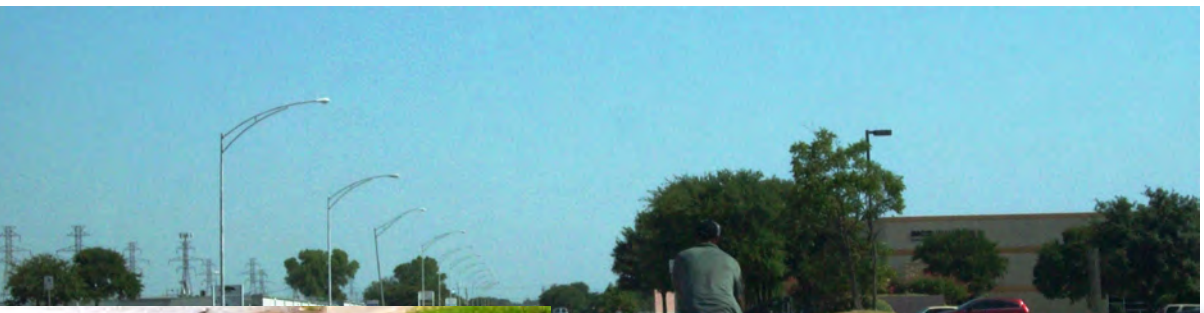
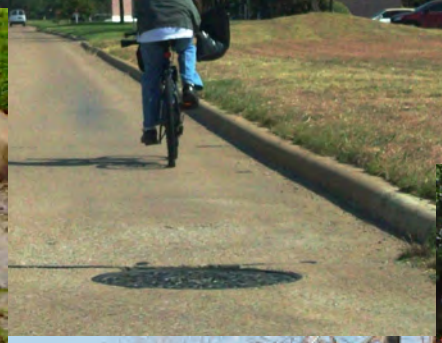
FORT WORTH

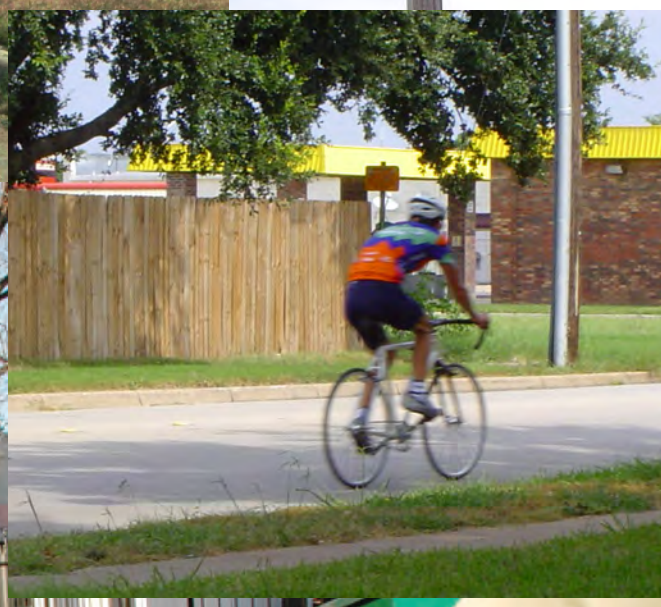
BIKE FORT WORTH

A Comprehensive Bicycle Transportation Plan

2009







MICHAEL J. MONCRIEF, MAYOR

CITY COUNCIL

CARTER BURDETTE
JOEL BURNS
SAL ESPINO
KATHLEEN HICKS
JUNGUS JORDAN
FRANK MOSS
DANNY SCARTH
ZIM ZIMMERMAN

DALE FISSELER, CITY MANAGER

ASSISTANT CITY MANAGERS

FERNANDO COSTA
CHARLES DANIELS
TOM HIGGINS
KAREN MONTGOMERY

DEPARTMENT HEADS

SUSAN ALANIS
DARLENE ALLEN
PETE ANDERSON
BRANDON BENNETT
BRIAN BOERNER
VANESSA BOLING
JAY CHAPA
WAYNE CORUM
FRANK CRUMB
LENA ELLIS
JEFF HALSTEAD
RANDLE HARWOOD
MARTHA HENDRIX
RUDY JACKSON
KAREN MARSHALL
KENT PENNEY
GLENIECE ROBINSON
KIRK SLAUGHTER
WILLIAM VERKEST
DAVID YETT
RICHARD ZAVALA

ACKNOWLEDGEMENTS

Bike Fort Worth: A Comprehensive Bicycle Transportation Plan was prepared by the Planning and Development Department.
Guidance and support for the development of this Plan was provided by the Bicycle Study Technical Committee (BSTC).

BICYCLE STUDY TECHNICAL COMMITTEE

RAMIRO ABAD
SCOTT BELLEN
BILLY CORDELL
HENRY DAY
BYRON DE SOUSA
JEN EBEL
ERIC FLADAGER
RANDLE HARWOOD
JOSEPH JEFFERSON
MICHAEL KAZDA
SCOTT PENN
MARK RAUSCHER
DICK RUDDELL
SUZANNE SWEETON
JOE TRAMMEL
JIM WILSON

This Plan is dedicated to the late Dr. Byron de Sousa, former chair of the Fort Worth City Plan Commission and community and bicycling advocate, without whose dedication to the cause of improving bicycling conditions in Fort Worth, this plan might not have been possible.

PROJECT STAFF

Don Koski, Planning and Development Department, Project Manager
Julia McCleeary, Planning and Development Department, Senior Planner
Esmeralda de la Cruz, Department of Transportation and Public Works, Planner
Stephen Murray, Planning and Development Department, Planner

PLANNING AND DEVELOPMENT DEPARTMENT

Susan Alanis, Planning and Development Department Director

PREPARED BY

Planning and Development Department
City of Fort Worth
1000 Throckmorton Street
Fort Worth, TX 76102
817-392-2593
www.fortworthgov.org

TABLE OF CONTENTS

TABLE OF EXHIBITS

EXECUTIVE SUMMARY
BIKE FORT WORTH PLAN

Bike Fort Worth is the City's comprehensive bicycle transportation plan for developing a friendlier bicycle environment. Recommendations for supportive policies, programs and facilities are included to increase bicycle transportation within the City of Fort Worth. Implementation of this plan will provide a safe and attractive alternative mode of transportation.

The City has identified three goals to benchmark the success of the plan:

- Triple the number of bicycle commuters (0.2% to 0.6%)
- Decrease the level of bicyclist related crashes by 10%
- Attain official designation as a Bicycle Friendly Community through the League of American Bicyclists.

As the City's population continues to grow, congestion and the resulting air quality problems will only worsen unless viable alternative modes of transportation such as transit, bicycle and pedestrian systems are available. Replacing a small portion of vehicular trips can help alleviate congestion on area roadways. The recommendations in this plan are intended to help accomplish that shift in travel mode.

The *Bike Fort Worth* plan provides the framework for:

- Establishing City policies that are supportive of bicycling;
- Developing and maintaining a safe and comprehensive network of bikeways;
- Educating policy-makers and the public about the benefits derived from integrating bicycling into the transportation system;
- Developing programs for bicycle education, encouragement and law enforcement;
- Promoting bicycling for transportation and recreation; and
- Securing the resources needed to implement the plan and evaluating the success of its implementation in a timely manner.

Study Overview

The *Bike Fort Worth* study area was defined as the City Limits and its extra territorial jurisdiction (ETJ), while understanding the importance of linking bicycle facilities across multiple jurisdictions. Bicycle facilities are identified in the ETJ area for future planning purposes as the City expands. The recommended bikeway network will provide seamless connections to neighboring jurisdictions, providing regional bicycling mobility.

Facility Recommendations

Providing a comprehensive bicycle transportation plan began with identifying the recommended bikeway network. Over 1,000 miles of on-and off-street bicycle facilities are recommended in this plan at ultimate build out. Development of the bicycle network focused on expanding the existing system, overcoming barriers, filling gaps and providing connections to transit and other major destinations.

The *Bike Fort Worth* plan provides on- and off-street facilities, policies and programs to improve bicycling conditions for people who use their bicycle instead of a vehicle to get to destinations rather than for recreation. The bikeway network identified in this plan is highly focused on on-street facilities, but off-street mixed-use trails can provide connections as well. Existing and future off-street trails are included, with special focus on those that provide connectivity to the on-street system and the regional bicycle transportation network.

EXECUTIVE SUMMARY
BIKE FORT WORTH PLAN

Policy and Program Recommendations
These recommendations and guidelines are a supplement to local and national design standards and guidelines. The following are some of the recommendations referenced in the *Bike Fort Worth* plan.

- Establish a permanent, mayor-appointed, ad hoc Bicycle Advisory Committee.
- Adopt a Complete Streets Policy and Ordinance.
- Establish a Bicycling Education program to promote safe bicycling behavior and interaction on the roads between cyclists and motorists.
- Include Bike Fort Worth facility recommendations into the Master Thoroughfare Plan.
- Distribute an updated Bicycle Map and Commuter Guide.
- Ensure bicycle accommodation on all major transit corridors, station areas and transit hubs.
- Develop a Bicycle and Pedestrian Transportation Planning Program.
- Implement a zoning ordinance for bicycle parking.

Funding
On-street bicycle facilities such as signed bicycle routes and lanes account for only 11% of the total network cost, however, comprise over 75% of the total lane miles. In many cases, re-striping or signing is all that is required to complete an on-street bicycle facility. Off-street facilities have a higher cost because of right-of-way acquisition and separate engineering studies.

No specific funding source has been identified to implement the facility recommendations in the *Bike Fort Worth* plan. However, the myriad of funding options available at the federal, regional and local level could be the building blocks to a comprehensive bicycle network. In addition, private developers can assist in constructing many of the off-street facilities through the development of their sites.

Conclusion
Implementation of the *Bike Fort Worth* plan will promote bicycling as a safe and attractive transportation alternative. A bicycle transportation network will serve to improve livability in Fort Worth by providing an alternative travel option to residents of the City and improved access to other modes of transit; allowing for better access to goods, services and activities.

Chapter One: Introduction

SECTION 1.1 OVERVIEW

Vision

The vision of the *Bike Fort Worth* plan is to provide transportation users in Fort Worth with a safe and attractive transportation alternative by creating bicycle friendly environment complete with policies, programs and facilities. Components of this vision include:

- Bicycle friendly environment
- A viable bicycle transportation system
- Enhanced safety and health of users
- A current and future transit system tying together all modes of travel
- Improved community livability

Bike Fort Worth provides a long-term vision for establishing bicycling as a safe and attractive transportation alternative. The vision includes bicycle facilities throughout the City accompanied by policies, programs and guidelines to promote safety and awareness. The recommended bicycle transportation network will improve livability in Fort Worth by providing an alternative travel option to residents of the City and improved access to other modes of transit.

Purpose

The purpose of *Bike Fort Worth* is to create a framework, using engineering, education, encouragement, enforcement and evaluation, to increase bicycle transportation and improve safety in the City of Fort Worth.

Need

Bicycling facilities and programs in Fort Worth are clearly needed. The public has raised concerns regarding the lack of safe alternatives to driving. Surveys indicate that providing access to bicycle infrastructure would encourage more people to consider bicycling as an alternative to motorized transportation. Without adequate bicycle accommodations, residents feel that bicycling is not a viable travel option.

The region's growth and traffic congestion are expected to increase over time. This could cost billions of dollars in wasted fuel and lost productivity. Increased traffic congestion will decrease regional air quality. These factors will greatly influence the quality of life in our community.

Nationally, 40 percent of urban trips are two miles or less and 28 percent are less than one mile. Many surveys indicate more people would cycle if safety and access to bicycle facilities were improved. Converting a small percentage of vehicular trips to bicycling trips will help improve the region's air quality by reducing the number of vehicles on the road.

Transportation planning should consider equity issues such as income and disability. This is discussed further in Section 2.1. Fort Worth's demographics indicate a need for transportation alternatives due to the rising costs of vehicle ownership and significant local population without access to a vehicle or are unable to drive.

Scope

The study area for the bikeway network includes the Fort Worth city limits and extra territorial jurisdiction (ETJ). Bicycle facilities identified in the ETJ are for future planning purposes as the City expands. The recommended network of bikeways was developed to serve novice and experienced bicyclists alike by way of a diverse set of bicycle facilities to increase and enhance safe bicycle commuting.

Because people travel without regard for jurisdictional boundaries, a critical step in developing the recommended bikeway network was to consider bicycle facility plans in neighboring communities. Ideally, the bikeway network in Fort Worth will provide seamless connections to those in neighboring jurisdictions to provide regional bicycling mobility.

This plan focused on providing facilities and programs that will improve bicycling conditions for people who use their bicycle instead of a vehicle to get to destinations such as work and shopping rather than strictly for recreation. This plan represents the City's first attempt at creating an integrated network of on- and off-street bicycling facilities that can serve both transportation and recreational purposes.

On-street facilities are a primary focus of this bicycle transportation plan. However, off-street mixed-use trails can provide utilitarian cycling connections as well. Therefore, existing and future off-street trails are included, particularly those that provide direct connections to other segments of the bicycle transportation network.

Bike Fort Worth identifies bicycle facilities that address the needs of many transportation users in the City. Prior to the implementation of individual facilities identified in the bikeway network plan, detailed feasibility, engineering and environmental studies will be required.

SECTION 1.2 BENEFITS OF BICYCLING

Health Concerns

According to the Centers for Disease Control (CDC), "In the past 30 years, the prevalence of overweight and obesity has increased sharply for both adults and children. Between 1976–1980 and 2003–2004, the prevalence of obesity among adults aged 20–74 years increased from 15.0 percent to 32.9 percent."

According to the CDC, "People who are obese are at increased risk for heart disease, high blood pressure, diabetes, arthritis-related disabilities and some cancers. The estimated total cost of obesity in the United States in 2000 was about $117 billion. A steady rise in the rates of obesity has increased the level of awareness of physical activity in the United States. Promoting regular physical activity and healthy eating and creating an environment that supports these behaviors are essential to addressing the problem."

Multi-modal transportation encourages physical activity while reducing the number of vehicles on roadways. A safe and supporting environment is needed to encourage physical activities to reduce these costs. A comprehensive bicycle and pedestrian network connecting to transit, schools and other destinations can reduce health care costs while providing an alternative to driving.

Efficiency

Bicycling is the most efficient form of transportation in terms of energy per mile traveled. Bicycles are significantly less expensive to purchase than automobiles, which also come with high maintenance and repair costs, insurance and fuel. As gas prices fluctuate, an increasing number of people have chosen to make trips by transit, bicycling or walking to reduce their reliance on gasoline-powered vehicles.

Providing bicycle facilities has been shown to be a cost effective use of public funds. Adding bicycle facilities to existing roadways can increase the capacity of the roadway network, as cyclists and vehicles can share the space.

Bicycles are also efficient users of space when parked compared to vehicles. As developable land in Fort Worth becomes increasingly scarce, the pressure to re-use expansive surface parking lots increases. Because ten bicycles can park in the same amount of space required for one automobile, getting more people bicycling can release land for other urban uses.

Traffic Congestion

The Texas Transportation Institute's 2007 Urban Mobility Report ranked the Dallas/Fort Worth area fifth in the nation for delays caused by traffic congestion. According to the North Central Texas Council of Governments (NCTCOG), the Dallas-Fort Worth region's population is expected to increase by 70 percent over the next 30 years.

The estimated growth, coupled with declining infrastructure conditions, increasing demands on roadway capacities and dwindling transportation funding, will only lead to greater congestion for the area, unless alternative transportation modes exist.

In 2007, the U.S. Census estimated that 77 percent of commuters drive alone in the City of Fort Worth. For many people, biking two miles can be a comfortable 10- to 15-minute trip without the parking hassles or frustration often experienced when driving a vehicle. The travel time associated with bicycle trips less than two miles is usually similar and sometimes less than the combined time needed for driving, parking and then walking to a destination.

Mobility

Mobility is a critical issue for people who may not be able to afford or have access to a personal vehicle. Providing a comprehensive network of bicycling facilities improves the mobility options, including enhanced access to rail and bus transit service, available to all in Fort Worth.

Air Quality

Vehicles emit approximately 50 percent of the pollutant nitrogen oxide (NOx) that leads to the formation of ozone in North Texas. Ozone pollution near the ground is the most widespread air quality problem in our region. Providing alternative transportation modes like bicycling is a part of the region's commitment to improving the air quality.

In 2009, the American Lung Association (ALA) ranked Dallas-Fort Worth as the seventh most ozone-polluted metropolitan area in the country. It was the eighth consecutive year the ALA gave the region a grade of "F" for air quality. The City's Comprehensive Plan recommends expanding the bicycle network as a strategy to improve air quality.

Recreation

Improvements to the bicycle transportation system will enhance Fort Worth's system of parks and recreation. The off-street trail system serves a dual purpose of both transportation and recreation. Improving connections between parks and neighborhoods will increase accessibility to a larger population.

Vibrant Communities

Recent research documents economic benefits of bicycle infrastructure investments, including increased tourism, higher adjacent property values, increased business activity and customer attraction, and economic savings from decreased automobile usage.

Having bicycle infrastructure and programs in place has been shown to make cities more attractive to businesses that cater to and hire the segment of the population known as the creative class – an emergent demographic segment made up of relatively young artists, intellectuals and knowledge workers recognized for creating vibrant urban communities.

SECTION 1.3 PLAN DEVELOPMENT

Planning Process

Background information was gathered for this plan from previous planning efforts and existing data, aerial photography and maps.

A Bicycle Study Technical Committee (BSTC) was formed to help develop the *Bike Fort Worth* plan and guide its public involvement process. This advisory committee provided technical and procedural support for the planning process, and reviewed and provided comments on plan materials.

Public Involvement

The *Bike Fort Worth* plan was developed using the following methods of public involvement. The proposed recommendations presented have received overwhelming support from local cyclists and interested parties.

Website

The City developed and maintained a webpage displaying information on the *Bike Fort Worth* planning process. This opportunity helped publicize the bicycling questionnaire and announce updates and public meeting information.

Questionnaire

City staff received 728 responses to a non-scientific bicycling survey. Information received from the questionnaire included demographics, bicycling participation, attitudes, user preferences regarding bicycle facility types, and identification of barriers. In an optional written comment section, many expressed support for a comprehensive bicycle plan. Below are some survey highlights:

- 74 percent of the respondents were male, 26 percent female.
- The average age was 45.
- 37 percent commute to work or school by bicycle, but most report biking primarily for recreation and/or exercise.
- The respondents who commute by bicycle traveled an average of 16 miles round-trip.

- 48 percent were occasional users of public transit, and 11 percent combined bicycling and transit to reach their destination. 16 percent were not aware of the opportunity to combine bicycling with transit.

Bicycle Study Technical Committee (BSTC)

BSTC members helped relay information and promote activities related to the planning process to their interested counterparts.

Public Workshops

City staff held four public workshops on the study in November 2007, each one covering a quadrant of the city. The workshops included a discussion of potential elements of the draft plan and bicycle network. There were also opportunities to provide feedback to be used in the development of the recommendations. Approximately 100 people attended the four workshops.

Public Meetings

Four public meetings were held spring 2009 to present the final draft recommendations and findings of the *Bike Fort Worth* plan. In a display of the increased interest in the *Bike Fort Worth* plan, the total attendance at these four public meetings increased to nearly 200 people.

Exhibit 1: Public Meeting, April 2009
Lockheed Martin Recreation Association Park Pavilion

Publicity

Articles were published in the *Star Telegram*, *Fort Worth Business Press* and *Fort Worth Weekly* announcing the public workshops and meetings, requesting input from the public, and discussing the City's challenges and efforts to become more bicycle-friendly. The local online blog *Fortworthology* helped create a lot of interest in and support of the plan by posting information and commentary. City staff also presented information on the *Bike Fort Worth* efforts to the public via a City Cable Network television program.

Presentations

Throughout the planning effort, City staff made presentations to interested organizations, neighborhood associations, bicycle clubs and business groups. Staff also presented updates on the planning process to the City Council's Infrastructure and Transportation Committee and the City Plan Commission.

Data Collection

Existing, funded and planned facilities

An inventory of on- and off-street bicycle facilities was collected through previous plans, electronic data and printed maps. Staff obtained bicycle facility inventories and plans from surrounding jurisdictions.

Field Analysis

Field inspections on existing and candidate bicycle facilities verified initial feasibility. The condition of the existing on-street system was analyzed, including pavement condition, pavement markings, signage, needed repairs and other relevant information.

Bicycling Counts

To this point, Fort Worth has not conducted bicycle counts. Data gathered for bicycle counts are very limited throughout the region. Much of data that is available was gathered from the U.S. Census American Community Survey and the NCTCOG's 1996 travel behavior surveys, which are now outdated. The limited amount of cycling data available only covers bicycle commuting to work, so the frequency of cycling as a proportion of all trips is unknown.

Bicycle-Related Crash Data

The Fort Worth Police Department maintains an incident report database for use in bicycle-related data crash collection and analysis. Bicycle crashes over a three-year period were analyzed to identify trends.

Existing Bicycle Plans, Policies and Programs

Staff reviewed bicycle facility plans from cities of similar size from all over the United States, regional planning organizations and state governments. Plans that received positive attention from national bicycling professional and advocacy groups were reviewed for best practices.

Bicycle Facility Design Standards

Staff reviewed existing design and engineering standards developed at the city, regional, state and national level.

SECTION 1.4 PAST PLANNING EFFORTS

Fort Worth's movement towards a more bicycle-friendly environment began years ago but has seen greater momentum through the efforts of local organizations, advocacy groups and businesses.

Bicycle Blueprint

The North Central Texas Council of Governments (NCTCOG) completed the Fort Worth Bicycle Blueprint in 1999, which recommended a network of over 300 miles of signed on-street bicycle routes. The first phase consisting of 40 miles of on-street bicycle routes was completed in March 2007.

Mobility Plan

NCTCOG's 2030 Mobility Plan recommended a regional system of primary bicycle and pedestrian facilities known as the Regional Veloweb and designated Bicycle/Pedestrian Transportation Districts. Substantial segments of the existing and proposed Regional Veloweb are located in Fort Worth, including the Trinity Trail system.

Bicycle Parking

In 2005, in an effort to improve cycling conditions, the City installed 57 bike racks in the downtown area and along Magnolia Avenue in the Near Southside to facilitate short-term bicycle parking.

Exhibit 2: Magnolia Avenue Bicycle Parking

Master Thoroughfare Plan

In 2002, the City revised the Master Thoroughfare Plan's Street Development Standards to include street cross section designs with 15 foot wide outside curb lanes on all arterial roads. The modification to the cross section provides an additional three feet of pavement for shared use by motorists and bicyclists.

Bicycles on Transit

The Fort Worth Transportation Authority (The T) *Bikes on Buses* program allows commuters to combine bicycling with the use of public transportation. Each of The T's regular fixed-route buses is equipped with a bike rack that securely holds two or three bicycles. At the operator's discretion, bicycle commuters are allowed to bring their bicycle onboard the bus if the rack is full or unavailable.

Through a joint effort by The T and Dallas Area Rapid Transit (DART), bicycle racks were installed at all Trinity Railway Express (TRE) train stations to encourage bicycle access. Bicycles are also allowed on TRE commuter trains to allow people to continue their commute by bicycle.

SECTION 1.5 PLANNING CONTEXT

Local, regional and federal policies support bicycle transportation facility investments by local governments in the Dallas-Fort Worth metropolitan area.

Federal Legislation and Policy

The Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) authorized the federal highways and transit programs for the six-year period through 2009. SAFETEA-LU governs the spending of federal transportation funds, including investments in the planning and implementation of non-motorized transportation systems.

The American Association of State Highway and Transportation Officials (AASHTO), a consortium of state transportation officials sets standards, policies and specifications for the design and construction of transportation facilities in the United States. In its *Guide for the Design of Bicycle Facilities (*from herein referred to as the AASHTO guide in this report): "…bicycles should be considered in all phases of transportation planning, new roadway design, roadway reconstruction, capacity improvements and transit projects." The purpose of the AASHTO guide is to provide information on the development of facilities to enhance and encourage safe bicycle travel.

Statewide Planning and Policy

The Texas Department of Transportation (TxDOT) guidance is primarily limited to program and project development direction under the Safe Routes to School program and Statewide Transportation Enhancements Program. TxDOT has also provided funding and assistance to the Texas Bicycle Coalition, a statewide agency whose mission is to advance bicycle access, safety and education in Texas.

TxDOT employs a State Bicycle Coordinator in charge of these efforts and a statewide Bicycle Advisory Committee advises the Texas Transportation Commission on bicycle issues and matters related to the Safe Routes to School program. Individual TxDOT districts assign personnel to work on bicycling-related issues on a case-by-case basis.

Regional Planning and Policy

As the federally designated Metropolitan Planning Organization for the metropolitan region, the North Central Texas Council of Government's Regional Transportation Council has identified regional plans and priorities for the investment of federal funds in bicycling infrastructure and programs. *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth* is the vision for regional transportation systems and services.

The Regional Veloweb, identified in the Mobility 2030 plan, is a system of interconnected trails that form a regional system designed to accommodate higher speed bicycle transportation and encourage concurrent pedestrian use. The *Bike Fort Worth* plan identifies the existing and recommended alignments for the Regional Veloweb within Fort Worth and its extra-territorial jurisdiction in **Appendix A**.

Local Planning and Policy

The *Bike Fort Worth* plan is intended to complement the approaches to land use and growth management outlined in the City's Comprehensive Plan, especially the concepts of urban villages, mixed use growth centers, transit oriented development, and sustainable development.

Plans and policies adopted by the City of Fort Worth also support the development of the *Bike Fort Worth* plan. This plan constitutes a major piece of the City's efforts to become the most livable city in Texas. Chapter 11 of the 2008 Comprehensive Plan presents the City's multi-modal approach to transportation including bicycling to support the City's mobility goals.

The Mobility and Air Quality (MAQ) Plan, adopted in 2009, is a blueprint for the Fort Worth region's transportation investments and planning policies over the next 20 years. It includes a diverse range of mobility options, such as commuter rail, rapid transit, bicycling, pedestrian and roadway projects. The MAQ plan recommends an investment of $22 million in bicycling infrastructure over the next 20 years to help address the region's mobility and air quality challenges.

Bike Fort Worth Goals

The City of Fort Worth will identify projects, policies and programs that will increase the use, safety and convenience of bicycling as an integral component of the City's transportation system.

Goal 1: Increase bicycling in Fort Worth.

Double the rate of bicycling for all trip purposes and triple the cycling commute rate from 0.2% (approximately 645 daily commuters) in 2007 to 0.6% (approximately 2000 daily commuters) by 2020.

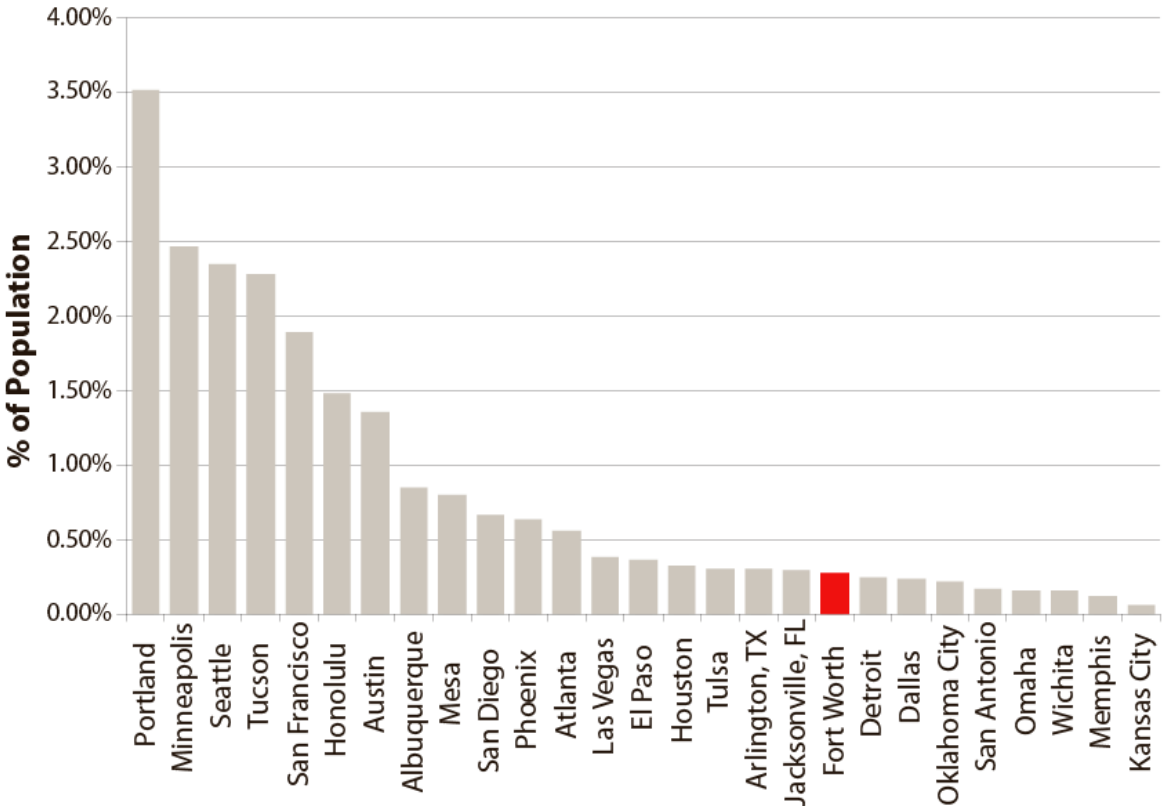


Exhibit 3: Percentage of Bicycle Commuters

Goal 2: Improve bicyclist safety

Establish a system to track bicyclist-related crashes and, once established, reduce the rate of bicycle-related crashes by ten percent by 2020.

Goal 3: National recognition by 2015

The City of Fort Worth should seek designation as a Bicycle Friendly Community (BFC) by the League of American Bicyclists. As of 2009, Austin was the only city in Texas designated as a Bicycle Friendly Community.

In order to reach this designation, a city must illustrate positive efforts in the following five areas. This structure was used to aid the development of the *Bike Fort Worth* plan.

1. Engineering – infrastructure projects and designing a connected network
2. Education - bicyclists and motorists alike can benefit from educational tools and messages that teach them the rules, rights and responsibilities of various modes of travel.
3. Encouragement - community events and programs; government incentives and requirements
4. Evaluation and Planning - action plans, targets and measures; trend evaluation; bicycle counts

5. Enforcement - traffic laws and regulating bicyclists, motorists, and other roadway users is a key element for ensuring a safe and healthy bicycling environment.

Plan Overview

This report contains the following chapters:

- **Chapter One** describes the plan's vision, purpose and scope, and provides an overview of the planning process.
- **Chapter Two** describes the current bicycling environment in Fort Worth.
- **Chapter Three** presents the ultimate recommended bikeway network.
- **Chapter Four** proposes design and engineering guidelines for the installation of bicycle facilities.
- **Chapter Five** presents the recommended programs, policies, statutes and ordinances.
- **Chapter Six** presents an implementation and financial strategy.

Chapter Two: Existing Conditions

SECTION 2.1 OVERVIEW OF FORT WORTH

Demographics

More people are calling Fort Worth home. In fact, 1,800 new residents move into Fort Worth neighborhoods each month. Fort Worth's population increased from approximately 535,000 in 2000 to 720,250 in 2009. It is estimated that by 2030 Fort Worth's population may reach 1,000,000.

The City's Comprehensive Plan lays out a strategy to accommodate this growth by integrating land use and transportation planning, supporting pedestrian and bicycle-friendly development and redevelopment along transportation corridors, within existing urban villages, and in mixed-use and transit-oriented neighborhoods. The *Bike Fort Worth* plan will play a key component of this strategy.

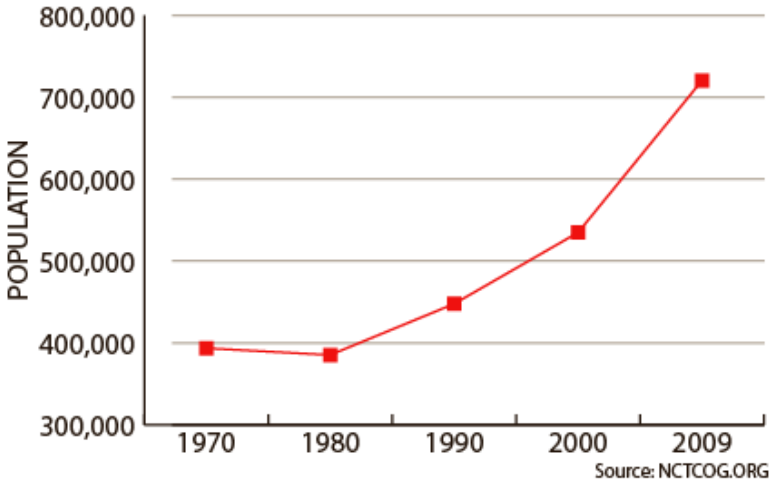


Exhibit 4: Fort Worth Population Trends

Income and Vehicle Ownership

The 2000 Census reported approximately 13 percent of families and 16 percent of individuals below the poverty level in Fort Worth. It also revealed that almost nine percent of households in Fort Worth do not own or have access to a vehicle for their mobility needs. Another 40 percent of households have only one vehicle available.

It is critical to provide bicycle transportation facilities for these populations to access in order to expand the transportation alternatives available to them. Bicycles can provide a reliable and inexpensive transportation alternative for those who are unable to afford or have access to a personal vehicle. The recommended bikeway network was designed with attention to the needs of these households.

SECTION 2.2 CHALLENGES AND BARRIERS

Many factors prevent individuals from choosing bicycling as a method of transportation. Specific challenges and barriers exist within the City of Fort Worth. The following are some of the factors that deter some bicyclists in the city.

Land Use

Suburban lower density land uses can discourage alternative transportation modes because of the large amount of land necessary for development. Because development is spread out over a larger area, automobile travel is usually necessary for mobility. While development is anticipated to continue in the suburbs, recent development trends have indicated a renewed interest in urban living. Promoting higher density, infill and mixed-use development increases efficiency of bicycling and walking for transportation.

Continuity of Bicycle Facilities

Since travel is regional, bicycle facilities, similar to streets, should not end at city limits. Intergovernmental cooperation is necessary to ensure a complete and continuous network across jurisdictional boundaries.

Bicyclist/Motorist Interaction

Cyclists expressed concern over the safe interaction with motorists while riding on streets. Sixty percent of respondents to the 2007 bicycle survey reported that they limited the amount that they bicycle due to inattentive or aggressive drivers. A similar percentage indicated they would be more encouraged to commute by bicycle if there was stronger enforcement of traffic violations.

Most bicycle-related crashes are the result of a traffic violation by either the motorist or the bicyclist. Motorists often complain that bicyclists do not follow traffic laws and behave unpredictably. Many motorists are unaware that bicyclists have the same rights and responsibilities on the road as vehicles, and some refuse to share the road.

Bridges

Bridges can be an obstacle to bicycling in Fort Worth. Bicyclists often have to ride on raised, narrow sidewalks along the bridge or share a narrow outside lane with high-speed, high-volume vehicular traffic. Many local bicyclists shared frustrations over the lack of safe crossings of barriers such as rivers, streams, highways and railroads. More than half of survey respondents indicated that bicycle accommodations on bridges would encourage them to bicycle more frequently.

Highways and Railroads

Fort Worth has an extensive highway and railroad system that dissects the City. These are significant barriers to bicycling, either because cycling is prohibited, unsafe or have limited crossing opportunities. Similar to highways,

railroads often create major barriers, and crossings often lack safe accommodations for bicyclists.

Street Network

The City's existing street network influences bikeability. Older parts of the City have well-connected street grids that create many options for cyclists to get to their destinations, although poor pavement conditions can decrease safety and comfort. Newly developed areas of Fort Worth often have less connected streets that detour traffic onto high capacity/high speed collector and arterial streets. Often these roads have no accommodation for bicyclists.

Existing on-street bikeways are often discontinuous or have abrupt beginnings and endings. The 2007 bicycling survey indicated support for construction of on- and off-street bicycle facilities throughout the City.

Lack of Bicycle Parking

The lack of secure parking facilities can discourage people from commuting by bicycle. When no parking facilities are available, many will leave their bicycle unattended, unlocked, or will use structures that might not be safe. Many voiced concerns about the design, visibility, usability and recognition of existing bike racks.

Exhibit 5: Makeshift Bike Rack, Downtown Fort Worth

Road Conditions

Poor road conditions can challenge bicyclists, who are vulnerable to flat tires, injury or accidents, especially when confronted with unexpected hazards. Broken pavement, potholes, damaged or poorly drained gutters, debris and litter create unsafe situations on bicycling facilities. Approximately half of the survey respondents reported poor road conditions a factor limiting the amount that they use their bicycles.

Climate

Fort Worth's climate conditions are ideal for outdoor activities during a majority of the year. With the exception of a few hot months and the occasional winter weather, Fort Worth's climate is ideal for bicycling. Generally, weather extremes should not be an impediment to cycling in Fort Worth if adequate facilities and programs are in place. Austin, Tucson, Minneapolis and Portland all report high bicycle commuting numbers despite weather extremes.

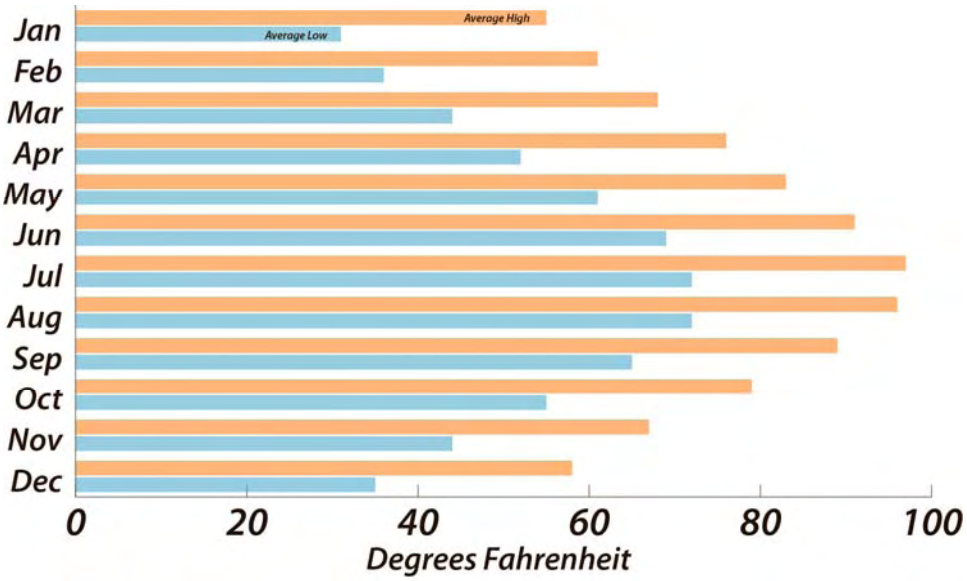


Exhibit 6: Average Temperature in Fort Worth, Texas
(Source: Weather.com)

SECTION 2.3 EXISTING BIKEWAY NETWORK

The existing bikeway facility network in the City of Fort Worth consists of a total of 102.6 miles.

Facility Type	Miles
On-Street Signed Route	38.9
On-Street Bike Lane	6.4
Off-Street Bikeways	57.3
Total	***102.6***

Exhibit 7: Existing Bikeway Facilities

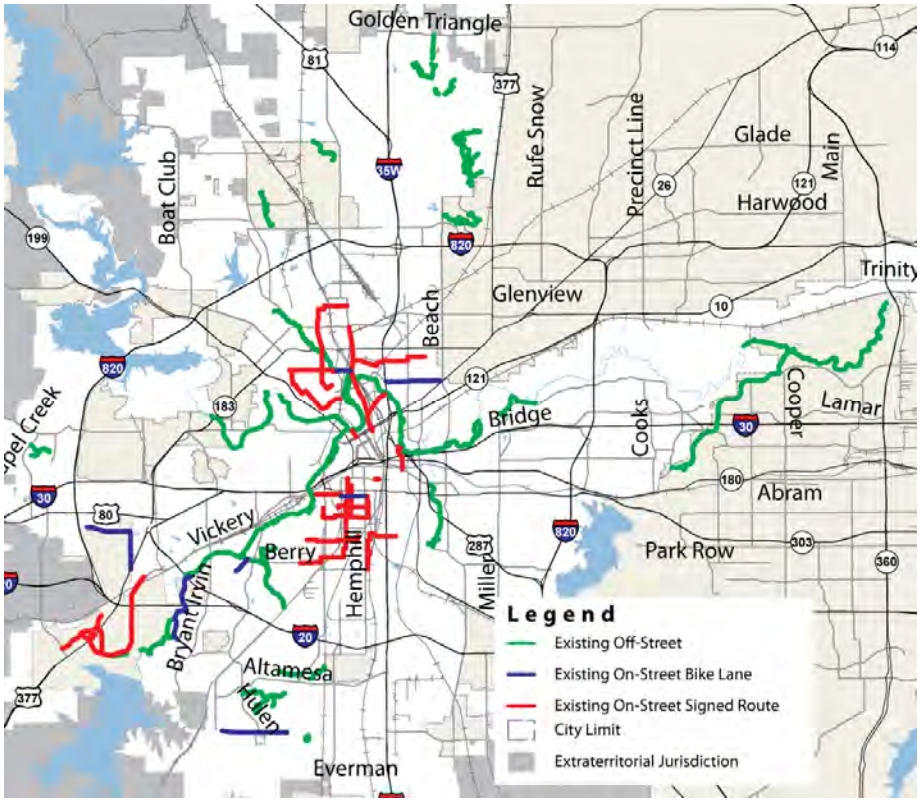


Exhibit 8: Existing Bikeway Locations

On-Street Bicycle Facilities

The existing on-street system consists of approximately 45 miles of on-street bike routes and lanes. Some of the existing on-street facilities do not conform to the design guidelines recommended in this plan, outlined in Chapter 4. These facilities should be brought into conformance with current design standards as opportunities arise.

Bike Routes

The first phase of the Fort Worth Bicycle Blueprint Plan consisted of almost 40 miles of signed bike routes in the central part of the City. This phase was completed in spring of 2007. Pavement markings and specially designed signs designate the shared lane use between motorists and bicyclists. These routes are primarily located on local residential streets, and many of the routes lead to downtown Fort Worth and the Trinity Trail network.

Exhibit 9: Existing Bike Route Signage and Pavement Markings

Bike Lanes

Bike lanes in Fort Worth traditionally have been designated using raised pavement markers or buttons, defining the lane for bicyclists. The *Bike Fort Worth* plan discourages the use of buttons and recommends pavement striping (Exhibit 10) to designate a lane. Some existing bike lane facilities do not meet the proposed design guidelines of this plan (Chapter 4) are not designated as existing.

Exhibit 10: Magnolia Avenue Restriping

Off-Street Bicycle Facilities

The *Bike Fort Worth* plan identifies 57.3 miles of existing multi-use trails in Fort Worth as off-street bicycle transportation facilities. Non-conforming facilities should be brought into conformance with current design standards as opportunities arise.

Park Trails

Fort Worth's Parks and Community Services Department provides multi-use trails within numerous parks for pedestrians and bicyclists. While many of these trails serve primarily recreational users, some also provide an attractive alternative to street transportation for non-expert cyclists. Paved trails providing a transportation connection were included in the existing *Bike Fort Worth* network.

Exhibit 11: Park Trail in Fort Worth

Trinity Trails

The Trinity Trail system – owned and managed by the Tarrant Regional Water District with support from Streams and Valleys and the City of Fort Worth – offers approximately 30 miles of paved trails along the Trinity River. The Trinity Trails provide connections to major destinations including parks, the greater downtown entertainment, cultural and historic districts. Although these trails are primarily recreational, they also provide transportation connections for many cyclists and are a component of the NCTCOG's Regional Veloweb bicycle transportation system.

The Phyllis Tilley Memorial Pedestrian Bridge is planned for construction in 2010. This bridge will span the Trinity River just south of the Lancaster Avenue Bridge. The bridge will provide access for pedestrians and bicyclists linking Trinity Park and the Cultural District. It will also serve as an alternative to the Lancaster Avenue and W. 7th Street bridges, which are not currently bicycle-friendly river crossings.

SECTION 2.4 BICYCLE PARKING

Citywide, there is a shortage of bicycle parking. The existing bike racks in Fort Worth have been provided either voluntarily by the property or business owner or by the City.

Private Developers

Currently, the City does not provide guidance to property owners or developers regarding the selection of bicycle parking facility types, designs or locations, unless on public property. City code does not currently require bicycle parking facilities for any new development. A small percentage of businesses have provided bicycle racks in Fort Worth. Schools and universities often provide parking facilities for their employees and students.

Public Schools

The City of Fort Worth is served primarily by the Fort Worth Independent School District. Due to the geographic layout of Fort Worth, 15 additional independent school districts (ISDs) provide educational facilities and services to portions of the city. Bike rack provisions vary by school, depending on surrounding land uses, the distance to residential areas, and the policies related to bike racks. Bike racks are more common in central city schools and schools near residential subdivisions. Fort Worth ISD currently installs bike racks at school buildings when requested, depending on available funding. Northwest ISD recently added a policy to include the provision of bicycle racks.

Exhibit 12: Bicycle Parking at Hillwood Middle School, Keller ISD

The T

The Fort Worth Transportation Authority (The T) installed bicycle racks at commuter rail stations along the Trinity Railway Express (TRE). Plans for the future Southwest to Northeast Commuter Rail line include bicycle parking at stations.

Exhibit 13: Bicycle Parking at the Intermodal Transportation Center Downtown Fort Worth

SECTION 2.5 BICYCLE SAFETY

The Fort Worth Police Department's Records and Identification Division maintains records of bicycle-related crashes in the City. A cursory analysis of data gathered from 2005 and 2008 shows a slight decrease in reported crashes from 78 in 2005 to 71 in 2008.

With limited data sampling, it is unwise to make inferences about bicycling safety trends in Fort Worth. Additional analysis will need to be conducted to ensure data reliability and reporting consistency. However, this information can help in the identification of potentially hazardous locations for bicyclists.

Chapter Three: Recommended Bikeway Network

SECTION 3.1 SUMMARY OF RECOMMENDED NETWORK

A bikeway is a facility specifically designated to accommodate travel by bicycle by the public. Bikeways may be located on or adjacent to a street, or within its own right-of-way. In this report, the terms bikeway and bicycle facility are interchangeable.

Providing a network of bicycle facilities throughout Fort Worth is critical to achieving the goals of this plan. The recommended bikeway network shown in **Appendix A** contains over 1,000 miles of interconnected on- and off-street facilities designed, signed and maintained to provide access to destinations and improved recreational opportunities throughout the City.

The recommended network represents the ultimate system vision that the City will use as a guide for development over time. Many proposed sections may not currently exist or be safe for bicycle travel.

Facility Type	City	ETJ	Total
Sidepath	24.0	0.0	24.0
Off-Street	163.1	37.6	200.7
TOTAL OFF-STREET	**187.1**	**37.6**	**224.7**
Bike Bus Shared Lane	1.4	0.0	1.4
On-Street Bike Lane	358.0	122.3	480.3
On-Street Signed Route	215.5	2.8	218.3
TOTAL ON-STREET	**574.9**	**125.1**	**700.0**
TOTAL	***762.0***	***162.7***	***924.7***

Exhibit 14: Recommended Bikeway Mileage

The recommended bicycle facility network and facility types were developed using guidance from:

- American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* (1999);
- National Center for Bicycling and Walking best practices;
- U.S. Department of Transportation;
- Bicycle facility and planning guides published by other state's Department of Transportation; and
- Bicycle transportation plans of nationally recognized cities.

SECTION 3.2 NETWORK DEVELOPMENT AND CRITERIA

This section describes the methodology used to identify the recommended network of facilities and the preferred types of facilities for each network segment.

An arterial bikeway network was developed to provide accessibility by bicycle to primary destinations along the same general travel corridors served by roads and highways. Several criteria guide the selection of the routes recommended as bikeways in this plan. These were developed with input from the Bicycle Study Technical Committee, City of Fort Worth staff and members of the public.

A conceptual primary bicycle corridor map **(Appendix C)** was developed to ensure development of a comprehensive and connected network. Projects within this system should have priority for implementation in the bikeway network.

The bikeway system should generally form a grid of north-south and east-west connections, with flexibility for major destinations and significant barriers. Generally, residents inside IH-820 should be no greater than ½ mile from a bikeway, outside IH-820 no greater than one mile.

1999 Bicycle Blueprint

The proposed *Bike Fort Worth* network incorporates a majority of the 1999 Bicycle Blueprint **(Appendix D)** facilities, with some modifications. About 40 miles identified in this plan are complete with route signage and pavement markings.

Avoid Dangerous Streets

Most cyclists are uncomfortable sharing the road on high speed and traffic roadways. Parallel routes were added along identified corridors if appropriate. Streets known to have high levels of trucks or traffic were avoided designation as an on-street route. If no parallel routes were available, bike lanes or sidepaths were considered.

Fill Gaps/Overcome Barriers

Projects that link bikeway segments across highways, rivers, railroads, and other natural and constructed barriers were included in the bikeway network. Some off-street multi-use trails are recommended to connect discontinuous bikeway facilities where there are no on-street alternatives.

Destination Connections

- Existing and planned rail transit stations
- Mixed-use growth centers and Urban Villages
- Downtown Fort Worth
- Schools, colleges and universities
- Major employers
- Major commercial, entertainment, and tourist destinations

Regional Connections

The recommended network incorporates connections to regional existing and planned bicycle facilities. These links were provided through the North Central Texas Council of Governments (NCTCOG) bicycle facility database and by representatives of neighboring communities.

Undeveloped Areas

Bikeways connecting to undeveloped areas of the City and extra-territorial jurisdiction were included using future arterial street alignments in the Master Thoroughfare Plan. As these areas develop, connecting bikeways on collector and local streets and off-street facilities should be planned and constructed.

Respond to Demand

Routes and connections identified by the public as needing improvement are recommended in the network.

Ease of Implementation

- Existing street and/or right of way width sufficient for recommended improvement
- Relatively low traffic volumes and speeds accommodate cyclists without major improvements
- Project is scheduled for capital improvement construction

Off-Street Facilities

City staff, Tarrant Regional Water District, Trinity River Vision, Streams and Valleys, and NCTCOG compiled the principal off-street system recommendations. Staff, in consultation with the Bicycle Study Technical Committee, also identified other secondary off-street multi-use trails recommended in the bikeways network.

SECTION 3.3 NETWORK FACILITY TYPE SELECTION

After determining the network structure, staff assigned a facility type (e.g. bike lane or bike route) to each network segment. Completed segments of the recommended network will have a visible cue such as signage and pavement markings indicating accommodations for cyclists.

Bicyclists should be accommodated on all city streets where legally allowed, regardless of any designation. Roadways not identified in this plan as recommended bikeways shall still be designed to accommodate bicyclists, and may be added to the bikeways network if deemed appropriate by City staff.

The *Bike Fort Worth* plan aims to provide continuity and consistency for all types of cyclists to the greatest extent practicable. The recommended bicycle network was developed to serve the needs of the broad range of bicyclists in Fort Worth. Cyclists' needs vary based on many factors including age, experience and confidence. A variety of needs was considered during the development of policies, plans and projects related to bicycling.

Experienced cyclists are typically confident riding almost anywhere they are legally allowed and are generally well served by adopting design standards that include wide outside lanes on higher-volume streets, as the City of Fort Worth has done with its 15 foot wide outside lane design standard for arterial streets. Elsewhere, these cyclists can comfortably negotiate streets that have little or no special accommodation for bicycling. More experienced bicyclists often avoid multi-use trails and sidepaths that are crowded with other users.

Most adult cyclists are less confident when sharing space on streets with higher vehicular volumes and speeds. They are best served through a system that provides a separated travel lane (bike lane) in combination with designated signed routes on lower-volume streets and off-street trail connections. Younger adults and children are typically less experienced as cyclists, and generally prefer riding on low-volume residential streets and trails.

Facility Selection Criteria

Signed bike routes, bike lanes and trails should be provided in places not identified in the *Bike Fort Worth* plan if called for during project development or by evaluation of requests if financially feasible, but should follow the design guidelines in Chapter 4.

The most appropriate facility type for on-street facilities should be determined by the volume and speed of vehicles. At low speeds and low volumes, bicyclists and motorists can comfortably travel in the same lane. As speeds or volumes increase, it becomes more desirable to separate vehicular and bicycle travel.

Signed Bike Routes

Signed bike routes are on-street bikeways that assist bicyclists with wayfinding. Pavement markings and signage indicate to motorists that they should expect to see cyclists sharing the road. Routes were proposed on the following types of roadways:

- Local/Residential streets
- Collector streets with traffic volumes under 3,000 vehicles per day
- Arterial streets where constrained by available right of way, land uses, natural features, etc.

On low volume roadways such as neighborhood residential streets, dedicated bicycle lanes are usually unnecessary. Most bicyclists can be accommodated on these roadways through bicycle route signage, occasional traffic calming to slow traffic, and intersection improvements where low-volume roadways intersect high-volume roadways.

Signed routes on collector and arterial streets should be accompanied by pavement markings to indicate the proper position of cyclists within the roadway and to alert to motorists and cyclists that they should expect to share the roadway. Routes on arterial streets should be considered interim until bike lanes can be provided or parallel facilities constructed.

Bike Lanes

A bike lane is for the exclusive or preferential use by cyclists on a roadway identified through signage, striping and other pavement markings. Lanes were proposed on the following types of roadways:

- Collector streets with traffic volumes greater than 3,000 vehicles per day and observed speeds of greater than 30 mph
- Arterial streets

Bike lanes are intended to provide separation and encourage proper behavior between bicyclists and motor vehicles. Additional benefits provided by bike lanes:

- Incent less-experienced adult bicyclists to ride where they otherwise would not
- Increase the comfort of bicyclists and motorists on roadways
- Indicate the appropriate location to ride on the roadway with respect to moving traffic and parked cars, both at mid-block locations and approaching intersections
- Increase the capacity of roadways that carry mixed bicycle and motor vehicle traffic
- Increase predictability of bicyclist and motorist movements
- Increase drivers' awareness of bicyclists while driving and when opening doors from an on-street parking space

Sidepaths

A sidepath is physically separated from motorized vehicular traffic by an open space or barrier within the street right-of-way or within its own right-of-way but parallel to the adjacent roadway. Pedestrians and other non-motorized

users typically also use sidepaths. Generally, they are located along arterial streets where:

- No on-street alternative is available due to physical constraints, limiting street width, high vehicle speeds and/or volumes
- A high amount of recreational cycling or cycling by children is expected, where turn movements, driveways and access points are limited, and where their inclusion is highly important for bikeway system connectivity

Sidepaths shall not be used to justify the elimination of on-street bicycle facilities for the parallel street. Sidepaths intended for dual-direction use must be physically separated from the street. This type of facility as part of the bikeway network should be limited, due to problems identified in the AASHTO guide.

Shared Use Paths (Off-Street Trails)

Trails play a key role in the bicycle transportation system, while also serving as key recreation facilities. Trails must be accessible to bicycles, connect to nearby neighborhoods and streets, and be designed to safely accommodate cyclists as well as other trail users to be included as a transportation route. (See Chapter 4) These facilities were generally located where:

- Logical corridors/rights of way (e.g., drainage/creek/river corridors, utility easements, abandoned railroads) are available
- Discontinuities in the street network make on-street connections impossible or unlikely in the near future
- Connections can be made to trails in neighboring communities or to the Regional Veloweb

The recommended off-street trail segments not identified through the agencies or efforts described earlier have been identified by City staff and/or the Bicycle Study Technical Committee as necessary to provide continuous linkages where the street network cannot, such as to provide bicycle access to major destinations, connections to isolated neighborhoods and across barriers.

SECTION 3.4 SPECIFIC CONSIDERATIONS

Arterial Streets

Arterial streets are often the only connection across major barriers such as rivers, railroads and freeways. These crossings are often at locations with high vehicular traffic volumes. Accommodations for cyclists are necessary to ensure safe mobility and access. In locations where arterials pass through pedestrian-oriented areas and limited streets widths preclude the provision of bike lanes, alternative means of enhancing bicycling access should be explored.

Sidewalks

Bicycling on sidewalks is highly discouraged in the *Bike Fort Worth* plan. Except where meeting the definition of sidepaths, this plan does not support the designation of sidewalks as bikeway facilities. It is common to see bicyclists riding on sidewalks, especially children and less-experienced adult cyclists, and along arterial streets with no on-street bicycle accommodations.

This is not ideal, but acceptable as long as pedestrian traffic is low and bicyclists behave like pedestrians.

Typical sidewalk widths in Fort Worth are four feet, which is not enough to accommodate pedestrians and cyclists concurrently. Designating sidewalks for bicycle use increases the potential for crashes between bikes and pedestrians.

Riding on sidewalks also makes cyclists less visible to motorists and increases the risk of automobile conflicts. Cyclists are five times more likely to be involved in a crash when riding on sidewalks than when riding on a street, even if that street has no bike facilities. (Source: *William Moritz, University of Washington: "Survey of North American Bicycle Commuters: Design and Aggregate Results," Transportation Research Board, Vol. 1578, 1997)*.

The Fort Worth Police Department Bicycle Patrol's normal practice is to ride on sidewalks during patrols; this is acceptable due to pedestrian-like speeds. When responding to a call that requires greater velocity, officers use the streets like any motor vehicle.

Downtown Fort Worth

Most downtown arterial streets have a narrow (12 feet or less) outside travel lane, on-street parking and relatively low speeds. Due to these factors, the bikeways in downtown were designated as signed and/or marked bikeways. In the future, routes with high vehicle volumes and speeds could be considered for dedicated bicycle lanes.

A unique opportunity in downtown Fort Worth recommended in this plan is the conversion the existing bus-only lanes on Throckmorton and Houston streets to shared bus- and bike-only lanes. City and the T staff support this conversion. The relatively low speeds on these streets, moderate headways for the bus routes operating on them, and anecdotal evidence indicating their use by bicyclists today support the conversion. Similar projects have had success in cities such as Tucson, Denver and Philadelphia.

Near Southside

The bikeways recommended in the Near Southside were developed considering the Council-adopted Near Southside Development and Street Standards. The Near Southside bike network includes a higher density of bike lanes than called for under this plan's network criteria. However, nothing precludes bike lanes on streets not identified in this plan if the design criteria are met and funding is available.

Regional Veloweb

The North Central Texas Council of Governments has undertaken an effort to update the recommended alignments that make up the Regional Veloweb, a regional bike/pedestrian trail network. A number of modifications to the recommended Regional Veloweb system within Fort Worth and its extra-territorial jurisdiction (ETJ) are included in this plan. Additional adjustments could still be required.

Chapter Four: Bicycling Facility Design and Engineering

As Fort Worth strives to become a bicycle friendly community, it is critical that bicycle facilities and design solutions chosen are appropriate for the user and the context of the facility. Application of these guidelines requires the use of engineering judgment when retrofitting streets to provide bicycle facilities.

This chapter provides design guidelines gathered from local, state and national best practices. It is intended to serve as a guide for city planners, engineers, and designers when designing and constructing bicycle facilities in the City of Fort Worth.

All bicycle facilities shall be designed to meet State and Federal design standards. The most recent edition of the national standards shall be followed. The following publications are referenced in this plan:

- *Guide to the Development of Bicycle Facilities*. The American Association of State Highway Transportation Officials (AASHTO) 1999.
- *Manual on Uniform Traffic Control Devices* (MUTCD). U. S. Department of Transportation, Washington, DC, 2009.
- *Americans with Disabilities Act Accessibility Guidelines*. U.S. Department of Justice, United States Access Board.
- *Designing Sidewalks and Trails for Access: Part Two - Best Practices Design Guide*. Published by U.S. Department of Transportation, Washington, DC, 2001.

SECTION 4.1 ON-STREET FACILITIES

Signage and pavement markings shall be consistent with the most recent version of the MUTCD and AASHTO guide. Any existing signage that does not conform should be replaced when the opportunity arises. The following recommendations are subject to change based on revisions of the MUTCD or the AASHTO guide. When constructing bicycle facilities, the use of additional signs consistent with MUTCD for warning, guidance or direction may be needed, as determined by the City Traffic Engineer.

Shared Roadways

Streets not designated as bikeways in this plan shall accommodate bicyclists, except where prohibited by law, such as on freeways. These streets should be designed according to the street design standards in the City of Fort Worth Master Thoroughfare Plan (MTP). The design standard for arterial streets includes a wide (15 foot) outside lane for shared use by vehicles and bicycles.

All streets may be designed to be more compatible to bicycle travel through bicycle-safe design features described in this section. A street that is not identified as part of the *Bike Fort Worth* bikeway network can be approved for any approved bikeway facility treatment if deemed appropriate through the project development process.

The City should consider the installation of Share the Road (Exhibit 15) signs on roadways with high levels of bicycling that are not identified as bike routes, a history of bicycle-related crashes or known hazard for bicyclists, and where bikeway facilities end or are incomplete.

Exhibit 15: Share the Road signage

Signed Routes

Signed routes are shared roadways that have been identified by signage as preferred bike routes. Routes on collector and arterial streets that do not have sufficient width or need for a bike lane may also include shared lane pavement markings (Exhibit 16). Installation of shared lane pavement markings (sharrows) should be continued. This pavement marking consists of a symbol of a bicycle below two chevrons that guide the path of a bicyclist.

Exhibit 16: Shared Lane Marking (Sharrow)

The *Bike Fort Worth* plan recommends using standard MUTCD bike route signage. It is recommended Fort Worth discontinue numbering routes, as done during implementation of the *1999 Bicycle Blueprint Plan*. The MUTCD bike route signs (Exhibit 17) should be used for shared lane routes. Shared lanes might be marked with shared lane pavement markings or sharrows. In place of route numbering, supplemental wayfinding signage is recommended for additional guidance to major destinations.

Exhibit 17: Bike Route and Supplemental Signage

Bike Lanes

A bike lane is a delineated space on streets for preferential use by bicyclists, intended to promote movements that are more predictable by both bicyclists and motorists on arterial and collector streets that have moderate traffic speeds and volumes. The preferred design for roadways with designated bike lanes is included in the cross-sections in **Appendix E**. Bike lanes should be constructed during initial infrastructure development to avoid costly retrofit projects.

Exhibit 18: Examples of Bike Lanes
(Source: City of Fort Worth)

Properly designed bike lanes have the following characteristics (sources: AASHTO guide and MUTCD):

- One-way in the same direction as the adjacent motor vehicle traffic;
- On both sides of two-way streets in order to avoid riding against on-coming traffic;
- On right side of one-way streets except where a bike lane on the left will decrease the number of conflicts (e.g., along a primary bus route with many bus stops);
- Minimum 4 foot width – excluding the gutter pan and seam and drainage inlets – with 5 foot preferred when next to curb;
- Minimum 5 foot width when next to designated parallel parking to provide space for bicyclists to avoid doors opening, with 6 foot preferred;
- Maximum 6 foot width to avoid use as a lane of travel for vehicles, unless shared with on-street parking;

- Bike lanes are not recommended next to head-in angled parking due to hazards posed by motorists backing into the bike lane with limited sight distance. Bike lanes may be included adjacent to back-in angled parking (Exhibit 19);

Exhibit 19: Example Back-In Angled Parking

- Parking is prohibited in the bike lane, unless 12 foot minimum/14 foot maximum shared bike/parking lane;
- Where parking is permitted, bike lane must be placed between the parking space and the travel lane;
- Lane is striped using paint, thermoplastic or similar; raised pavement markings can be a hazard to bicyclists and are not recommended;
- Stripe between bike lane and travel lane should be 6 inch wide, with a 4 inch stripe or crosses or T markings between bike lane and on-street parallel parking, if applicable;
- Surface that is smooth and free of structures, including flush utility covers; and
- A bicycle pavement marking and arrow to indicate direction of travel immediately after all intersections and as needed.

Proper treatment of bike lanes at intersections is a challenge. Treatments recommended in the AASHTO guide and MUTCD should be considered along with the street context when making decisions. Additional right of way dedication or acquisition might be required. Bike lane stripes should be dashed to mark the clearance zone needed at bus stops, indicating that buses will cross through the bike lane space to pull over to the bus stop.

Where bike lanes are constructed, drainage inlets, railroad crossings, traffic control devices, and other street design features need to be evaluated and retrofitted if necessary for bicycle use. Bike lanes must be swept and pavement markings maintained on a regular basis.

Bike Lane Sign

Bike lanes should be signed using the standard MUTCD bike lane sign. Supplemental signs call attention to upcoming or ending bicycle lanes. When signing a bike lane termination, Share the Road or Bicycles may use full lane signage may be used to remind motorists and cyclists that bicyclists will continue on the route. Bike lane signs may be accompanied by no parking signs where needed.

Sign spacing should be placed at consistent intervals and based on speed of bicycle traffic, block length, distances from intersections and other considerations, as described in the MUTCD. Other supplemental signage included in the MUTCD may be considered to promote safe bicycling conditions and provide wayfinding.

Exhibit 20: Bike Lane Signage

Bicycle Lane Pavement Markings

The bike lane should be separated from the travel lane by a 6 inch solid white line, with a 4 inch solid white line separating the bike lane and on-street parking, if applicable. The preferred marking for bike lanes include the symbol of a bicycle and a directional arrow. The words BIKE LANE can substitute for the bicycle symbol, but the symbol is preferred. The diamond symbol, traditionally used to indicate a restricted use lane, is no longer to be used. These markings should be placed on the far side of each intersection and more often if there are long, un-intersected sections of roadway.

Shared Bus/Bike Lane

This plan recommends a conversion of the existing bus- and right-turn only lanes on Throckmorton and Houston streets in downtown Fort Worth to exclusive lanes for buses, bicyclists and right turns. Many local cyclists reported that they already used the bus-only lanes since there is relatively little bus traffic during most parts of the day. Successful implementation of this type of conversion was found in similar downtown environments across the United States, including Philadelphia, Madison and Tucson.

These streets provide north-south movement through downtown. Accommodating bicyclists at these locations would greatly improve mobility and access for cyclists getting to and through downtown.

Twelve feet is the recommended minimum width of shared bus/bike lanes. Implementation should be coordinated between the City of Fort Worth Transportation and Public Works Department and the Fort Worth Transportation Authority (The T).

Exhibit 21: Example Shared Bus/Bike Lane Signage

Bike Lane Retrofits and Road Diets

The *Bike Fort Worth* plan proposes dedicated bicycle lanes on existing arterial and collector streets. Where a bike lane is recommended on an existing roadway, engineering feasibility will be required. The following process, based on a modified version from the City of Seattle, is recommended:

Analyze the existing street cross section and traffic characteristics. The following questions should be asked:

- Can any existing lanes (e.g., travel lane, center turn lane, parking lane) be narrowed?
- Can any existing lanes be removed (also referred to as a road diet)?
- Can the existing pavement be widened, or can the curbs be moved?
- Can medians or parkways be narrowed?

Consider the effect any changes in the existing cross section will have on the following factors in relation to the street:

- Pedestrian needs (buffers and sidewalk widths)
- Roadway capacity
- Traffic volume and speed
- Roadway grade
- On-street parking demand & turnover
- Heavy vehicle traffic (trucks and buses)
- Horizontal alignment (curved roadway sections)
- Physical constraints

If analysis finds that the desired bike lane is feasible, the project can move forward to implementation. If there are constraints, alternatives should be developed with the goal of improving bicycle safety and access to the highest degree possible. Alternative designs should be developed with consideration

of the recommendations of *Bike Fort Worth.* Engineering alternatives should be explored with the goal of improving bicycle safety and access, and providing the most suitable bicycle facility given operational and environmental constraints within the corridor.

When considering a possible road diet conversion of an existing 4-lane undivided arterial to a 3-lane street with bike lanes, the guidelines included in the 2009 Master Thoroughfare Plan Street Development Standards should be followed.

Drainage Inlets

Whether identified as a bikeway facility or not, careful consideration of conditions for cyclists must be undertaken when designing roadways. Drainage inlet down-slopes protruding into travel lanes pose a cycling danger (Exhibit 22). Recessed/inset inlets save shared lane space for bicyclists. It is critical that drainage inlets not pose an additional hazard or barrier to cyclists.

Exhibit 22: Drainage Inlet Design

Hugging the curb, a common practice for inexperienced cyclists, in these situations could be extremely dangerous due to the design of the drainage inlets. The arterial streets shown in the image on the left in Exhibit 21 have no specific accommodation for bicyclists, and their relatively high speeds and traffic volumes require cyclists either to take the entire outside lane or hug the curb. Inlets placed within the parking bays or dedicated bicycle lanes should be considered.

Paved Shoulders

When widening or constructing county roads in rural parts of the City of Fort Worth and its extra-territorial jurisdiction, Tarrant County will often include 6-foot paved shoulders that are conducive to bicycle use.

Intersections

There are a number of bicycle-related design challenges at intersections, in addition to those discussed previously regarding the treatment of bike lanes. Complex intersections present a particular challenge for bicyclists. Design treatments can help bicyclists travel through intersections and make drivers of vehicles aware of the presence of bicycles. Treatments undertaken shall be consistent with the MUTCD and AASHTO guidelines.

Traffic Signals

The greatest risk to bicyclists traveling through intersections is during the clearance interval and actuated phases of low traffic flow. A bicyclist needs enough time to react, accelerate and cross the intersection within the allotted green phase. It is recommended that Fort Worth install and calibrate equipment (loop detectors, cameras, etc.) to detect bicyclists at traffic signals along the City's existing and proposed bikeways.

Exhibit 23: Standard Bicycle Loop Detector Signage

For traffic signals where bicyclists are having difficulty being detected, bicyclists should be directed by pavement markings to the spot above the loop where a bicyclist should be positioned to trip the signal (Exhibit 23). Consideration should be given to bicyclists in the timing of the traffic signal to provide an adequate clearance interval for bicyclists who enter the intersection at the end of a green phase. The AASHTO guide provides guidance on determining the amount of time needed for bicyclist clearance intervals and start-up green phases.

Railroad Crossings

Skewed or diagonal at-grade railroad crossings can pose a significant crash hazard to bicyclists if the front tire becomes trapped. To avoid this hazard, on-street bicycle facilities should enable the bicyclist to approach the track at an angle closer to 90 degrees (Exhibit 24) without having to swerve into motor vehicle travel lanes. This widened area should provide sufficient space on the approach and departure of the crossing to transition back to the on-street facility.

Where this measure is not feasible, a filled or rubberized flangeway can also help reduce, but not eliminate, the risk of a trapped wheel. At-grade crossings should be improved to ensure safe crossings for motorists, bicyclists and pedestrians.

Exhibit 24: Example Bike Lane Railroad Crossing
Madison, WI

Bridges

Bridges are important for providing connectivity throughout the Fort Worth bikeway network. Accommodations for bicyclists should be provided on bridges and their approaches and access ramps, unless prohibited by law. In the interim, bicycle access should be improved on existing bridges on roadways identified as bikeways. Long term, existing bridges with no bicycle accommodation should be retrofitted with bicycling facilities.

All new bridges should include a wide outside lane or dedicated bike lanes in addition to pedestrian sidewalks. Wide (minimum 10 foot) sidewalks physically separated from vehicular travel lanes may also be provided as facilities for shared use by bicyclists and pedestrians, though it should be recognized that many cyclists prefer to remain in the travel lanes. Where bicyclists will be traveling next to a handrail, it should have a minimum height of 54 inches.

Grade Separated Crossings

Where shared use paths intersect major highways, railroads, and other barriers, it may be necessary to provide a grade-separated trail crossing. These facilities should be designed in compliance with the Americans with Disabilities Act, and in consideration of challenges regarding lighting, screening, drainage, personal security and aesthetics.

Highway underpasses often need lighting for safety and visibility due to the prevalence of automobiles making many different turn movements and a need for motorist-directed signage indicating the potential presence of cyclists. Bike/pedestrian-only underpasses also have special need for lighting due to safety, visibility and security concerns.

SECTION 4.2 OFF-STREET FACILITIES

Signage protocols for off-street trail facilities should be determined by the appropriate jurisdictional agency, but when forming part of the bicycle transportation system, bike trails shall also be signed and marked consistent with the AASHTO guide and the MUTCD.

Shared Use Paths

Shared use paths (also referred to as multi-use trails) such as the Trinity Trails are an important component of Fort Worth's bicycle transportation system. To be included as part of the bicycle transportation network, the following characteristics of shared use paths should be met:

- Exclusive right of way
- Minimal conflicts with motor vehicles
- Provide for two-way travel
- Paved (hard) surface
- Minimum 10 foot width, 12 foot preferred (8 foot is acceptable if physical or right of way constraints are present)
- Adhere to Americans with Disabilities Act Accessibility Guidelines (ADAAG)

Exhibit 25: Shared Use Paths
Trinity Trails - Fort Worth

Shared use paths intended to become a part of the Regional Veloweb should meet the NCTCOG's criteria for those facilities. All facilities should be designed consistent with the AASHTO guide's standards for slopes, clearances, and other alignment aspects. Shared use paths should include signage and markings consistent with local procedures and AASHTO guidelines. It may be desirable in high-use segments of shared use paths to construct wider (14 foot) trails or separated facilities for pedestrians and bicyclists.

Sidepaths

Sidepaths are shared use paths located adjacent to the roadway. Sidepaths are often located on one side of a road and are intended to provide two-way bicycle and pedestrian travel. Sidepaths should be at least 5 foot from the adjacent street curb or be separated by a physical barrier. AASHTO has identified a number of challenges that must be addressed when considering the construction of sidepaths.

Exhibit 26: Sidepath Example

Where sidepaths are constructed, they should not be considered a substitute for on-street bicycling improvements even when the path is located adjacent to the street. Many bicyclists will find it less convenient to ride on these paths compared with the streets, particularly for utilitarian trips.

SECTION 4.3 BICYCLE RACKS AND PARKING FACILITIES

This plan recommends the adoption of the Bicycle Parking Guidelines established by the Association of Pedestrian and Bicycle Professionals (APBP) in 2002. The current guidelines are attached in **Appendix F**. The type, design, spacing, and siting of bike parking facilities in Fort Worth should follow these guidelines.

Short-term parking facilities intended for short periods, usually bike racks.
Long-term parking facilities intended for longer periods, usually bicycle shelters or lockers.

Parking Facility Designs

Recommended bike rack designs have common factors that include supporting the bicycle frame in at least two contact points and accommodating the most widely used locking devices such as U-locks. Ribbon-style racks and racks that only secure the bike by the front wheel are discouraged. Racks should have a protective coating that will preserve the rack material and limit replacement needs. Cyclists and the public should easily recognize bike racks.

Location and Spacing

Bicycle rack siting should be planned with the convenience and security of bicyclists in mind. The location and spacing guidelines in the APBP guide are recommended for Fort Worth.

SECTION 4.4 INNOVATIVE TREATMENTS

A number of cities throughout the country have conducted demonstration projects of unique and experimental bikeway facility designs. Many of these designs are recommended for inclusion in the new versions of the AASHTO Bicycle Facility Design Guide and Manual on Uniform Traffic Control Devises (MUTCD). It is recommended that the City of Fort Worth consider the following (Exhibit 27) design treatments where appropriate.

On-Street Treatments

Bicycle Boulevards

Bicycle Boulevards are streets with special design treatments, traffic calming measures and pavement markings that indicate bicycle priority over motor vehicles

Bike Boxes

At signalized intersections along streets with bike lanes, areas in front of the stop bar reserved for cyclists to prepare safely for a green signal within view of motorists behind.

Colored Bike Lanes

Traditional bike lanes painted to stand out to both bicyclists and motorists.

Bicycle Traffic Signals

Specialized traffic signal usually used with at-grade crossings between high-volume bike facilities and capacity roadways.

Segregated Bicycle Facilities

Contra-flow Bike Lanes

Bike lanes physically separated by raised curbs or other physical barriers that provide for bicycle travel in the direction opposite that of the adjacent vehicular traffic.

Cycle Tracks

Exclusive bicycle facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane (Source: Alta Planning & Design)

Exhibit 27: Example Innovative Treatments

Chapter Five: Policy and Program Recommendations

The cities most successful at increasing bicycling have done so with a comprehensive focus that includes municipal policies, statutes and ordinances, as well as substantial efforts regarding bicycle safety, education, enforcement, encouragement and promotion. The following sub-sections include recommendations for Fort Worth regarding these efforts.

SECTION 5.1 CITY OF FORT WORTH BICYCLE PLANNING PROGRAM

Bicycle/ Pedestrian Program

The City of Fort Worth should establish a program office under the dedicated specifically to manage implementation of the recommendations of *Bike Fort Worth*, as well as other pedestrian and bicycle programs.

As a first step towards this vision, the City should designate a Bicycle Coordinator to coordinate implementation of this plan, to attend to and coordinate response to bicycle network maintenance and operations issues, and to advocate for the needs of cyclists as other transportation and land use projects proceed through the development process. *Primary responsibility: Planning and Development Department*

Bicycle Advisory Committee

A Bicycle Advisory Committee typically includes representation from interested members of the public and participation from City staff and other relevant agencies so that issues can be addressed. Fort Worth's Bicycle Advisory Committee would provide direction on plan implementation and bicycling and guide development of future updates to *Bike Fort Worth. Primary responsibility: Planning and Development Department.*

Bike Fort Worth Website

A City of Fort Worth website dedicated to bicycling can provide an important way of communicating with bicyclists and residents interested in bicycling. *Primary responsibility: Planning and Development Department.*

Facility Maintenance Program

This program would assist in protecting the City's infrastructure investments and providing bicyclists an inviting and safe bicycling environment. It would establish a centralized structure for residents and cyclists to report problems with debris, lane striping, poor surface conditions and other maintenance issues on bikeways and ensure prompt response to these requests. *Primary responsibility: Transportation and Public Works Department. Secondary: Bicycle Coordinator.*

Bicycle Count Program

Conduct regular, annual bicycle counts on bikeways to track level of service and evaluate progress towards the goals of *Bike Fort Worth. Primary responsibility: Bicycle Coordinator.*

Bicycle Crashes

A reliable data source does not currently exist for bicycle-related crashes in Fort Worth. Some data can be obtained through the Texas Department of Public Safety and the City of Fort Worth Police Department. It is recommended that the City's Bicycle Coordinator collect crash and injury reports that are more reliable than the current method. *Primary responsibility: Bicycle Coordinator. Secondary: Police Department.*

SECTION 5.2 CITY ORDINANCES, POLICIES, AND PROCESSES

Complete Streets

Complete Streets is a philosophy of addressing the needs of all modes of transportation, including walking and bicycling. Pedestrian and bicycle facilities are not additions to streets, but part of them. This approach includes providing for public transit, ADA and facilities for people of all ages and abilities. The *Bike Fort Worth* plan recommends that the City of Fort Worth adopt a policy and that the Complete Streets philosophy be incorporated into the planning, design, construction and maintenance phases of all transportation projects under the City's jurisdiction. *Primary responsibility: Planning and Development.*

Master Thoroughfare Plan

The City should amend the Master Thoroughfare Plan and its Street Development Standards to incorporate the cross-sections referenced in **Appendix E** as the preferred cross-sections for arterial and collector streets recommended for bike lanes in the bikeways network **(Appendix A)**. It is recommended that Regional Veloweb rights-of-way be preserved and acquired.

The Street Development Standards, referenced in the City's Subdivision Ordinance, should be amended to include additional, enforceable street connectivity requirements to improve bicycling within and between subdivisions, including shorter maximum street block lengths, more required connections to adjacent properties, and more limitations on cul-de-sacs or dead-end streets if they fail to provide bicycle and pedestrian connections. *Primary responsibility: Planning and Development Department. Secondary: Transportation and Public Works Department.*

Discontinue Granting Waivers

Some new sections of arterials have been constructed without the 15 foot wide outside lane for mixed vehicle/bicycle travel called for in the Master Thoroughfare Plan Street Design Standards. If roadway construction projects are designed to accommodate bicyclists from the beginning, the implementation can be simple and inexpensive. Retrofitting roadways after construction costs more due to widening the roadway, acquiring additional

property and mobilization of construction equipment. *Primary responsibility: Transportation and Public Works Department. Secondary: Bicycle Coordinator.*

City Staff Training

Staff involved in development of roadway infrastructure should be trained on implementation and design of the bicycle network. *Primary responsibility: Bicycle Coordinator. Secondary: Transportation and Public Works Department.*

Master Trail Plan

A number of separate entities plan, finance, construct and maintain trails in Fort Worth, with varying levels of coordination. Developing a cohesive trail plan for the City of Fort Worth would provide clarity to staff involved in the development review process to aid in the preservation and acquisition of land needed for trail corridors. It would help focus on the highest priority trail segments and projects, a necessity when funding opportunities arise and reduce the possibility of duplicative efforts. *Primary responsibility: Parks and Community Services Department. Secondary: Bicycle Coordinator, Program Management Office.*

SECTION 5.3 CITY FACILITIES

The provision of accessible and safe bicycle parking and end-of-trip accommodations such as shower and change facilities is vital to creating a bicycle-friendly environment.

The City owns, operates and/or provides services from many facilities throughout the city. Providing bicycle accommodation at city facilities would show support for alternative transportation modes, and set an example for the community.

Bicycling Accommodations

Short-term Parking

The City of Fort Worth should provide short-term bicycle parking racks in a covered location near the entrance of City buildings. All new and existing buildings that offer government services should have short-term parking, provided at the time of construction for new buildings and retrofitted into existing buildings. *Primary responsibility: Transportation and Public Works Department – Facilities Division. Secondary: Bicycle Coordinator.*

Long-term Parking

Long-term parking offers bicycle commuters highly secured parking and protects bicycles from the weather. Existing City-operated parking garages should be evaluated for bicycle parking capacity. Future parking garages should include bicycle parking. *Primary responsibility: Transportation and Public Works Department – Facilities Division. Secondary: Bicycle Coordinator.*

Showers/lockers

If showers/lockers are available in government buildings, they should be made accessible to employees who bike, run or walk to work. Future City facilities should include shower and change facilities for employees unless there is a

lack of need due to the size or location of the facility, or other constraints. The City should collaborate with operators of other facilities with showers/lockers to allow Fort Worth employee access. *Primary responsibility: Transportation and Public Works Department – Facilities Division. Secondary: Bicycle Coordinator.*

City Bicycle Fleet

The City should explore providing a small fleet of bicycles for City staff, similar to the Texas Christian University Purple Bike Program, which rents bicycles to students, faculty and staff. A number of cities nationwide have established bicycle fleets. This program is consistent with the City's sustainability efforts. It could be used a model for local businesses that might benefit from a similar program. *Primary responsibility: Equipment Services. Secondary: Bicycle Coordinator.*

SECTION 5.4 END OF TRIP FACILITIES

Bicycle Rack Program

The City should explore the establishment of a program to install bicycle racks within public right of way, upon request from adjacent property owners, and subject to available funding, to assist in addressing the existing shortage of bicycle parking. Criteria should be developed to analyze requests, including demand, proximity to bikeway facilities, surrounding land uses, and proximity to transit.

A funding program should be considered, similar to those in other cities, whereby the City purchases and provides bike racks to qualifying property owners who are then responsible for the costs of installation and maintenance. *Primary responsibility: Bicycle Coordinator. Secondary: Transportation and Public Works Department.*

Bicycle Commuter Station

Many cities across the country have established bicycle stations serving areas of high bicycle usage such as downtowns, school campuses, major transit stations and recreational destinations. Commuter bicycle stations often contain these elements:

- secure long term bicycle parking, sheltered from the elements
- shower/change facilities
- information on bicycle routes and destinations, and transit services
- bicycle repair and rental services
- retail bicycle equipment and accessory stores

Exhibit 28: Bicycle Commuter Station, Long Beach CA

A commuter bike station can serve as a prime end-of-trip facility by offering numerous services to bicycle commuters, such as locker rooms, showers, and secured bicycle parking and storage.

Commuter stations are ideally located at or near major transit centers like The T's Intermodal Transportation Center (ITC) where The T's bus transfer center, commuter rail (TRE), AMTRAK and Greyhound services are located. *Primary responsibility: Bicycle Coordinator.*

Temporary Bike Parking

The City should continue its collaboration with The T, business groups, bike shops, colleges and other organizations to ensure that bicyclists' parking needs are accommodated at major public events in Fort Worth. Bike corrals staffed by bike retailers are a regular sight at other major events in the City. This program also forms a unique opportunity to promote the City's efforts to improve bicycling. *Primary responsibility: Bicycle Coordinator. Secondary: Community Relations Department.*

Bike Parking Ordinance

Many cities report a measurable increase in bicycle trips following the creation of bicycle parking requirements. City staff should review zoning regulations adopted by other cities to develop regulations for Fort Worth. *Primary responsibility: Planning and Development Department.*

The amount and type of bicycle parking required should depend on the projected need, land use, the number of employees or residences or other factors. Bicycle parking should always be conveniently located, should not interfere with pedestrian access, and should be sheltered from the elements whenever possible.

SECTION 5.5 BICYCLING EDUCATION

A strong education component is necessary to inform both motorists and bicyclists on the proper ways to share roadways. Bicycling education helps inexperienced cyclists gain the confidence necessary to ride on the City's trails and streets. Education can also ensure that bicyclists and motorists understand their shared responsibilities to make roads safer.

Bicycling Education Program

This program should be designed to educate the public on safe bicycling behavior and safe interaction on the roads between cyclists and motorists. The program should target all users and abilities. Motorist interactions with cyclists should be specifically addressed.

Several school districts currently educate students on bicycle safety through a series of lessons in their physical education programs. This plan encourages all schools serving the Fort Worth area to educate children on safe bicycling behavior. This education should continue into junior and senior high school to help students further develop safe riding skills and encourage them to travel safely by bicycle. *Primary responsibility: Community Relations Department. Secondary: Bicycle Coordinator.*

Safe Routes to School

Safe Routes to School is a federally funded program administered in Texas by the Department of Transportation (TxDOT). The City's Transportation and Public Works Department has worked with area schools to provide safe walking routes and street crossing projects and programs.

These efforts should be expanded to qualify for Safe Routes to School funding. Safe Routes to School programs encourage safe walking and biking to school through education programs and the construction of infrastructure, including sidewalks, paths, bike lanes, crosswalks, signals, and signage. These programs encourage greater enforcement of traffic laws, public education and improving street safety.

Identifying and improving walking and bicycling routes to school is one of the most effective means of reducing morning traffic congestion and addressing existing safety problems. The City should continue to work with district and school personnel and parent organizations to develop Safe Routes programs citywide. *Primary responsibility: Transportation and Public Works Department. Secondary: Bicycle Coordinator.*

SECTION 5.6 BICYCLING ENCOURAGEMENT AND PROMOTION

A bicycling encouragement program is needed to improve bicycling as a travel option. Funding and staffing this program will be critical, and partnerships will be necessary. Large-scale events consume time and resources. However, the benefits to the community to promoting bicycling will likely outweigh the cost.

Employers can be encouraged to promote bicycling as a commuting option to their employees by pointing out the positive health benefits of bike commuting. By providing end-of-trip facilities and incentives for employees, employers can help make Fort Worth more bicycle friendly.

Bicycle Commuter Guide

The publication of a citywide bicycle map is a great way to inform the public of existing bicycle facilities and destinations. The map should contain bicycle commuting guide, with tips and other bicycling information. The map and commuting guide should be made available in print and online, and should be distributed at promotional events. *Primary responsibility: Bicycle Coordinator. Secondary: Community Relations Department.*

Bicycle Promotion

It is recommended that the City take a primary role in the staging of major bicycling events such as Bike to Work Day and the Clean Air Bike Rally that promote bicycling and the City's efforts to become a bicycle friendly community. *Primary responsibility: Community Relations Department. Secondary: Bicycle Coordinator.*

SECTION 5.7 LAW ENFORCEMENT

Violation Enforcement

The Fort Worth Police Department should ticket both motorist and bicyclist violators for running red lights, speeding, wrong-way riding, reckless driving/riding and failure to yield. Enforcement will encourage safe operation of both bicycles and motor vehicles. Many bicyclists have experienced aggressive or inattentive drivers on roadways and often fear injury. Respondents to the 2007 bicycling questionnaire indicated that stronger enforcement of traffic laws would encourage more bicycling in Fort Worth. *Primary responsibility: Police Department.*

Education/Training

The Police Department should continue to emphasize education and training law enforcement personnel on the rights and responsibilities of cyclists and motorists. Officers should be made aware of the common problems between motorists and cyclists and the proper ways to teach safe sharing of the road.

Law enforcement should be trained in bicycle/motorist crash types and understand and focus on violations that may lead to such crashes. Officers should be trained to provide consistent reporting of bicycle-related crashes for more detailed data analysis.

Bicycle Patrol

A small bicycle patrol team exists within the Police Department, serving downtown Fort Worth. Texas Christian University also has a bike patrol component in its police department. A police bicycle patrol can help reinforce bicycling as a legitimate mode of transportation.

Traffic Ordinances

These ordinances are recommended for consideration by the Fort Worth Police Department and the Fort Worth City Council to increase bicyclist safety:

- Require motorists to provide a minimum of three feet clearance while overtaking a bicycle.
- Prohibit motorists from opening a vehicle door into oncoming traffic.
- Prohibit parking in designated bike lanes.
- Prohibit bicyclists from riding on standard-width sidewalks in areas with high pedestrian traffic or a history of bicycling crashes on sidewalks.
  Primary responsibility: Police Department. Secondary: Bicycle Coordinator.

SECTION 5.8 BICYCLE ACCESS TO TRANSIT

Bicycle Accommodation

On-going and future transit studies should consider bicycle accommodations in the design of station areas, along roadways leading to the stations, along the transit corridors, and on the vehicles. Options within major transit corridors include accommodation of bicycles on transit vehicles, a parallel bike path or a bikeway on an adjacent parallel roadway.

Bike parking should be provided at stations consistent with the recommendations in this report. It is recommended that bikeway projects that provide or improve access to transit facilities receive higher implementation priority. *Primary responsibility: Fort Worth Transportation Authority. Secondary: Bicycle Coordinator.*

SECTION 5.9 RECOMMENDATIONS TO OTHER AGENCIES

Texas State Legislature

It is recommended that the Legislature support and pass the following initiatives:

- A law requiring motorists to allow at least three feet of distance when passing a bicyclist on a public street;
- Statewide Complete Streets policy;
- A law authorizing Metropolitan Planning Organizations (MPOs) to select projects funded by the Statewide Transportation Enhancement Program (STEP); and
- Increase the emphasis on safe interaction between motorists and bicyclists in driver education classes, training and examinations.

Texas Department of Transportation

It is recommended that the Texas Department of Transportation undertake the following initiatives:

- Allow local governments to fund, construct and designate bicycle facilities on roadways under State jurisdiction in coordination with TxDOT districts;
- Develop statewide bicycle facility design and planning guidelines;
- Develop a statewide bicycle plan;
- Require accommodation of bicyclists along and across State highways except where bicycling is prohibited by law;
- Consider the needs of bicyclists when determining the preferred maintenance treatments on State highways;
- Allow both on- and off-street bicycle accommodations on projects going through the State approval process when consistent with local bicycle transportation plans; and

- Require that staff trained in bicycle transportation planning and design review and comment on the bicycling accommodation components of State highway projects.

Regional Planning

It is recommended that the North Central Texas Council of Governments/ Regional Transportation Council adopt a regional complete streets policy and align investment decisions with the policy.

SECTION 5.10 ROADWAY CONSTRUCTION/DETOURS

Construction activities often present a hazardous environment to bicyclists due to debris, travel lane modifications and traffic. Provisions for cyclists in construction areas are often overlooked. Accommodations for bicyclists should be required when on-street bikeways and trails are closed due to construction. *Primary responsibility: Transportation and Public Works Department, Water Department.*

SECTION 5.11 MAINTENANCE

Bicycle facilities require maintenance. Cyclists identified bike facility maintenance as a major problem in the public outreach phase of the planning process. The City should provide regular maintenance of existing on- and off-street bikeway facilities. The following recommendations are necessary to keeping the existing and future bikeways in good condition. *Primary responsibility: Transportation and Public Works Department.*

- Give priority to streets that have bikeways in the prioritization and evaluation of streets for maintenance, restriping or repaving;
- Include bikeway striping, marking and/or signage recommended in the *Bike Fort Worth* plan in street maintenance, rehabilitation, and reconstruction projects;
- Assign priority to streets with bike lanes and routes when scheduling street sweeping activities;
- Off-street facilities should be maintained consistent with the policies of the managing jurisdiction;
- Maintenance and resurfacing of streets should include inspection for compatibility with safe bicycling riding;
- Repair surface defects that may cause bicyclists to lose control, giving priority to the outside lane of on-street signed routes and striped bike lanes;
- Require that minor repairs or improvements include a level or tapered transition to the existing pavement surface to increase bicyclist safety; and
- Establish a routine inspection procedure for all on-street bikeways.

Chapter Six: Implementation and Financial Plan

This chapter identifies steps to implement the recommendations of the *Bike Fort Worth* plan, including project prioritization, implementation strategies, cost estimates and potential funding sources.

SECTION 6.1 PROJECT AND PROGRAM PRIORITIZATION AND PHASING

Project Identification

The primary bikeway infrastructure projects identified from the recommended facilities categories in the map in **Appendix A** are split into the following categories:

On-Street

- Constructing bike lanes on future arterial streets
- Retrofitting existing collector and arterial streets with bike lanes
- Installing signage or signage and pavement markings along existing streets

Off-Street

- Constructing trails or trail connections (separate right of way)
- Constructing sidepaths (trails parallel to and within the right of way of streets)

Project Prioritization/Phasing

The prioritization of projects in this plan is a guideline for spending infrastructure funding. As funding becomes available, the prioritization is intended to identify the preferred order of implementation. Priorities might change over time as bicycling or development trends change, or as funding opportunities arise.

City staff should develop and review a prioritized list of projects at regular intervals along with updates of the bicycle transportation plan. Other infrastructure projects, such as bicycle related improvements to intersections and other spot facilities can be addressed through the development projects.

The following order of priority is recommended for project implementation:

Priority I: Projects that are fully funded or can be included as part of a capital improvement program or maintenance project.

- Bike lanes on fully funded roadways, when consistent with the recommendations in this plan.
- Bike lanes retrofitted on streets during reconstruction or repaving projects, if sufficient width exists to accommodate the bike lane, and can be included within the project.
- Funded trail projects

Priority II: Projects that complete segments of the bikeway network corridor backbone (**Appendix C**). The bikeway corridor backbone represents a primary or arterial bikeway network intended to serve bicyclists much like the freeway system serves motorists. Specific facilities within the corridors are not identified. Projects that complete segments of the backbone should receive priority. These projects could include improvements along the backbone segments as well.

Priority III: Projects that provide bicycle access to major destinations such as transit, schools, parks, Trinity Trails/Regional Veloweb, libraries, urban villages, etc.

Priority IV: Projects providing connectivity between higher priority segments but that do not directly provide access to major destinations.

Priority V: Projects located in the City's extra-territorial jurisdiction. These projects are very long-term and unless needed for major regional connections, would not be provided until the area is incorporated into the City.

Prioritization of Priority Categories

It is recommended that the Fort Worth bicycle program staff consider the following criteria when prioritizing projects within the priority categories listed above:

- Overcoming gaps in bikeway system: connects existing, funded or proposed bikeway facilities
- Connectivity: number of intersecting existing, funded or proposed bikeway facilities per mile of the proposed facility
- Connections to fixed route transit stations and bus lines
- Proximity to bicycling destinations
- Within or close to urban villages or mixed use areas
- Public requests for bicycling improvements
- Proximity to Regional Veloweb, location in or near NCTCOG's identified Bicycle Transportation Districts
- Located along a corridor with a history of bicycle-related crashes
- Located far from existing bikeways
- Located in census tracts with low automobile ownership levels

Program Implementation

The educational, enforcement and encouragement activities recommended in this plan are critical. It is recommended that they be implemented as soon as possible. Many of these activities could be implemented via partnerships.

SECTION 6.2 PLANNING LEVEL COST ESTIMATES

This plan does not include a specific recommendation regarding an average annual funding commitment target toward the construction of the recommended bikeway facilities. However, it is recommended that the City consider dedicated resources towards bikeway development that implements this plan. Cities of similar size with similar bicycle infrastructure plans researched in this effort typically request annual bikeway construction program budgets of between $1,000,000 and $5,000,000.

Facility Type	Miles	Cost/Mile*	Cost*
Bike Routes	215.5	$6,000.00	$1,293,000.00
Bus/Bike Lanes	1.4	$10,000.00	$14,000.00
Bike Lanes	286.4	$20,000.00	$5,728,000.00
Bike Lane w/ Road Diet	35.8	$40,000.00	$1,432,000.00
Bike Lane w/ Road widening	35.8	$250,000.00	$8,950,000.00
Total Proposed On-Street	***574.9***		***$17,417,000.00***
Off-Street Path	163.1	$800,000.00	$130,480,000.00
Sidepath	24.0	$500,000.00	$12,000,000.00
Total Proposed Off-Street	***187.1***		***$142,480,000.00***
GRAND TOTAL	***762.0***		***$159,897,000.00***

*Estimated planning level construction costs, maintenance not included

Exhibit 29: Recommended Bikeways Cost Summary
Fort Worth ETJ excluded

For planning purposes, the cost for bike lane projects was divided into: 80% signing and striping bike lanes on new facilities; 10% signing and striping bike lane with road diet (removing old pavement markings and re-striping) of existing street; and 10% signing and striping bike lane with widening (acquiring right of way to move curbs out) of existing street. Actual costs will vary, more so for projects where right-of-way must be acquired, existing bridges must be retrofitted, or where grade-separated crossings are needed.

Costs for recommended programs vary widely depending on program size and scope. It is recommended that the City of Fort Worth begin by committing staff time and an initial financial commitment of $100,000 annually towards these programs, increasing the amount to $300,000 annually by 2015.

Estimated planning level costs for off-street facilities were calculated an average from the per-mile construction costs quoted in a variety of bicycle plans, based on a 10 foot trail. Other costs include grading, obstruction clearance and barrier construction where adjacent to steep slopes. The cost estimates assumed the need for bridge structures since many if not most trails are located in low areas/creek beds/along rivers, they often need bridge structures due to geographical constraints.

Maintenance program implementation will require significant resources. For both trails and sidepaths, maintenance costs average approximately $10,000 per mile per year. On-street bike routes and lanes should be swept regularly by the City with normal street sweeping operations, and additionally when needed. Proper maintenance of on-street bikeways is also estimated to cost approximately $10,000 per mile per year.

SECTION 6.3 POTENTIAL FUNDING SOURCES

The recommended network capital costs are approximately $160,000,000. Some potential funding sources include:

Federal Funds	Congestion Mitigation and Air Quality Improvement (CMAQ)
	Department of Energy, EECBG Grant
	Federal Earmarks
	National Recreation Trails Fund (TX Parks and Wildlife)
	Safe Routes to School
	Transportation Enhancement Grants

Regional Funds (NCTCOG)	Local Air Quality Program
	Regional Toll Revenue
	Sustainable Development Grants

Local Funds	Bond Programs
	Fort Worth Transportation Authority (The T)
	Gas Well Revenues
	Tarrant County
	Tax Increment Financing and Public Improvement Districts

Other Funds	Adopt a Bikeway (Maintenance)
	Private development
	Public/Private Partnerships

SECTION 6.4 IMPLEMENTATION STRATEGIES

The implementation stage of the plan is a critical component that identifies a long-term strategy to develop the proposed bikeway network. This section outlines performance measures to track progress of the implementation.

Leveraging and Matching Funds

The City should dedicate local funding to be available to leverage federal and regional dollars in future calls for projects in which bikeway implementation is an eligible activity.

Implementation Responsibility

It is recommended the City create and fill a position for a Bicycle Coordinator to manage the overall Bicycle Program. The bicycle coordinator will be responsible for implementing, evaluation and recommending changes. The

program coordinator should be supported by additional staff and resources as needed to help reach program goals.

Strategic Priorities

It is critical to capitalize on efficiencies whenever possible, such as including facilities in capital or maintenance projects and partnerships with other jurisdictions and the private sector.

Prioritization of Projects

It is recommended that prioritization be revised regularly based on system connectivity opportunities, cost benefit, safety, demand, funding availability and project feasibility.

Bicycle Planning Integration

To ensure success of the Bicycle Program, the plan must be adopted and integrated into the City's capital and maintenance programs and the development and building review processes.

Bike Plan Updates

A comprehensive update of this plan should be conducted on a regular basis to account for growth, measure progress, update existing facilities and revise City standards. It is recommended the plan be updated at least every five years.

SECTION 6.5 PERFORMANCE MEASURES

This plan identified three goals to measure the progress of implementation: an increase in bicycling, a decrease in bicycle-related crashes, and designation as a Bicycle Friendly Community by the League of American Bicyclists. Measuring the effectiveness of the *Bike Fort Worth* plan can be performed by the following methods:

- Establish baseline bicycle counts;
- Track mileage of constructed facilities;
- Calculate the percentage of residents who have convenient access to existing bikeways each year;
- Track the number of bike racks or storage spaces added each year by the City and, if known, by the private sector;
- Track bike rack usage on buses and the number of bikes on board commuter trains;
- Identify unsafe areas and potential solutions to reduce bicycle related crashes; and
- Conduct public opinion surveys relating to the effectiveness of the bicycle program.