cases. However, such cases should be carefully considered and mitigating measures applied.

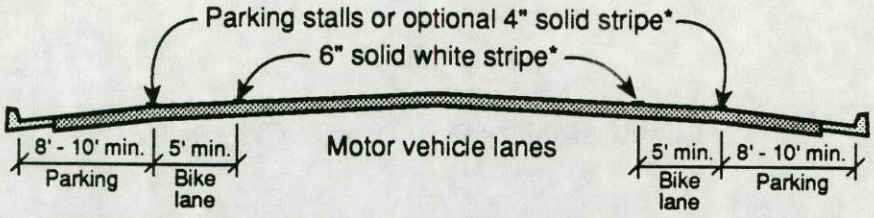
1 *Width*: Bicycle lanes should be at least 4 feet wide. Curb and gutter sections should not be counted. In such cases, there should be at least 5 feet between the bicycle lane stripe and the joint between the roadway and the gutter pan. When no curb and gutter section is present, the 4-foot bicycle lane should, as a general rule, meet a smoothly graded shoulder at least 2 feet wide.

2 *Two-way streets*: On two-way streets, one-way bicycle lanes should be provided on each side, to the right of the right-most through lane. Under no conditions should two-way bicycle lanes be provided on one side of the street.

3 *Side of road*: On one-way streets, a one-way bicycle lane should be provided typically on the right side of the road. Special circumstances may dictate striping a bicycle lane on the left side; however, the circumstances should be carefully documented.

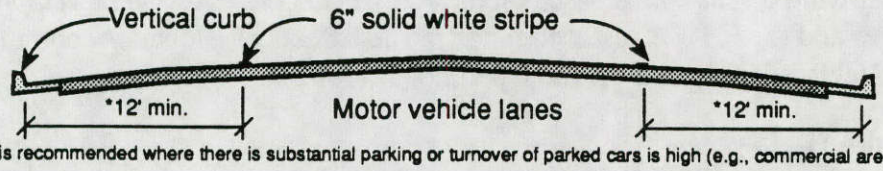
4 *Designation*: Bicycle lanes should be designated by lane striping, regulatory signs, and pavement markings, as shown in the diagram on the following page.

5 *Striping*: Bicycle lanes should be separated from other travel lanes by a 4" or 6" solid white stripes. In general, a bicycle lane stripe may be solid from the beginning of a block to within 50 feet of the end; at that point, it should be dashed until it hits the intersection (MUTCD, 1988). There should be no curb between bicycle lanes and the rest of the roadway, nor should bicycle lanes be placed on a sidewalk.



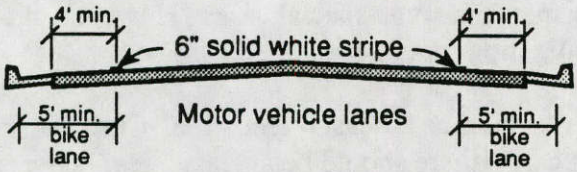
* The optional solid white stripe may be advisable where stalls are unnecessary (because parking is light) but there is concern that motorists may misconstrue the bike lane to be a traffic lane.

(1) Striped parking

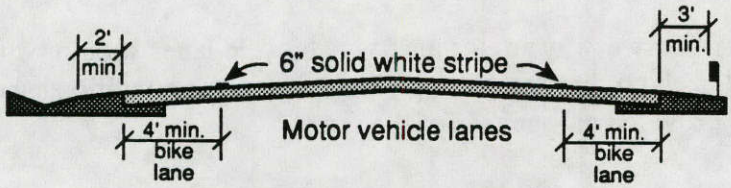


*13' is recommended where there is substantial parking or turnover of parked cars is high (e.g., commercial areas).

(2) Parking permitted without parking stripe or stall



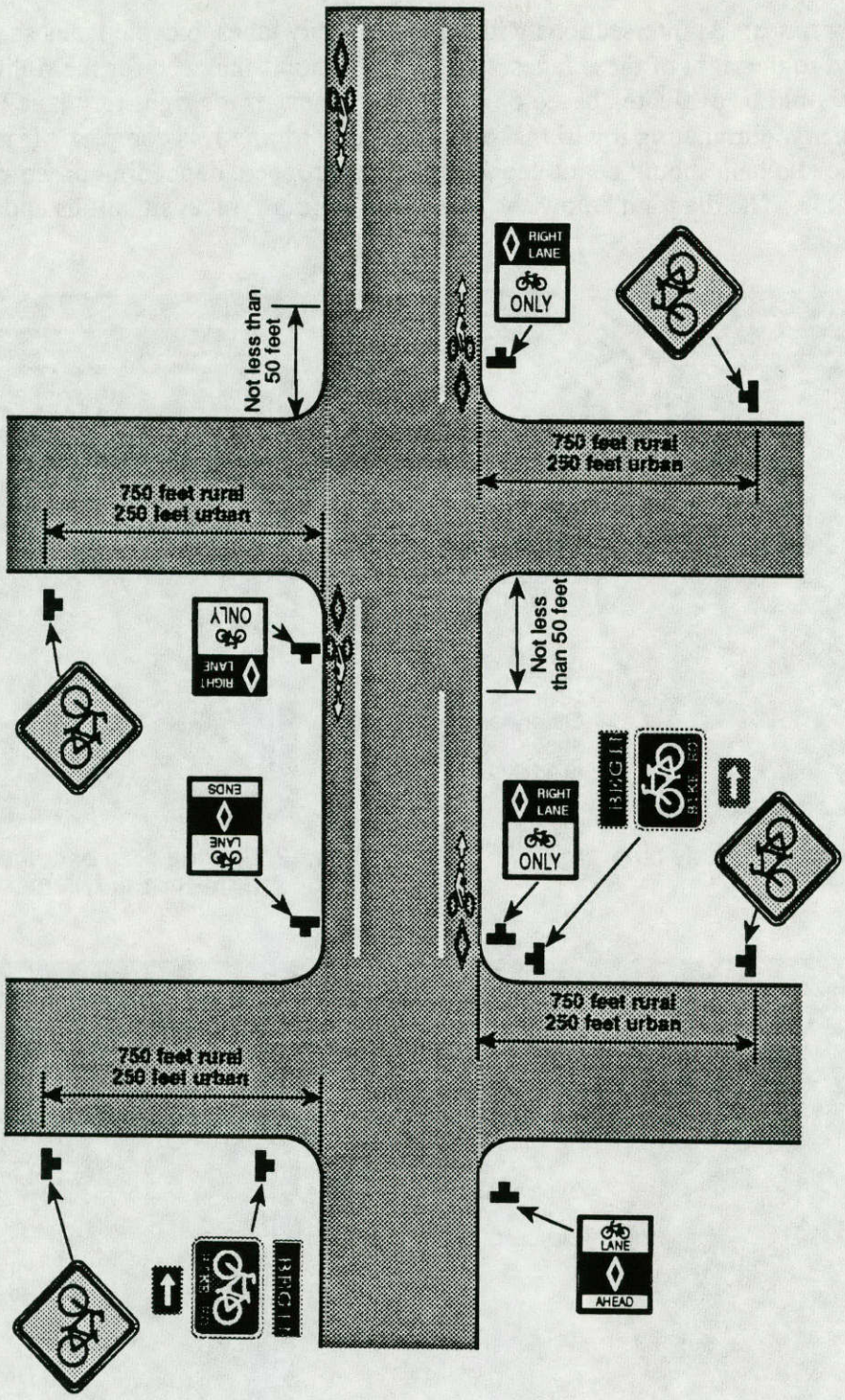
(3) Parking prohibited



(4) Typical roadway in outlying areas parking restricted

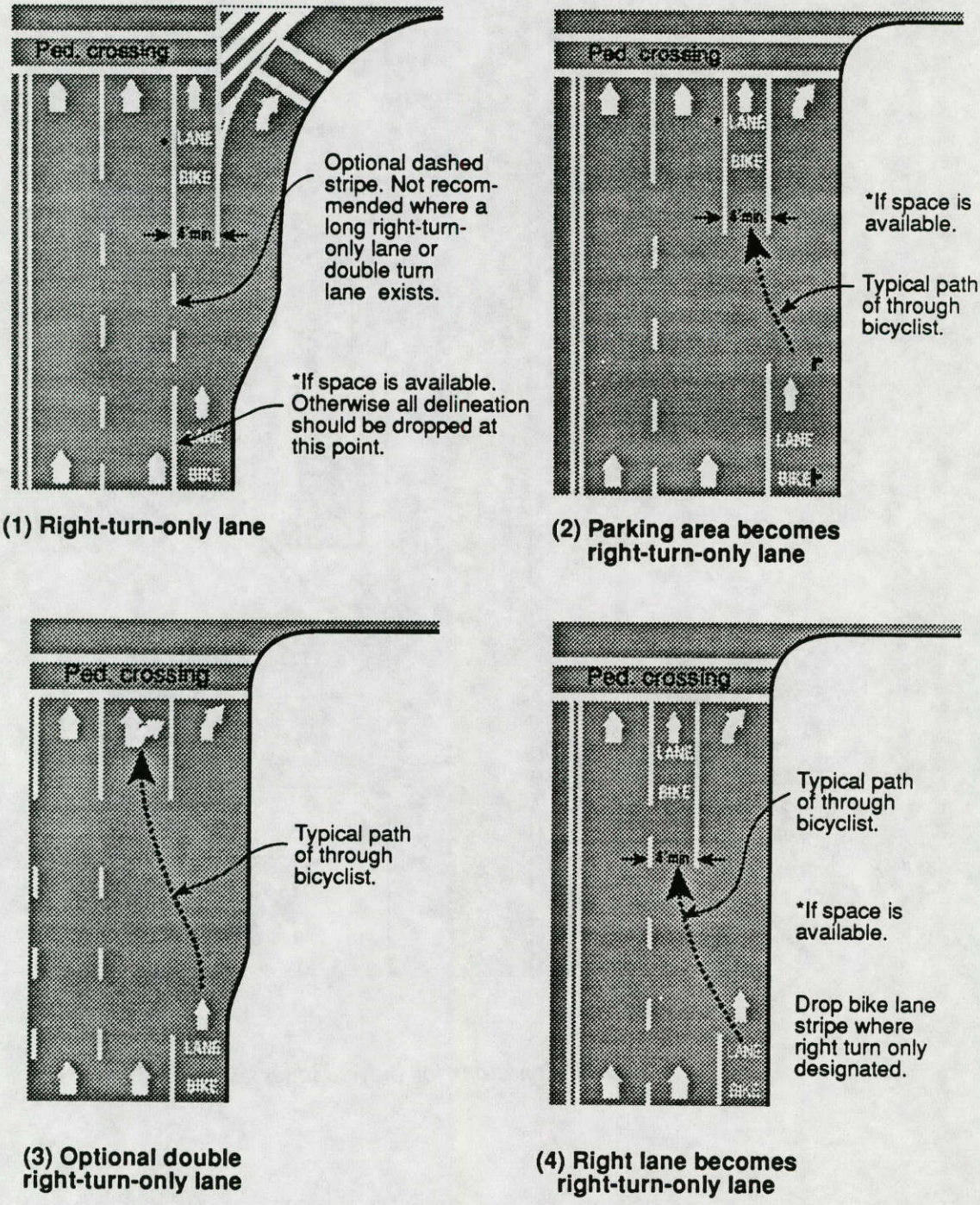
Bicycle lanes provided for different types of roadway conditions

6 *Parking*: Bicycle lanes should be to the traffic side of all curbside parking. Standard width parking spaces should be provided and should not be narrowed to create the bicycle lanes. Such an approach encourages a dangerously close relationship between parked cars and bicycles.



Typical designations for bicycle lanes.

7 *Intersections*: At intersections with right-turn-only lanes, bicycle lanes should not be striped to the right of these lanes. In these situations, the need for the right-turn-only lane should be evaluated based on turning volumes. If the right-turn lane is not necessary, eliminating it will make bicycle lane striping less complex. If it is necessary, the bicycle lane should be moved to the left or dropped, depending on how much space is available. The diagram below shows a range of four typical situations and some possible solutions.



Bicycle lanes and right turn lanes: 4 options.

8 *Signal actuation*: At demand-actuated signals, special accommodation will be needed in the bicycle lane in order to assure bicycle detection. See the General Improvements Section below for more details.

Bicycle Boulevards

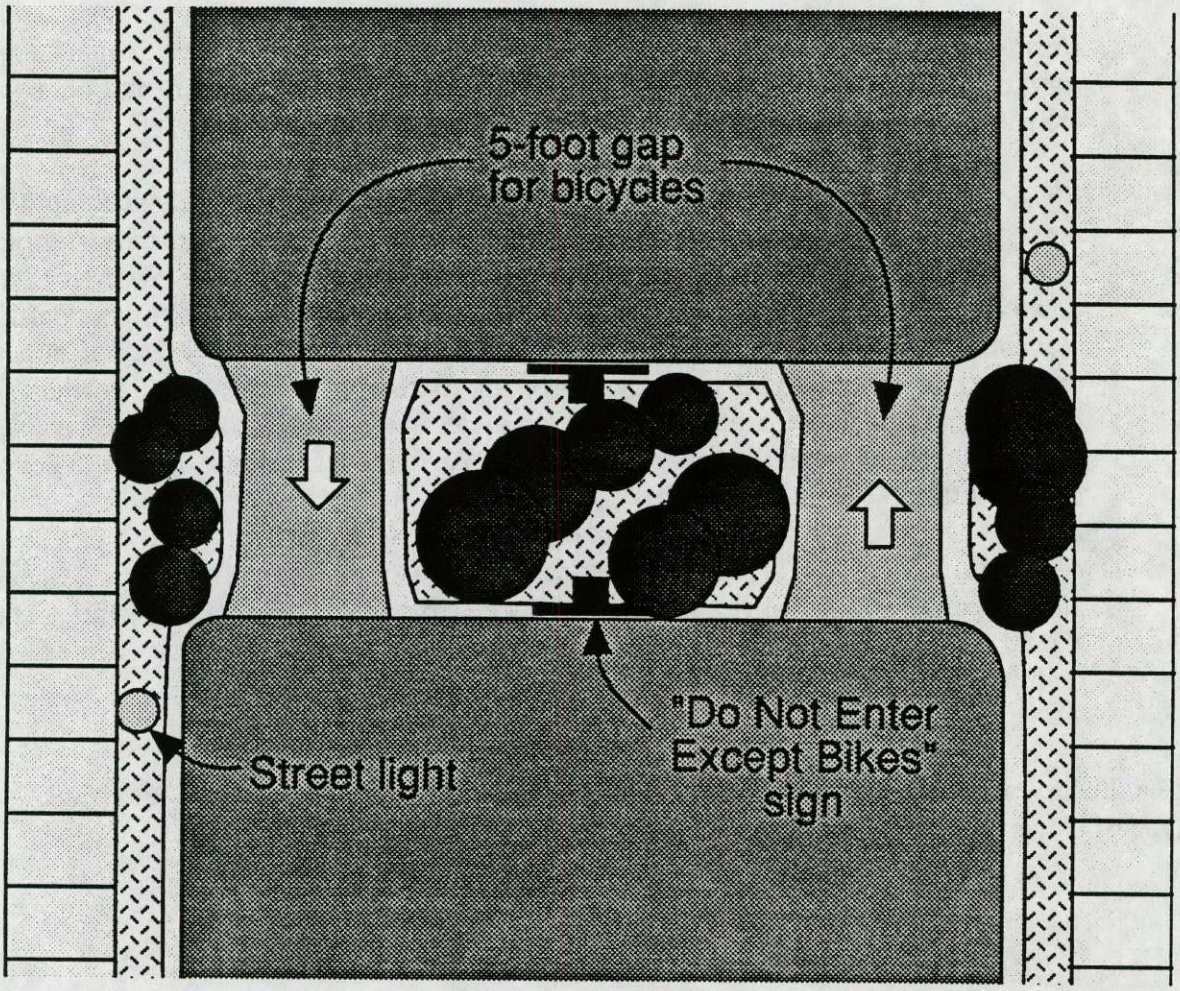
At present, there are no nationally recognized standards for bicycle boulevards. Clearly, they must be safe for all users and must accomplish their primary aim: to provide through bicycle access while restricting non-local automobile traffic.

1 *Designation*: Designation of bicycle boulevards should conform to the normal standards for bicycle route designation (see section 14 under "General Improvements" below and the MUTCD Part IX).

2 *Physical barriers*: Restricting through motor vehicle traffic is generally accomplished through some sort of physical barrier. The design approach chosen depends to some extent on the specific circumstances. In general, devices that merely slow motorists down (e.g., residential street traffic circles, chicanes, speed tables, etc.) do not define a bicycle boulevard, because they do not restrict motor vehicle traffic. Barriers, either at mid-block or at intersections, are the typical approach used. However, all barriers should be clearly visible and unambiguous for all travelers. Further, motorists must be able to access all residences on the bicycle boulevard. Also, bicyclists must be able to get past the barriers without difficulty.

3 *Frequency of barriers*: There is no standard for how often barriers are needed to make a bicycle boulevard. However, a balance must be struck between cost and utility. They should be close enough together to discourage through traffic, but not so often as to be prohibitively expensive.

The illustration on the facing page shows a mid-block traffic barrier with gaps for bicycles. This type of barrier is often used to create bicycle boulevards.



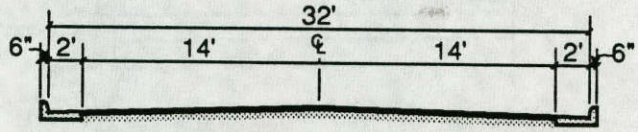
Mid-block traffic barrier with gaps for bicycles; used to create a bicycle boulevard.

General Improvements

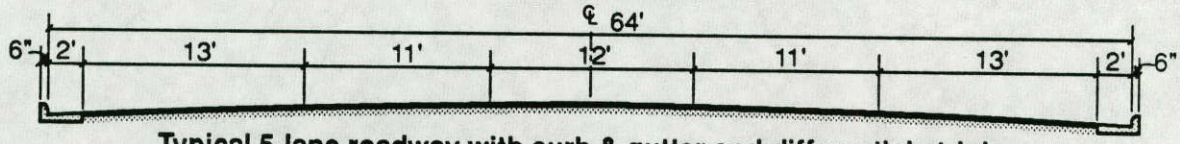
While special bicycle improvements like bicycle lanes can help serve particular needs, the vast majority of bicycle travel is likely to take place on undesignated streets. For this reason, it is important to make basic improvements to all streets on an on-going routine basis. Such improvements are even more important for special bicycle facilities, because their designation serves as an invitation to bicycle users. Some of the most important hazards to eliminate are:

1. *Narrow curb lanes*: Busy streets with narrow curb lanes force bicyclists and motorists to share an inadequate amount of space. This tends to lead to conflicts as motorists have difficulty passing bicyclists and bicyclists often are passed too closely by motorists. One solution is to widen the curb lane. A wide curb lane provided for bicyclists, while not technically a special bicycle facility, should conform to certain requirements nonetheless. A wide curb lane should be at least 14 to 15 feet in width, from the lane stripe to the joint with the gutter (if any). Extra width may be welcome by bicyclists but may encourage motorists to share the lane with one other side-by-side.

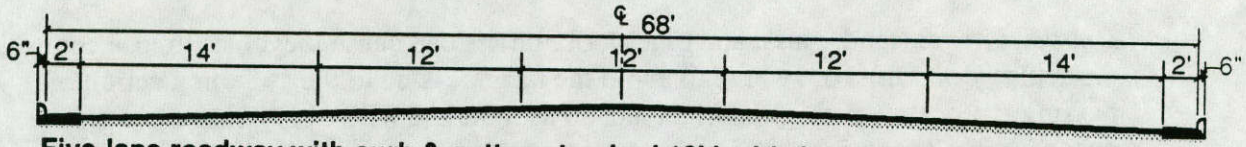
   At intersections with right turn lanes, the extra width should be added to the rightmost through lane. Under most conditions, right turning motor vehicle and bicycle traffic can coexist in a right turn lane. At demand-actuated signals, special accommodations may be needed in the right side of the rightmost through lane in order to assure bicycle detection. See *Unresponsive Traffic Signals* below for more details.



Two-lane roadway with wide lanes



Typical 5-lane roadway with curb & gutter and differential striping



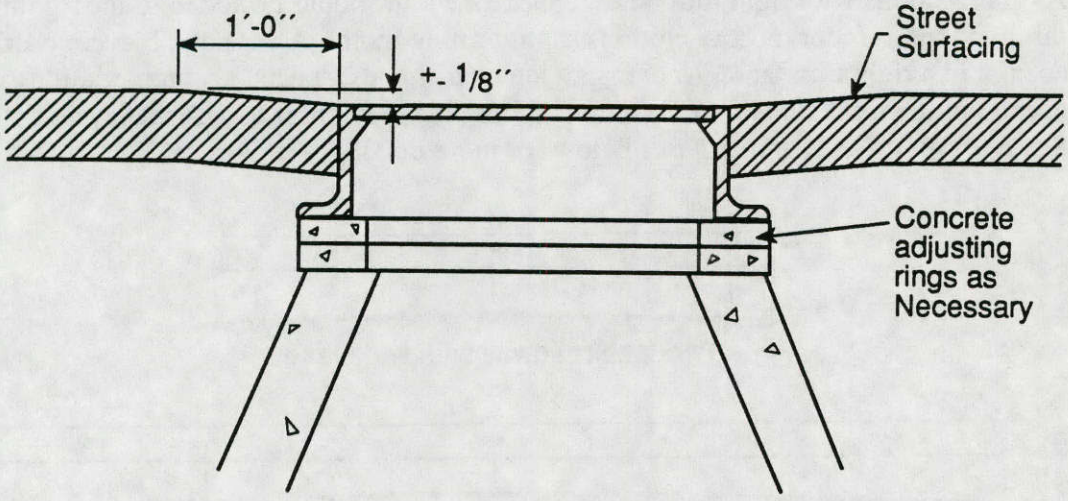
Five-lane roadway with curb & gutter, standard 12' inside lanes, and widened curb lanes

Three possible roadway situations with wide curb lanes.

2 *Parallel bar drainage grates*: Parallel bar grates can catch a bicyclist's front wheel, causing the bicyclist to catapult over the handlebars and land face first on the roadway. However, numerous designs have been developed over the years that eliminate the dangers of the parallel bar grate, while at the same time maintaining hydraulic efficiency. Three of the most popular include:

- Vane grate (e.g., Neenah Foundry Type L)
- Honeycomb grate (e.g., the CalTrans Standard Grate)
- Curb face inlets

3 *Uneven grates or utility covers*: Occasionally, a grate or utility cover is not brought up to grade when a new overlay of asphalt is added to the roadway. The result, for a bicyclist, is much like a pothole and can cause anything from wheel damage to a serious crash. One solution to this problem is to adopt a standard for manhole and utility cover adjustment, similar to that shown below. In addition, where possible, new utilities should be installed away from the expected line of travel for bicyclists.



Levelling a manhole cover.

4 *Debris*: Gravel, sand, glass, and other loose debris can cause bicyclists to lose control, particularly on turns, or swerve to avoid the hazard. Due to the sweeping action of passing motor traffic, this material tends to accumulate where bicyclists often ride (e.g. near the right edge of the roadway or at intersections).

Eliminating excessive debris that may cause bicyclists trouble may require modifying standard maintenance practices. Sweeper crews should routinely clean as close as practical to the right edge of the road. In addition, the use of chip seal materials should be closely monitored for its effects on bicyclists. Because this material tends to quickly accumulate to depths of three or four inches along the side of the travel lane, it can be particularly hazardous for bicyclists.

5 *Rumble strips*: Rumble strips are devices laid down on highway shoulders perpendicular to the direction of travel. Their purpose is to cause either an auditory or a physical disturbance to a driver who is drifting off the roadway, perhaps due to sleep deprivation, boredom, or alcohol consumption. Where bicycle travel is expected, there are three primary approaches to using rumble strips:

a) policies that restrict the use of such devices on roads where bicyclists are allowed;
b) policies that restrict the use of rumble strips to roads with eight to ten foot wide shoulders; or
c) the use of abbreviated rumble strips that cover only part of the shoulder.

6 *Rough pavement*: Rough pavement can be a serious impediment to safe bicycling. Rough pavement includes roads with potholes, raveled edges, and cracks (especially those going the direction of travel). A routine patching policy that requires each patch to 1) match the level and quality of surrounding pavement, and 2) last a sufficiently long period of time can help with this problem.

7 *Narrow outside lanes*: Narrow lanes cause significant conflicts between bicyclists and motorists. Types B and C bicyclists are best served at least by wide curb lanes, particularly where there are significant amounts of motor vehicle traffic. As a general policy, outside travel lanes should be wide enough for comfortable sharing by bicyclists and motorists. On low volume residential streets, traffic calming approaches may provide useful options.

8 *Bridge expansion joints*: Some bridge expansion joints are uneven and can cause wheel damage when bicyclists pass over them. One solution is to use a rubber-filled joint system. Another is to cover the joint with a beveled and textured steel plate, and weld it to one side of the joint (to allow for bridge expansion and contraction).

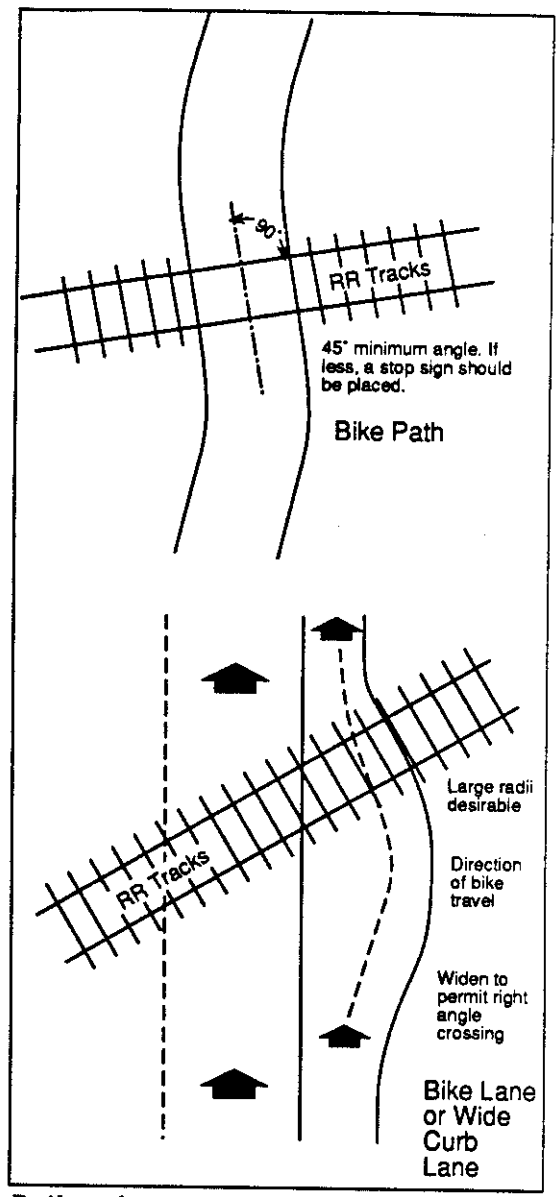
9 *Metal grate bridge decks*: Some bridge deck designs can cause bicyclists difficulty in controlling their bicycles, due to the unevenness of their surfaces. One of the more problematic types of bridge decks is constructed of a steel honeycomb material. Using a more suitable deck material (e.g., concrete) is the preferable solution to this problem. If such an approach is not feasible, it may be possible to fill the voids with concrete, particularly near the right edge of the roadway.

10 *Diagonal railroad crossings*: On diagonal railroad crossings, the gap next to and on the inside of the rail (called the "flangeway") can trap a bike's front wheel causing it to divert. The end result is a quick fall for the bicyclist. This problem is most serious when the track crosses at an angle less than 45 degrees to the direction of travel.

There are two primary solutions to this problem:

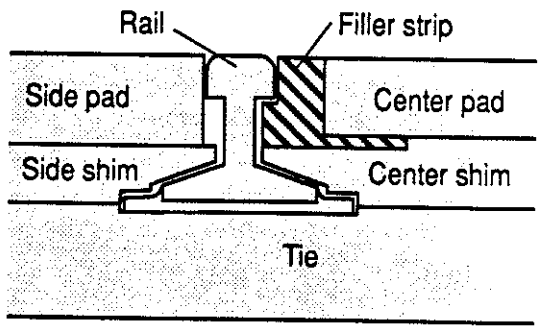
1) provide a way for bicyclists to approach the track at an angle close to 90 degrees; and
2) fill the flangeway with a rubberized material.

The first approach can best be accomplished by flaring out the roadway as shown in the diagram at right. In this way, the bicyclist can cross at a right angle without swerving into the path of passing motor traffic.



Railroad crossing improvements for bicyclists.

The second approach, installing a flangeway fill, works only on very low speed rail lines (e.g., in an industrial yard). Since a passing train's wheels must compress the dense fill material, the train must be moving slowly. The wheels of a fast-moving train will not compress the fill and will, as a result, derail. However, in the proper setting, flangeway fill provides a good solution to a serious bicycle safety problem.



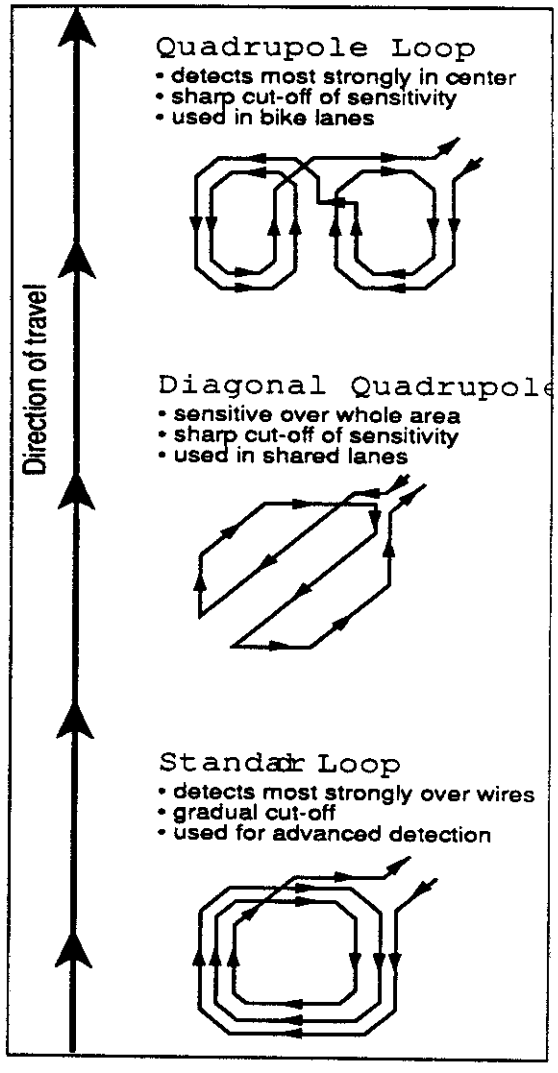
Flangeway fill eliminates gap between rail and center pad.

11 *Rough railroad crossings*: Railroad crossings take a continual and significant beating from both motor vehicle and train traffic. If not properly maintained, they can cause bicyclists either wheel damage or falls, or both. Frequent maintenance, therefore, can be one solution to the problem, particularly when a popular bicycling route is involved. However, the best solution is to replace a defective crossing with a rubberized installations. While these may cost significantly more to install than the less expensive timber or asphalt crossings, they generally save money in long term maintenance.

12 *Unresponsive traffic signals*: Many demand-actuated signal systems were designed and installed without attention to their effects on bicyclists. As a result, bicyclists may find it impossible to get a green light.

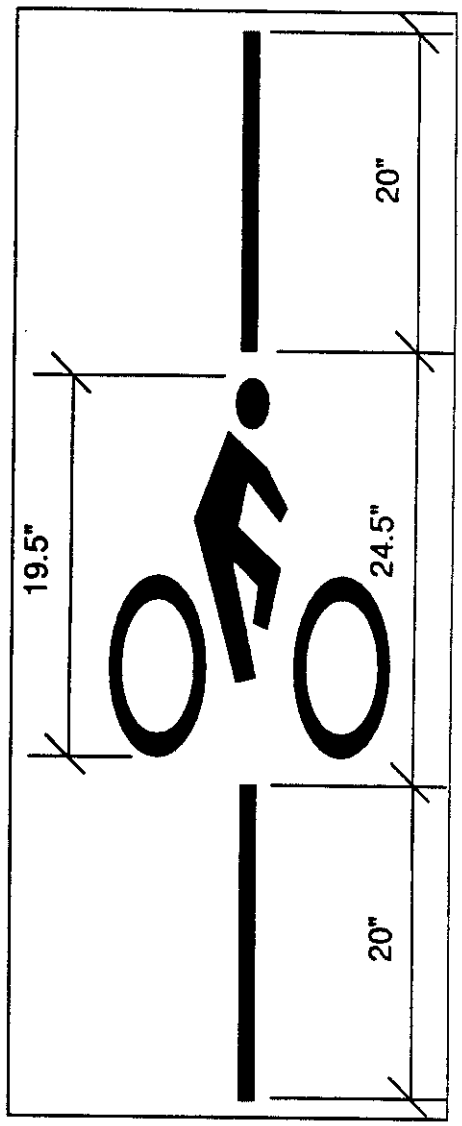
Solutions to this problem depend upon the particular characteristics of the intersection, the type of bicycle facility chosen, and the hardware in place. For example, at an intersection with bicycle lanes, the standard Quadrupole loop can provide reliable detection

In a shared lane situation (e.g., in a wide curb lane), the modified Quadrupole (or "Type D "loop) can detect bicyclists over the full width of the loop.



Three loop detector options for different situations.

Existing unresponsive detector loops may work if the bicyclist can stop right above the wire. A simple pavement marking can serve this function, as shown to the right..



Marking to show bicyclists the optimal location for detection; typically placed along the right edge of the detector loop.

13 *Sight obstructions*: Sight restrictions, like shrubs, fences, or parked cars near intersections, are significant factors in many car/bike crashes. Standard solutions to such problems are already in place in many communities. These consist of sight triangle ordinances and adequate enforcement to monitor encroachment.

14 *Destination signage*: As a community implements a network of bicycle facilities, the issue of signage arises. People need to know how to get to the facilities, where they go, and how far typical destinations may be. Bicycle route signage is the normal approach to filling such a need.

A bicycle route is typically not considered a type of bicycle facility; rather, it is a directional aid that can help bicyclists find their way to a particular destination. A bicycle route consists of a series of signs mounted at key points along the route. Bicycle route signing may be used in conjunction with bicycle lane designation, wide curb lane provision, or even on roads with no special accommodations. In such cases, the route could be used to show bicyclists a low-volume back way to an important destination.

D11-1
24" x 18"

D1-1b(L)
24" x 6"

Bicycle Route sign.

Bicycle routes are generally signed with the D11-1 "Bike Route" plate (see diagram above), combined with destination subplates. At turning points, a separate arrow subplate may be added or an arrow may be added to the destination subplate. Another common method is the use of a numbered bike route sign. These can be particularly useful when combined with a map that describes the different bike routes. Bicycle route designation is not intended to serve as a warning to motorists. Such a purpose is best served by yellow warning signs that serve a particular need.

Route choice is important, particularly if there are no special bicycle accommodations (e.g., bicycle lanes). Low volume roads that serve as bypasses to high volume arterials can make excellent bicycle routes.

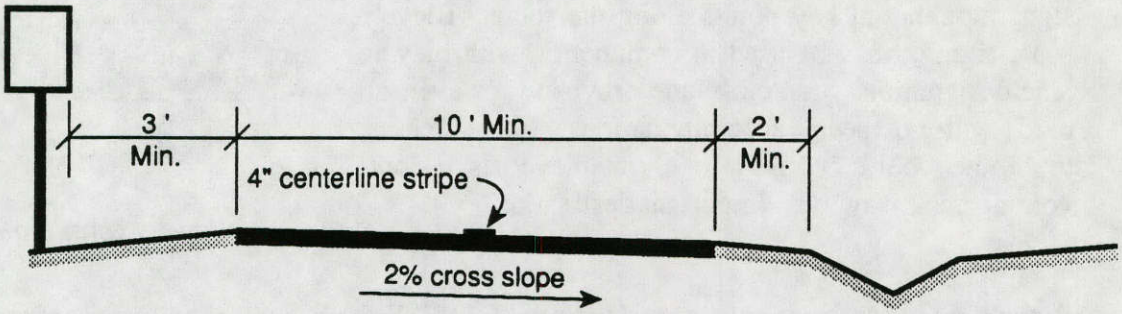
Independent Facilities

An independent bicycle facility can provide bicycling access to a currently inaccessible location, provide a short cut to a location otherwise reachable through a circuitous route, or provide a relatively stress-free riding experience for bicyclists. Many riders prefer such off-street riding environments. Surveys conducted for the 1990 Texas Outdoor Recreation Plan show consistently high levels of interest in bicycling, particularly on trails.

Trails should be designed with a clear understanding of the 1991 AASHTO *Guide to the Development of Bicycle Facilities*. Some of the key characteristics of independent bicycle trails are as follows:

1 *Extension of road system*: AASHTO suggests viewing trails as non-motorized extensions of the road system. Design and planning functions for bicycle trails should be taken as seriously as those for motorized facilities.

2 *Adequate width*: At a minimum, bicycle trails should be 10 feet in width and should have shoulders at least 2 feet wide on either side. Clearances to static obstructions (e.g., light poles) should be a minimum of 3 feet, as shown below.



Typical width and characteristics for an independent bicycle trail.

3 *Adequate design speed, sight distances, and curve radii*: The AASHTO *Guide to the Development of Bicycle Facilities* suggests a minimum design speed of 20 mph on independent trails. This design speed gives minimum sight distances and curve radii that should be closely followed.

4 *Mixed use*: In general, mixing bicyclists and pedestrians is undesirable, particularly in locations where high volumes of each can be expected. Extra width, proper signing, and regulation can sometimes mitigate problems. Some jurisdictions, however, have found that providing separate paths for bicyclists and pedestrians serves both better than a mixed use environment.

5 *Separation from roadways*: Ideally, bicycle trails should be completely separate from roadways, occupying their own rights-of-way. If other major factors dictate providing a trail adjacent to a roadway, however, there are ways to mitigate the conflicts. First, it is best to provide a wide separation between the trail and the roadway. If adequate separation distance cannot be maintained, a physical barrier between the path and the road should be provided. In addition, all intersections must be carefully handled to avoid safety problems.

6 *Adequate maintenance*: Keeping independent bicycle trails clean is an important task. Maintenance responsibilities are well described in the AASHTO *Maintenance Manual* (1988) and consist, among other things, of sweeping, trimming vegetation, sign replacement, pavement marking, and replacing damaged pavement.

Route Selection Criteria

Primary Factors

Choosing a route for bicycle-related improvements involves evaluating candidates based on their potential usefulness for bicyclists first. The following chart shows the primary and secondary factors to consider. They are described in more detail below.

Route Selection Criteria Checklist

Primary Factors	Secondary Factors
☐ *Directness*	☐ *Pavement surface quality*
☐ *Access*	☐ *Maintenance*
☐ *Continuity*	☐ *Bus traffic*
☐ *Delays*	☐ *Truck traffic*
☐ *Intersection conditions*	☐ *On-street parking*
☐ *Bridges*	☐ *Commercial driveways*
☐ *Traffic volumes*	☐ *Route attractiveness*
☐ *Traffic speeds*	☐ *Security*
	☐ *Topography*
	☐ *Ease of implementation*

1 *Directness*: A potential route's directness can best be measured in conjunction with important destinations within the logical capture area. Bicyclists, in general, will not take circuitous routes to get to where they are going. Their willingness to divert from a straight course depends on the perceived benefits of the chosen route vs. the extra time it will take.

Routes that give a similar level of directness to major arterial and collector routes will be preferred over routes that take bicyclists well out of their way. Even better are routes that break major barriers and provide significant time savings over the available alternatives.

2 *Access*: A candidate route's potential for access must be considered from two primary points of view. First, is the potential route itself accessible to bicyclists? For example, can they enter the route from a variety of nearby neighborhoods or must they go out of their way to get to the bicycle facility? Second, does the potential route give bicyclists access to major destinations or across major barriers? Can they use the route to get somewhere they presently cannot reach without either great risk or a very stressful trip? Or can bicyclists get into a shopping center that a particular route passes by? In some cases a potential route may come very near a major destination but be separated by intervening land uses (e.g., railroad yards) or by barriers and walls.

3 *Continuity*: Since the average bicycle trip is approximately 2 miles in length, a desirable route will be one that has the fewest gaps in service. For example, a route comprised mainly of low volume streets, but which has several important gaps served only by high volume arterial streets, would be relatively unattractive to bicyclists. In such cases, the value of the route must be measured against the likelihood and potential expense of mitigating measures for closing those gaps. Also, a potential route with numerous right and left turns—all in the course of a trip of only a mile or two —would be frustrating for most riders.

4 *Delays*: Bicyclists are no more interested in being delayed than are motorists. To this end, factors that would cause such delays should be carefully considered. For example, a route along a residential street that meets numerous busy arterial streets at stop signs would cause significantly more delay for bicyclists than one along a collector that crosses those arterials at signalized intersections. On the other hand, a route along a heavily congested arterial filled with stop-and-go traffic may give little advantage to a bicyclist and would prove unpleasant as well. Choosing roads with lower traffic volumes but, at the same time, advantageous crossings is an important key to successful route selection.

5 *Intersection conditions*: In evaluating any potential bicycle route, a balance must be struck between the need for continuity and the need for access. Clearly, there must be a sufficient number of intersections to allow bicyclists access to and from the route. At the same time, those intersections should be evaluated for their desirability for bicyclists. The principal factor is complexity. A route with simple 3- or 4- legged intersections would be well within the capabilities of most Type B and C bicyclists.

One factor that can affect a route's desirability is whether intersections with major arterial streets are offset and in which direction. The preferred alternative is one in which the route does not offset either right or left, with respect to the arterial street. In such a case, bicyclists must simply choose a gap to cross. Design features, like medial refuges, can also help bicyclists cross arterials in two steps. If the route does offset, the preferred alternative is for it to do so to the left. An offset to the left, with respect to the arterial street, requires bicyclists to make right turns from the arterial street. On the other hand, if the route is offset to the right, bicyclists will make left turns from the arterial street. The former case is significantly less stressful than the latter and should be preferred.

If the potential route includes basic low-volume right turn lanes, these should be taken into account in the design phase but should only marginally reduce the desirability of the potential route. Conversely, a route with very complex intersections (e.g., freeway interchanges with on- and off-ramps, or major intersections with multiple right turn lanes) will be relatively unattractive to most bicyclists. The decision to choose such a route, despite its undesirable characteristics, should be based on whether alternative routes are available, whether the particular route is critical to serve important destinations, or whether mitigating measures can be applied to simplify existing conditions.

6 *Bridges*: Because bridges generally cross major barriers and tend to funnel traffic, they must be closely considered when evaluating a potential bicycling route. As major investments, bridges tend to stay around for generations and deficiencies may take years to correct. In general, bridge deck width should be evaluated in terms of the possibility of adding bicycle lanes or wide outside lanes. In addition, bridge end conditions (e.g., presence of high speed ramps) should be carefully studied for potential safety problems. Finally, possible options (e.g., sidewalk use) should be considered, particularly as solutions to worst-case scenarios. In general, however, sidewalks on bridges are not considered to be desirable.

7 *Traffic volumes*: For a potential route on an existing roadway, the volume of motor vehicle traffic is an important determinant of its desirability for bicyclists. In general, bicyclists prefer to avoid high volumes of traffic. If given a choice between two otherwise equal routes between points A and B, bicyclists will almost without exception choose the quieter route.

However, bicyclists will endure higher volumes of traffic if a route has other critically important characteristics. For example, if the route is the only way to cross a major barrier, all alternatives are particularly indirect by comparison, or alternatives have high numbers of stop signs, then many bicyclists are likely to choose the high volume route. Many others, however, will choose to forego the bicycle trip altogether.

Preliminary research from the Traffic Institute suggests that provision of bicycle facilities (e.g., bicycle lanes) can make a busy street significantly more attractive, particularly for Types B & C bicyclists. In this way, bicycle lanes can help mitigate the negative effects of high volumes of traffic.

8 *Traffic speeds*: For most bicyclists, comfort level is related to the relative speed of passing motor vehicle traffic. If the difference in speed is high, they tend to feel less comfortable than if the difference in speed is marginal. Thus, if there is a choice between a low speed route (e.g., 35 mph or lower) and a high speed route (e.g., 55 mph), bicyclists will tend to choose the former and avoid the latter. In addition, crash studies suggest that high traffic speeds tend to be associated with elevated levels of bicyclist deaths. While there may be relatively few car-bike crashes in such settings, those that do happen are more likely to be fatal.

Provision of striped, smoothly-paved shoulders can help reduce the potential conflict between higher speed motor traffic and bicycle traffic. Such measures can result in a very usable route, particularly for adult riders.

Secondary Factors

Secondary factors, while not quite as critical to the value of a particular route, are important considerations nonetheless. They should be used in a "second pass" analysis of potential routes that have passed the test in terms of primary factors. Many can be dealt with through design; however, choosing the most desirable route option can save money and effort. The following are worthy of attention:

1 *Pavement surface quality*: Particular potholes and piles of roadside debris are transitory phenomenon and should not affect the decision on whether to choose an otherwise suitable route. However, the overall quality of a route's pavement and its long-term health is a vital consideration. For instance, if a section of road consists of an asphalt overlay on top of an aging and cracked concrete roadbed, it is likely to be a source of on-going pothole and cracking problems. As a result, it would likely be a less desirable bicycling route unless major reconstruction was being considered. On the other hand, a generally sound roadway with occasional problems should be considered a viable candidate for bicycle traffic. Specific major hazards like diagonal railroad crossings that may not be easily improved should be noted in any evaluation.

2 *Maintenance*: The general level of--and need for-- maintenance of a possible bicycling route should be a factor to consider. If, for example, debris routinely gathers on the right edge of the roadway (due perhaps to high volumes of gravel truck traffic) and is seldom removed, such a route would be less desirable than one without such a chronic maintenance problem. In addition, when a route is chosen for improvement, there should be a clear understanding of who has maintenance responsibilities and an acceptance of that role by all parties involved.

3 *Bus traffic*: Major bus routes offer a particular challenge to bicyclists. Thus, the schedule of bus traffic on a candidate route should be considered, in terms of the number of bus routes that use the particular road section, as well as the number of individual buses per hour during peak bicycling time. The primary problem for bicyclists involves buses pulling to the curb to load or unload passengers. Bicyclists may then pass the bus on the left only to be passed once again as the bus leaves the curb and picks up speed. This type of leap-frog action is aggravating for both bicyclist and bus driver and has led to numerous confrontations, as well as some crashes, in communities around the country.

If a route is otherwise suitable, solutions can be found to bus/bicycle conflicts. One option is to stripe bicycle lanes to the left of a bus/right turn lane. On one-way streets, the possibility of providing a facility on the left side of the road is also an option that should be carefully considered.

4 *Truck traffic*: The occasional truck usually presents no significant problem for bicyclists. However, high volumes of truck traffic (e.g., on a truck route near a major trucking hub) can. On low-speed routes, the primary consideration is one of space. Trucks can occupy almost the entire width of a travel lane, leaving little or nothing for bicyclists. Providing bicycle lanes or wide outside lanes can solve the problem. On high-speed routes, an additional factor involves wind blast from passing trucks. The force of such winds can literally push a bicyclist off the road or pull him or her into the middle of a travel lane. In such a case, adequately wide paved shoulders can mitigate the effects of wind blast from trucks.

5 *On-street motor vehicle parking*: On-street parking can affect the attractiveness of a particular route in several ways. First, it consumes precious road space. In some cases, the elimination of one or both parking lanes can help create space for bicyclists, in the form of bicycle lanes or wide outside lanes. Second, high parking turnover rates can cause conflicts with bicyclists, who must interact with motorists entering and leaving parking spaces. Diagonal parking, often used in small town commercial areas, can cause even more conflicts with bicyclists. Often, motorists must back well out of their parking space before they can see approaching traffic.

6 *Commercial driveways*: Whether a street has numerous commercial driveways (e.g., in a strip commercial area) is a factor to consider when evaluating a potential route. If the route has many such driveways per mile, conflicts between turning motorists and bicyclists going straight may be very common. Such a route's potential attractiveness (in terms of access to local bicycling destinations) must be evaluated in terms of its potential for causing conflicts (especially with bicyclists using it as a through route).

7 *Route attractiveness*: While a potential route's attractiveness is most often associated with recreational use, it has relevance for utilitarian bicycling as well. Since bicyclists often move more slowly than motorists and are unprotected from the environment, they are likely to be more affected by a degraded physical environment. A route that goes through a bleak, smoke-filled industrial landscape, for instance, may not be a good candidate for improvement. In addition, bicycling is inherently an enjoyable activity and it deserves a positive environment.

8 *Security*: Personal security is an issue for many bicyclists, particularly since they are among the most vulnerable travelers. They have no metal shield and few can speed away from danger. In many communities, bicyclists are assaulted for their bikes. In this light, preference should be given to routes that have the least potential for personal threat. Routes that go through highly visible, well-populated, and well-lit areas will be more desirable than routes that go through areas hidden from view and generally unpopulated. To some extent, increased enforcement (e.g., regular police patrols using mountain bikes) can help mitigate the potential for security problems. An otherwise attractive route may warrant the investment.

9 *Topography*: Other factors being equal, most bicyclists will choose the flattest route between two points. There are two primary reasons for this. First, many bicyclists either lack adequate gearing for steep hills or lack the ability to effectively use the gears they do have. Second, climbing hills takes energy and, with the exception of fitness-oriented riders, few bicyclists wish to expend extra energy if there is an option. Evaluation of potential routes should consider both length and steepness of grades. Those routes with the least climbing (and the least stressful climbing) are preferred.

10 *Ease of implementation*: Whether a route is desirable, in terms of directness, access, and continuity, is one thing. Whether it can be built is often another. Insofar as transportation plans must be "fiscally constrained" it is important to consider the likely costs involved in improving a particular route for bicycling. If, for example, it would mean building a major new structure (e.g., an underpass beneath an interstate highway), the potential utility of the route must be weighed against the probable costs. An important factor in such a decision would be an analysis of alternatives. If bicyclists literally "can't get there from here," then the importance of the route would be greater than if it was merely somewhat more convenient than a nearby alternative. Fortunately, many bicycle-related improvements can be accomplished at relatively low cost, particularly if they can be included as "incidental" components of other transportation projects.

Types of Improvements

Criteria for Choosing a Facility Type

Once a candidate route has been chosen, the next step is to determine what type of improvement is called for. Clearly, if the route is away from all roadways, the decision is simple: a bicycle trail is the only logical option. Similarly, if the route involves spanning a major barrier (e.g., a river or interstate highway), the possible alternatives are few: either going over with a bridge or under with an underpass or tunnel. But if the candidate route is along an existing (or planned) roadway the choice between possible improvement options must be based on considerations like traffic volume and speed, as well as available width and other geometric factors. These can be accomplished in a two step process.

Initial Analysis

The initial decision can be arrived at through analysis of the following factors: primary design bicyclist, traffic volume, and traffic speed. These factors can be considered using the tables on the following pages, extracted from the FHWA report, *The Effects of Bicycle Accommodations on Bicycle/Motor Vehicle Safety and Traffic Operations* (1992).

Table 1. Group A bicyclists, urban section, no parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	sl 12	sl 12	wc 14	wc 14	sl 12	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14
30-40 mi/h	wc 14	wc 14	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15	wc 14	WC 15	wc 15	wc 15
41-50 mi/h	wc 15	wc 15	wc 15	wc 15	wc 15	wc 15	SH 6	SH 6	WC 15	WC 15	SH 6	SH 6
over 50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6

1 mi/h = 1.61 km/h

Key:* **wc** = wide curb lane** **sh** = shoulder **sl** = shared lane** **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

** WC and SL numbers represent "usable.widths" of outer lanes, measured from lane stripe to the edge of gutter pan, rather than to the face of the curb. If no gutter pan is provided, add 1 ft (0.3 m) mininum for shy distance from the face of the curb.

Table 2. Group A bicyclists, urban section, with parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 15	wc 15	wc 14
30-40 mi/h	wc 14	wc 14	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15
41-50 mi/h	wc 15	wc 15	wc 15	wc 15	wc 15	wc 16	wc 16	wc 16	wc 15	wc 15	wc 16	wc 16
over 50 mi/h	na	na	na	na	na	na	na	na	na	na	na	na

1 mi/h = 1.61 km/h

Key:* **wc** = wide curb lane** **sh** = shoulder **sl** = shared lane **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

** WC numbers represent "usable widths" of outer travel lanes, measured from the left edge of the parking space (8 to 10 ft [2.4 to 3.0 m] minimum from the curb face) to the left stripe of the travel lane.

Table 3. Group A bicyclists, rural section.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	sl 12	sl 12	wc 14	wc 14	sl 12	wc 14	wc 14	wc 14	wc 14	wc 14	sh 4	sh 4
30-40 mi/h	wc 14	wc 14	sh 4	sh 4	wc 14	wc 15	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4
41-50 mi/h	sh 4	sh 4	sh 4	sh 4	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6
over 50 mi/h	sh 4	sh 6	sh 6	sh 4	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6

1 mi/h = 1.61 km/h

Key:* **wc** = wide curb lane** **sh** = shoulder **sl** = shared lane** **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

** **WC** and **SL** numbers represent "usable widths" of outer lanes, measured from the lane stripe to the edge of the pavement if a smooth, firm, level shoulder is adjacent. If rough or dropped pavement edges or a soft shoulder exists, add 1 ft (0.3 m) minimum for shy distance from the edge of the pavement.

Table 4. Group B/C bicyclists, urban section, no parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	bl 5	bl 5	bl 5	bl 5
30-40 mi/h	bl 5	bl 5	bl 5	bl 5	bl 5	bl 6	bl 6	bl 5	bl 5	bl 6	bl 6	bl 5
41-50 mi/h	bl 5	bl 5	bl 5	bl 5	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6
over 50 mi/h	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6

1 mi/h = 1.61 km/h

Key:* **wc** = wide curb lane** **sh** = shoulder **sl** = shared lane **bl** = bike lane** **na** = not applicable

* See page 11 for definitions.

** **WC** numbers represent "usable widths" of outer lanes, measured from lane stripe to edge of gutter pan, rather than to face of curb. If no gutter pan is provided, add 1 ft (0.3 m) mininum for shy distance from face of curb. **BL** numbers indicate minimum width from the curb face. The bike lane stripe should lie at least 4 ft (1.2 m) from the edge of the gutter pan, unless the gutter pan is built with adequate width to serve as a bike lane by itself.

Table 5. Group B/C bicyclists, urban section, with parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	bl 5	bl 5	bl 5	bl 5
30-40 mi/h	bl 5	bl 5	bl 5	bl 5	bl 5	bl 6	bl 6	bl 5	bl 6	bl 6	bl 6	bl 6
41-50 mi/h	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6	bl 6
over 50 mi/h	na	na	na	na	na	na	na	na	na	na	na	na

1 mi/h = 1.61 km/h

Key:* **wc** = wide curb lane** **sh** = shoulder **sl** = shared lane **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

** WC numbers represent "usable widths" of outer lanes, measured from left edge of the parking space (8 to 10 ft [2.4 to 3.0 m] minimum from the curb face) to the left stripe of the travel lane.

Table 6. Group B/C bicyclists, rural section.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
		truck, bus, rv				truck, bus, rv				truck, bus, rv		
less than 30 mi/h	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4
30-40 mi/h	sh 4	sh 4	sh 4	sh 4	sh 4	sh 6	sh 6	sh 4	sh 6	sh 6	sh 6	sh 6
41-50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6
over 50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 8	sh 8	sh 8	sh 8	sh 8	sh 8	sh 8	sh 8

1 mi/h = 1.61 km/h

Key:* **wc** = wide curb lane **sh** = shoulder **sl** = shared lane **bl** = bike lane **na** = not applicable

* See page 11 for definitions.

Secondary Analysis

After the initial choice has been made, a second level of analysis is useful in further refining the route choice. Some secondary factors might, for example, suggest a change in the selected option or, perhaps, a suitable design approach. Factors to consider are given below:

Wide Curb Lanes

Acceptance: Bicycle programs in numerous communities have found that Type B and C bicyclists seldom see a difference when wide curb lanes are provided. Therefore, if the desired outcome is greater numbers of bicyclists or a visible "Pro Bicycle" statement, this option will not satisfy the need.

Traffic speeds: Some knowledgeable bicycle facility planners argue that wide curb travel lanes tend to increase motorist speeds. Whether a possible marginal increase in speeds is important in a particular situation should be the subject for analysis.

Available space: Clearly, there must be sufficient space on the roadway to accommodate widened curb lanes. Restriping may be necessary to give an outside lane of 14 or 15 feet (not counting the gutter pan). If the space is not available, this type of facility may not be possible without a major road widening project and another potential route may be preferred.

Bicycle Lanes

Minimum traffic volumes: Providing bicycle lanes on very quiet residential streets may accomplish little. To most Type B and C bicyclists, the primary benefit of bicycle lanes is to give them space where they feel a lower level of threat from passing motor vehicle traffic. If there is little such traffic, the facility may not be seen as serving a purpose.

Complexity: Intersection complexity is an important consideration in designating bicycle lanes. A route with simple 3- or 4 legged intersections can be striped with little difficulty. On the other hand, a route with very complex intersections (e.g., freeway interchanges with on- and off-ramps, or major intersections with multiple right turn lanes) will be difficult to stripe and should be reconsidered.

Available space: The spatial needs for installing bicycle lanes are greater than those for wide outside travel lanes. If such space does not currently exist, installation may require removing parking lanes, elimination of a travel lane, or road widening. If these options are not possible, another route choice may be preferable.

Bicycle Boulevards

Utility: By definition, a bicycle boulevard must provide a viable alternative to a major thoroughfare. Therefore, it should provide access to major destinations served by the major route. Also, it should continue for a sufficient distance to attract bicyclists. If, however, the bicycle boulevard only provides an alternative for four or five blocks, then it is unlikely to serve bicycle travel needs.

Traffic volume: While a specific volume threshold has not been established for when it is appropriate to install a bicycle boulevard, it should primarily carry local access traffic. And, while volumes may be higher initially, the physical characteristics of a bicycle boulevard will likely reduce volumes of through traffic.

Street conditions: The street chosen should be in relatively good condition with a smooth surface and few hazards. Also, it should contain no underlying structural problems that could lead to chronic maintenance problems. For example, a concrete roadbed with an overlay of asphalt will likely result in on-going maintenance problems. Such a street would probably not make a good bicycle boulevard candidate.

Intersections: Intersections with major roads should be relatively simple and should be modifiable, so that bicycle crossings can be created. For instance, a traffic signal might prove necessary at a major arterial, if the boulevard is to prove useful. In some cases, the intersection between a popular bicycling route and a major multi-lane arterial road has been modified to include stop signs on the bicycle route with a ramped median refuge in the center of the arterial. Such a refuge allows bicyclists to cross half of the street at a time.

Shoulders

Rumble strips: If a potential route has paved shoulders, but they include rumble strips, the desirability of such a road will be substantially reduced. Rumble strips provide an unridable surface for bicyclists and are considered hazards by most riders. In such cases, either replacing the shoulders or choosing an alternate route would be preferred solutions.

Unpaved parking lots and access roads: Motorists entering a paved roadway from an unpaved road or parking lot tend to bring gravel onto the pavement. In such a situation, the shoulder may be unridable. One solution is to pave a sufficient distance into the driveways and access roads to reduce the encroachment of debris onto the shoulder. Alternatively, a road that has few such problems might make a better candidate route.

San Antonio -- Bexar County
Bicycle Mobility Plan - Long Range Plan

Appendix C
Bicycle Mobility Plan Resources List

Bicycle Mobility Plan Resources List

BICYCLE MOBILITY PLAN OVERSIGHT COMMITTEE (POC)

Abbey, David
Traffic Engineer

City of San Antonio, Public Works Department
PO Box 839966
San Antonio, TX 78283
V: (210) 299-7732
F: (210) 270-4418

Bransford, Dale

City of San Antonio, Parks & Recreation Department
PO Box 839966
San Antonio, TX 78283
V: (210) 299-8480
F: (210) 299-8444

Cantu, Ruben P.E. (former member)
Traffic Engineer

Grana, Ray
Traffic Analyst

Bexar County, Public Works Department
233 North Pecos
Suite 420
San Antonio, TX 78207
V: (210) 270-6700

Conner, Bonnie

Northside Neighborhood Organization Development (NNOD)
3400 River Path
San Antonio, TX 78230
V: (210) 699-8774

Cortinas, Alfred

San Antonio Independent School Districts (SAISD) Transportation Department
1103 Austin Street
San Antonio, TX 78208

Cunningham, Kyle

Helotes Creek Association
PO Box 591
Helotes, TX 78023
V: (210) 695-3159

DeMartino, Larry (former member)

Curtis, Dave

San Antonio Coalition of Neighborhood Associations (SACNA)
115 Armour Place
San Antonio, TX 78212

Erickson, Brian
Community Manager

Great Northwest Community Improvement Association
8809 Timberwilde Drive
San Antonio, TX 78250
V: (210) 681-2983
F: (210) 681-2986

Greenberg, Mark Vice President	**San Antonio Wheelmen (SAW)** 6518 Ridgecreek San Antonio, TX 78233 V: (210) 344-6265
Oldham, Wade Parks Director	**Bexar County Parks Department** 233 North Pecos Suite 320 San Antonio, TX 78207 V: (210) 270-6730 F: (210) 270-6717
Peak, Howard Councilman	**City of San Antonio** PO Box 839966 San Antonio, TX 78283 V: (210) 299-7275 F: (210) 299-7027
Scott, Reginald C. Transportation Coordinator	**Education Service Center, Region 20** 1314 Hines Street San Antonio, TX 78208 V: (210) 299-2405 F: (210) 299-2423
	Council of Mayors c/o Alamo Area Council of Governments 118 Broadway Suite 400 San Antonio, TX 78205 V: (210) 227-5371
Stanush, David P. Attorney-at-Law	**Texas Bicycle Coalition of San Antonio** 26334 Romance Point San Antonio, TX 78258 V: (210) 299-2306 F: (210) 224-7540
Young, Cris Strategic Planner	**VIA Metropolitan Transit** PO Box 12489 San Antonio, TX 78212 V: (210) 227-5371 F: (210) 227-0584
Zigrang, Kenneth W. Transportation Planner	**Texas Department of Transportation, San Antonio District** PO Box 29928 San Antonio, TX 78284 V: (210) 615-5923 F: (210) 615-6295

CONSULTANT'S TEAM

Metro Systems Engineering

PO Box 681116
San Antonio, TX 78268-1116

Prime contractor

Garza, Ismael	Principal	V:	(210) 680-7335	F:	(210) 680-1707
Parkes, Kevin	Transportation Planner	V:	same	F:	same

Bicycle Federation of America

1506 21st Street, NW
Suite 200
Washington, DC 20036

Clarke, Andrew	Project Manager, BFA	V:	(202) 463-6622	F:	(202) 463-6625

Dixie Watkins III & Associates

3330 Oakwell Court
Suite 110
San Antonio, TX 78218

Watkins III, Dixie	Principal	V:	(210) 824-7836	F:	(210 824-0128

GOVERNMENT AGENCIES

Texas Department of Transportation, San Antonio District

4615 NW Loop 410
PO Box 12489
San Antonio, TX 78216

- Existing traffic counts
- Traffic projections
- Facility cross-sections, lanage, ROW
- Committed highway improvements
- Travel demand models (ongoing)

Zigrang, Ken
V: (210) 615-5923
F: (210) 615-6295

Bexar County, Public Works Department

233 North Pecos
Suite 420
San Antonio, TX

- Committed highway improvements
- Past corridor-specific reports

Grana, Ray
V: (210) 270-6700

Traffic Analyst

Bexar County, Parks Department

233 North Pecos
Suite 320
San Antonio, TX

- Existing park facility locations
- Existing, committed, and planned bikeways

Oldham, Wade
V: (210) 270-6730

Parks Director

City of San Antonio, Parks & Recreation Department

115 Plaza des Armas
San Antonio, TX

- Existing park facility locations
- Existing, committed, and planned bikeways

Bransford, Dale
V: (210) 299-8480
F: (210) 299-8444

POC Member

Inman, Don
V: (210) 821-3160

Superintendent, Park Design & Project Services

City of San Antonio, Public Works Department

Main Plaza Building
114 West Commerce Street
San Antonio, TX

- Traffic counts
- Facility cross-sections, lanage, ROW

Abbey, David
Ballard, Andy
V: (210) 299-7732
F: (210) 270-4418

Traffic Engineer

City of San Antonio, Planning Department

Main Plaza Building
114 West Commerce Street
San Antonio, TX

- Land use information
- Demographic data
- 1975 "Bicycle Plan"

Garza, Jesus
V: (210) 299-7950

Texas Department of Transportation, Austin, TX

Douglas, Paul
V: (512) 416-2342

Statewide
Bicycling
Coordinator

Texas Department of Parks & Wildlife

Katherine Nichols
Jeff Goldbloom
V: (512) 389-4735

Trails Section

OTHER PUBLIC SERVICE ORGANIZATIONS

Alamo Area Council of Governments (AACOG)

118 Broadway
Suite 400
San Antonio, TX 78205

- Land use information
- Demographic data
- Suburban city contacts & resources

Whitworth, Shelley — Transportation Planner
V: (210) 227-5371

San Antonio--Bexar County Metropolitan Planning Organization (MPO)

434 South Main
Suite 205
San Antonio, TX 78204

- Bicycle Mobility Plan--LRP management
- Committed transit infrastructure
- Planned and committed intermodal facilities
- Transportation Improvement Program (TIP)

Kennison, Janet A. — MPO Administrator
Hebner, Dan — Transportation Planner
Riojas, Michael, P. E. — Transportation Engineer
Hubbs, Juanita — Secretary
Ericksen, Scott — Public Affairs
V: (210) 227-8651
F: (210) 227-9321

VIA Metropolitan Transit

800 West Myrtle
San Antonio, TX

- Transit service routes
- Planned transit service expansion
- Committed transit infrastructure
- Transit service data

Young, Cris — Strategic Planner
V: (210) 227-5371
F: (210) 227-0584

Greater San Antonio Chamber of Commerce

602 East Commerce
PO Box 1628
San Antonio, TX 78296-1628

Castenada, Tristan "Tris" — Vice President, Government Affairs/Education
V: (210) 229-2162
F: (210) 229-1600

National Park Service
San Antonio Missions National Historical Park

2202 Roosevelt
San Antonio, TX 78210
Alan Cox — Assistant Superintendent
V: (210) 229-5706

BICYCLE INTEREST GROUPS

Alamo Area Bicycle Coalition

PO Box 120232
San Antonio, TX 78212-4331

Trenchard, Kathleen — President
V: (210) 225-6608

Abel's Bicycle Repair & Rental

1119 Ada
San Antonio, TX 78223

Ramirez, Abel — Proprietor
V: (210) 533-9927

B&J Bicycle Shop

8800 Broadway
San Antonio, TX

Sicman, Tom — Proprietor
V: (210) 826-0177

Cenna's Cycles

2132 NW Military Highway
San Antonio, TX 78213

Vaelli, Cenna — Proprietor
V: (210) 340-5845

Helotes Bicycle

14464 Old Bandera
Helotes, TX

Cunningham, Kyle & Hank — Proprietors
V: (210) 695-3159

San Antonio Wheelmen (SAW)

PO Box 34208
San Antonio, TX 78285

Greenberg, Mark — Vice President
V: (210) 344-6265

STORM Mountain Bike Club

Lanfier, Dan
V: (210) 227-8800

Texas Bicycle Coalition of San Antonio

26334 Romance Point
San Antonio, TX 78258

Stanush, David
V: (210) 299-2306

PUBLICATIONS

"1990 Traffic Map". San Antonio Urban Transportation Study of Bexar County. State Department of Highways and Public Transportation. Austin, TX. 1990.

1990 Travel Survey San Antonio--Bexar County Metropolitan Planning Organization. San Antonio, TX. 1990.

1994 Work Plan: Seattle Pedestrian and Bicycle Program. Seattle Engineering Department. Seattle, WA. 1994.

A Synthesis of Existing Bicyclist and Pedestrian Related Laws and Enforcement Programs. National Bicycling and Walking Study: Case Study #13. Federal Highway Administration (FHWA). Washington, DC. 1993.

Bicycle Friendly Cities: Key Ingredients for Success. Clarke, Andy. Bicycle Federation of America. Washington, DC.

Bicycle Planning in Urban Areas: The US Experience. Clarke, Andy. Bicycle Federation of America. Washington, DC.

Bicycle Use and Hazard Patterns in the United States, and Options for Injury Prevention. Consumer Product Safety Commission. Washington, DC. 1993.

Community-Based Planning Under ISTEA: A Handbook for Citizens and Agencies. Bicycle Federation of America. Washington, DC. 1993.

Evaluating the Suitability of Roadways for Bicycle Use: Towards a Cycling Level of Service Standard. Epperson, Bruce. Miami Urbanized Area Metropolitan Planning Organization. Miami, FL. January 1994.

"FY 1995-97 Transportation Improvement Program - San Antonio--Bexar County Metropolitan Area." San Antonio--Bexar County Metropolitan Planning Organization. San Antonio, TX. October 1, 1994.

Guide for Development of Bicycle Facilities. American Association of State Highway and Transportation Officials (AASHTO). Washington, DC. August, 1991.

Highway Route Designation Criteria for Bicycle Routes. Report No. FHWA-RD-86/066. FHWA: Office of Research & Development. Washington, DC. April 1986.

Intermodal Surface Transportation Efficiency Act of 1991 . Public Law 102-240--December 18, 1991. 102nd Congress. Washington, DC. 1991.

Liability Aspects of Bikeway Designation: A Special Report. English, John W.. Bicycle Federation of America. Washington, DC. April 1986.

One Less Car: The Bicycle Advocate's Action Kit. Bicycle Federation of America. Washington, DC.

People Power's Bicycle Advocacy Resource Guide. Goodman, Ron, ed. Bicycle Federation of America. Washington, DC. 1993.

San Antonio Master Plan. City of San Antonio, Department of Planning. San Antonio, TX. December, 1993.

Selecting Roadway Design Treatments to Accommodate Bicycles. Federal Highway Administration (FHWA). Washington, DC. 1993.

The Interaction Hazard Score: A Theoretical Model. Landis, Bruce, PE, AICP. Sprinkle Consulting Engineers, Inc. Lutz, FL. November 1993.

The National Bicycle and: Walking Study:: Transportation Choices for a Changing America Publication No. FHWA-PD-94-023. USDOT: Federal Highway Administration. Washington, DC 1994.

Trails for the Twenty-first Century: Planning, Design, and Management Manual for Multi-Use Trails. Ryan, Karen Lee, ed. Rails-to-Trails Conservancy. Island Press. Washington, DC. 1993.

San Antonio -- Bexar County
Bicycle Mobility Plan - Long Range Plan

Appendix D
Public Meeting Flyers

"Bicycling in Bexar County and San Antonio" Survey

Please return this short questionnaire to help us get a better picture of bicycling in Bexar County and San Antonio.

Return to:
Bicycle Mobility Plan, Metro Systems Engineering, P.O. Box 681116, San Antonio, TX 78268-1116.

1. Age:_____

2. Gender: ☐ Male ☐ Female

3. Which area of Bexar County or San Antonio do you live in?

_____

4. How many times have you ridden a bicycle in the last:

week_____ month_____ year_____

5. What is the average length of trips you make?

_____miles

6. What type of trips do you usually make?
☐ Work ☐ Recreation ☐ Shopping ☐ School

7. Why do you ride a bicycle?
☐ Fun ☐ Fitness ☐ Economics ☐ Environment
☐ Save time ☐ No other choice ☐ No car
☐ No car parking

8. Have you ridden to work in the last 6 months?
☐ Yes ☐ No

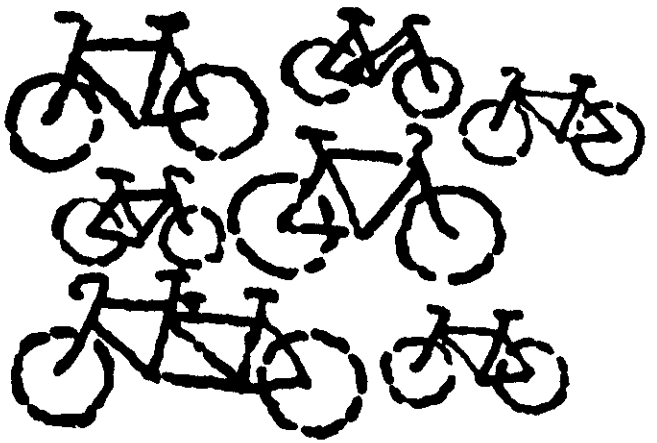
9. What are best routes/roads for bicycling in Bexar County and/or San Antonio?
(Please attach a map/list showing your bike ride to work, most common bike ride, etc.)

10. What are the worst roads/intersections for bicycling in Bexar County and/or San Antonio?
(Please attach a map/list showing them.)

11. What would encourage you to ride more often?
☐ Designated bicycle facilities (bike lanes, trails, shoulders
☐ Signed bike routes
☐ Better road surfaces
☐ Safe crossings of US 90, I-37, I-35, I-10 and I-410
☐ Bike-to-work events/promotions
☐ Education for children/motorists/adult bicyclists
☐ Bicycle parking facilities
☐ Other_____

Bicycle Mobility Plan
Metro Systems Engineering
P.O. Box 681116
San Antonio, TX 78268-1116

The future of bicycling in San Antonio and Bexar County is in your hands...



What is the future for bicycling in Bexar County and San Antonio?

Throughout Texas, the popularity of bicycling is growing. More than one third of all adults in the state enjoy bicycling for recreation, and an increasing number are choosing to bicycle as a means of everyday transportation.

The San Antonio metropolitan area has many features that encourage bicycling. For example, our metropolitan area is relatively flat, and within Loop 410 development is quite compact. There are active bicycle clubs and advocacy groups promoting bicycling for recreation and transportation. Other cities with similar characteristics, such as Tucson, Arizona and Minneapolis, Minnesota have much higher levels of bicycling all year round, so we know there is potential for improvement here.

However, San Antonio also has some problems for bicyclists. Loop 410 and the other major highways in the region are a significant barrier. There are few special facilities for bicyclists, and often not even any secure bicycle parking is available. New growth in the region is adding traffic and increasing the potential for conflicts between motorists and bicyclists.

Fortunately, the San Antonio-Bexar County Metropolitan Planning Organization recognizes there are both problems and potential for bicycling in this area. As planners for the area we are now developing a plan to address bicycle issues, and your input is needed.

We need your help . . .

The San Antonio Bicycle Mobility Plan will shape the future of bicycling in the metropolitan area. To produce the best plan possible, we need input from active bicyclists as well as those who would like to bicycle if conditions were better. We want to hear from motorists and pedestrians, too. The plan must balance the needs of every highway user.

Specifically, we're inviting you to help us ...

Create a vision

The San Antonio Bicycle Mobility Plan looks forward 20 years into the future. What is the metropolitan area going to look and feel like for bicycling in the year 2015? Will San Antonio be more pleasant or more dangerous and less convenient for bicycling? Will people have a real choice to bicycle to work, or to the store? You can help determine the answer to these and other questions.

Identify problems

How close to your vision is San Antonio today? We need to know what problems exist in the region before we can start to address them in a plan. What makes bicycling more difficult or dangerous than it could be? Why don't you, or your friends and family, ride more often? We're looking for a complete picture of the current conditions for bicycling—from nasty potholes to inhospitable developments and highways.

Imagine the possibilities

We are interested in more than just the bad things about bicycling! We also want to know about the best places to ride, the great opportunities for bicycling in the area and the kinds of things that could be done to improve conditions for bicyclists. What would make YOU ride more often?

Balance the needs of bicyclists and motorists

What is an appropriate balance among bicycling, walking, transit and driving, and are we achieving that balance today? Demand is high for highway space and funds— what is an appropriate level of investment to make the streets safe and inviting for bicyclists?

We need your help to answer these and other questions in the coming months.

What you can do to help

The San Antonio-Bexar County MPO wants your help in creating a plan for bicycling in the San Antonio metropolitan area. You can help in many ways:

1. Attend public meetings; Thanks very much for joining us today. The meetings will give you a chance to have your say on all the issues raised in this brochure, and to give us information on the favorite routes and worst roads and intersections you encounter.

Where: Southpark Mall Community Meeting Room

When: October 1, 1994, 9 a.m.

2. Two more meetings will be scheduled later this fall. By returning the survey and form below, you'll be notified of the next meetings.

3. Complete the short survey in this brochure.

4. Write in your comments. Send your ideas, comments and information about your favorite and worst routes for bicycling in the city to Bicycle Mobility Plan, Metro Systems Engineering, P.O. Box 681116, San Antonio, TX 78268-1116

5. Contact the San Antonio Wheelmen, Alamo Area Bicycle Coalition and other local bicycle clubs. Let them know what you think about bicycling in San Antonio—and join them for a ride!

6. Contact your city staff or elected officials to let them know your views on the future of bicycling in San Antonio.

Name_____

Affiliation_____

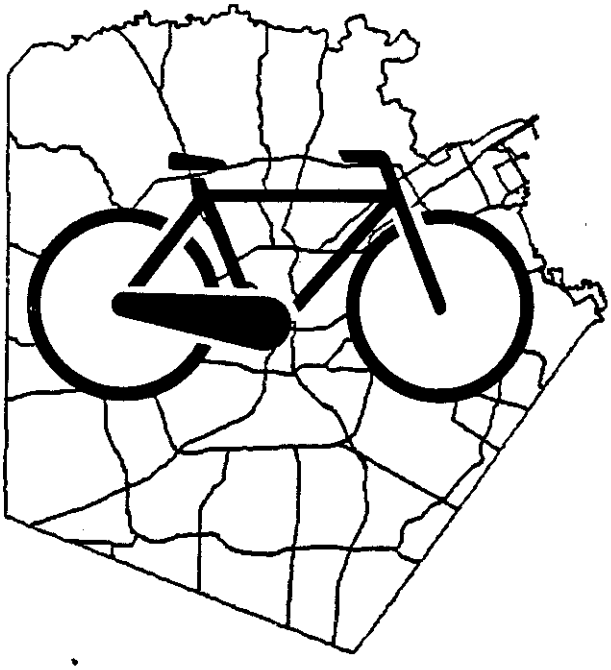
Address_____

_____

Mail to:

Bicycle Mobility Plan
Metro Systems Engineering
P.O. Box 681116
San Antonio, TX 78268-1116

San Antonio - Bexar County



METROPOLITAN PLANNING ORGANIZATION

LAST CALL!

for comments on the

BICYCLE MOBILITY PLAN

PUBLIC MEETING

TUESDAY, JANUARY 10, 1995, 7:00 p.m.

RIVER ROOM, VALERO ENERGY BLDG.

530 McCULLOUGH AVE.

Twenty years from now, what will our community be like for bicycling?
Why isn't San Antonio more bicycle-friendly today?
How can the Bicycle Mobility Plan make our town a great place for cyclists?

Please share this information with co-workers, friends and neighbors.

MPO meetings are accessible to disabled persons. To arrange for special assistance or an interpreter, call 227-8651 or TDD 1-800-735-2989 (Relay Texas) at least 48 hours in advance.

San Antonio -- Bexar County
Bicycle Mobility Plan - Long Range Plan

Appendix E
Public Meeting Agenda

AGENDA

PUBLIC MEETING: OCTOBER 1, 1994

SAN ANTONIO, TEXAS

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1. Introduction from MPO or Consultant (5 minutes)
2. Description of planning process (10 minutes)
3. Slide show (15 minutes)
4. Break out groups
   - Vision (15 minutes)
   - Current conditions (45 minutes)
   - Strategies/Actions (30 minutes)
   - Voting (10 minutes)
5. Wrap-up (15 minutes)

SAN ANTONIO WORKSHOP FACILITATOR NOTES

1. Hello and welcome! My name is ...

2. If any MPO employee (or member of the Plan Oversight Committee) is present, they should be invited to welcome people and provide a short overview of this bicycle plan.

3. If no such person is present, the facilitator should note:

   a) The MPO is currently developing a long range transportation plan, as required by ISTEA. This must be finished by late February, 1995.

   b) One element of this plan is a bicycle section. The bicycle element is supposed to outline the MPO's goals and objectives in relation to bicycling. This element is required by ISTEA to be integrated into the overall transportation plan.

   c) No similar planning effort has really ever taken place in the study area. However, cities and metropolitan areas across the country are going through the same process and there is quite a lot of experience to draw on.

   d) The MPO is excited about this project! Looking forward to the outcome of the workshops and public involvement, and to figuring out the what can be done to make San Antonio and Bexar County better for bicycling.

4. Introduce the Bicycle Mobility Plan.

   a) Consultants -- introduce members of the team who are present and mention those who are absent!

   b) Tasks -- provide a very brief description of the 6 tasks to be completed as part of the project, with a timetable or schedule of when the different elements are going to be done.

   c) Make a special note of how the public involvement session fits into the process, and describe the different outreach efforts

      - Public meetings
      - News releases
      - Brochure soliciting comments
      - Questionnaire/survey for MPOs/Counties
      - Follow-up in-depth interviews

d) All this information, suggestions, problems, etc. will be consolidated into a single report for the MPO. This will be the starting point for our efforts to help the MPO determine what it can best do to help this area become safer and more pleasant for bicycling.

e) In particular, we'll develop an action plan for the MPO -- both external and internal.

f) Stress that this is not a plan that will result in a comprehensive map showing bike routes and facilities across the whole city. There will be some key corridors identified, and improvements to those routes will be recommended. Major barriers will also be identified, and ways to overcome them explored -- that's where we need your help! In addition, there will be a series of policies and procedures suitable for neighborhoods, the city, county and MPO to follow if they want to make conditions better for bicycling.

5. Introductions from participants -- who are they, where are they from, do they represent an agency or user group?

6. Purpose of this meeting.

This meeting is designed to maximize your input into the development of a bicycle plan for the San Antonio and Bexar County study area. It is not designed to have you listen to presentations for hours. This is your show.

That's the good news. The bad news is we don't have any immediate answers for the problems, issues and opportunities you are going to raise. We are gathering information, not solving problems!

It is also designed to get you talking and discussing these issues among yourselves. For some of you, its the first time you've met face to face, or been on the same side of the table working together on a project. That is important, because a lot of what is going to have to change to make communities more bicycle-friendly and walkable is going to happen at the local level, by people like you, if not you yourself. We hope you'll have a more constructive working relationship with folks when you leave the room.

7. To introduce the format and subject matter of the workshop, I want to show a few slides, both to get your creative juices flowing and to provide examples of what you're going to discussing in smaller groups.

8. Start the slideshow.

Workshop Facilitator Notes Part 2

1. After the slide show has been completed, facilitators should prepare people for the brainstorming session.

2. Break people up into smaller groups.

3. Ask each group to identify three people:

   Reporter: Someone who will report back to the larger group

   Recorder: Someone who will record the discussion, write on boards, etc.

   Ruler: Chair of the session to keep the discussion focused and on time

4. Go over the different phases of the brainstorming again, introducing people to the questions and issues we are asking them to discuss. At each stage, tables will be given a sheet with the question and product they are supposed to be addressing.

These are:

1. Vision.

Each group is asked to define a vision for how they want their community to look 20 years from now, and how bicycling and walking fit into that vision. The question is:

20 years from now, what is your community like for bicycling and walking?

We do not necessarily need an actual vision statement -- we only have 15 minutes! And remember also to remind people this exercise allows them to think ahead and imagine they are in control of their destiny. They can change things -- think back 20 years what we thought was possible then and what has changed since then.

At the end of the 15 minutes, each group should have written down some or all of the following:

a) Adjectives or words that define a livable, bikable community.

b) Goal statements. We want to challenge people to come up with some broad policy statements or goals that relate to

- modal split targets -- % of people walking/bicycling
- safety targets -- reduction in number of bike/ped crashes
- $$$ targets -- minimum level of annual investment in bike and ped
- access targets -- all streets and highways bicycle-friendly

c) An actual mission statement, if they get that far.

2. Problem and opportunity identification.

In this section of the program, we need your explanation as to why more people don't ride bicycles and walk in your community. What is the problem?

Why isn't you community bicycle-friendly and walkable today?

What is wrong with your community right now for walking and bicycling?

Where are the barriers -- both physical and institutional?

What is stopping/preventing/discouraging people from bicycling and walking today?

What are some of the opportunities that exist in your community?

Keep people from getting too site specific -- we need to know that debris doesn't get cleared from shoulders, but we really don't need to know which shoulders on which side of a particular street. But do mention examples that were provided during the public meetings.

At the end of the 45 minutes allotted to this task, each group should have written up a list of problems and opportunities -- probably at least 10 issues but not too exhaustive a list, as they are going to have to try and identify solutions and answers to them later!

3. Strategies and Actions

This discussion should focus on the steps necessary to overcome the problems, take advantage of the opportunities, and realize the vision.

What needs to change to make your community more bicycle-friendly and walkable?

In particular, participants should be looking at what MPO / County policies need changing, and how those changes can be made. Is it legislation, regulation, guidance?

What attitudes need to be overcome and how can this be done.

Who is responsible for change?

At the end of the 30 minutes allotted for this, each group should have a list of strategies and actions that they can prioritize.

4. Voting

Which of the strategies and actions are the most important to act on?

Each participant will be given a certain number of dots with which to cast their votes for priority actions. They may put all their dots on one item, or spread them around among the list.

OK, now start the brainstorming, and remember to identify a recorder, reporter and ruler! You are starting with the vision thing.

For Group Leaders' Use

20 years from now, what is San Antonio/Bexar County like for bicycling?

At the end of the 15 minutes, your group should have written down some or all of the following:

- **adjectives or words that define a livable community, or a community that is bike-able.**
- **policy statements or goals that relate to**
  - **modal split targets -- % of people walking/bicycling**
  - **safety targets -- reduction in number of bike/ped crashes**
  - **$$$ targets -- minimum annual investment in bike and ped**
  - **access targets -- all streets and highways bicycle-friendly**
- **an actual mission statement, if you get that far.**

Why isn't San Antonio/ Bexar County good for bicycling today?

At the end of the 45 minutes allotted to this task, your group should have written up a list of problems and opportunities -- probably at least 10 issues but not too exhaustive a list, as you are going to have to try and identify solutions and answers to them later!

What needs to change to make San Antonio/Bexar County better for bicycling?

At the end of the 30 minutes allotted for this, each group should have a list of strategies and actions to prioritize.

Which of the strategies and actions are the most important to act on?

Each participant will be given a certain number of dots with which to cast their votes for priority actions. You may put all your dots on one item, or spread them around among the list.

REPORTING BACK AND DISCUSSION

1. After the voting, each group should be asked to present a brief summary of their discussions, and describe the strategies and actions that won the most votes. Timing will depend on how many groups you have and how long is left at this stage.

2. Again, depending on time, ask if there are any general comments people would like to make about the outcome of the voting. Or, ask a question yourself to draw out opinions on interesting outcomes of the session.

3. With about 15-20 minutes to go, call a halt to the discussion. Thank people for their participation, time and ideas. Tell them what happens next: remind people how this workshop fits in the with the other outreach efforts, and the use to which all this information is going to be put -- i.e. consolidated with all the other meetings ideas, submitted to the MPO as a report, later to be used as the basis for recommendations to the MPO on how they can help communities become more bicycle friendly.

4. Tell them a participants list will be mailed to each of them, as will any subsequent brochures etc. Suggest they stay in contact with the local bicycling groups; MPO staff or whoever else is appropriate.

5. Conclude by introducing the video from Seattle. We are showing this as an example of how one community has started to make the transformation that is possible in any city. The specific of the program are interesting and there are lots of good ideas that you can perhaps adapt to your local circumstances -- but more importantly, the video shows the process by which change is being made possible. It describes key elements of success that will impact any community and help them reach their goals.

6. Show the video. It lasts 12 minutes.

7. Good-bye and Thank You again.

San Antonio -- Bexar County
Bicycle Mobility Plan - Long Range Plan

Appendix F
Public Agency Survey Form

San Antonio--Bexar County Metropolitan Planning Organization
Bicycle Mobility Plan
Plan Oversight Committee (POC)

Survey of Existing Bicycle Network

Dear POC Member:

This survey of agencies represented by the Bicycle Mobility Plan Oversight Committee is being conducted as part of Task 3, Inventory Existing Systems and Data. Please answer the questions below as completely as possible. Your assistance with obtaining this information about existing or committed bikeways in San Antonio is greatly appreciated.

Please return the completed survey and attachments (as appropriate) to:

Metro Systems Engineering, Inc.
PO Box 681116
San Antonio, TX 78268-1116

Please return the completed survey prior to June 5, 1994. If you have any questions, please contact Metro Systems Engineering, Inc. by voice at (210) 680-7335 or by FAX at (210) 680-1707. Thanks very much for your input.

1. Your name & title: _____

   Agency represented: _____

   Phone: _____ FAX: _____

2. What departments in your agency are involved with bicycle related issues?

   _____

   _____

3. Who (if not yourself) is responsible for bicycle issues in your agency?

   Name & title: _____

   Address: _____

Phone:_____ FAX:_____

4. Does your agency have any procedures or guidelines directly related to bicycle transportation? ____ YES ____ NO ____ DON'T KNOW

If YES, please attach a description or copy.

Survey of Existing Bicycle Network

Existing bicycle facilities

For each existing bicycle facility presently managed by your agency, please provide the information requested below. Photocopy and attach additional pages as necessary to describe each facility.

Name of Bicycle Facility_____

Bicycle Facility Location_____
(street, park, or other location name)

If on-street, please give termini names:

From_____

To_____

Please feel free to attach a map showing the bikeway location.

Description:

Linear distance:_____ miles Width: _____ feet

Surface: Gravel Asphalt Concrete Natural Woodchip
(Circle one)
Other (please describe) _____

Costs:

Development cost: $_____

When installed:_____

Annual maintenance cost $_____

Most recent rehabilitation:

When did rehabilitation of the bikeway last take place?_____

What part(s) of the bikeway was/were rehabilitated?_____

Survey of Existing Bikeway Network

Rehabilitation cost: $_____

Committed bicycle facility projects

For each bicycle facility project already committed by your agency, please provide the information requested below. Photocopy and attach additional pages as necessary to describe each facility.

Name of Bicycle Facility _____

Bicycle Facility Location _____
(street, park, or other location name)

If on street, please give termini names:

From _____

To _____

Please feel free to attach a map showing the proposed bikeway location.

Description:

Linear distance: _____ miles Width: _____ feet

Surface: Gravel Asphalt Concrete Natural Woodchip
(Circle one)

Other (please describe) _____

Costs:

Projected development cost: $_____

Projected completion date: _____

Projected annual maintenance cost: $_____

Projected service life: _____ years

ZS 380.8 BI583M 1995
Metro Systems Engineering.
Bicycle mobility plan

DATE	ISSUED TO