

APPENDIX C: Pedestrian/ Bikeway Regional Plan Summary

Purpose

The purpose of the Houston-Galveston Area Council's (H-GAC) Regional Bikeway Plan is to serve as a guide for investment, interagency coordination and best practices in developing facilities for bicyclists in the 8-county Houston-Galveston Transportation Management Area (TMA). The following is a summary of the Regional Bikeway Plan; the complete document is available on the Publications page at www.H-GAC.com/go/pedbike.

Introduction

A bicycle is defined as a vehicle in the Texas Transportation code (Section 551.101(a)). As such, a person operating a bicycle has both the same rights and responsibilities as the driver of a car. Bicyclists also share motorists' preferences for smooth pavement, minimum interruptions to movement, and direct access to their trip destinations. These conditions can be achieved with on-street (bike lanes, signed routes on shoulders, bike routes on suitable streets with low traffic volumes) or off-street (shared use paths) bicyclist facilities, or bikeways.

Existing Conditions

The current level of bicycle travel within the Transportation Management Area (TMA) is not precisely known. Bicycle trips accounted for 0.3% of total journeys to work in the TMA according to the 2000 Census, and a considerably higher share in some areas. Data for non-work and recreational trips is not regularly collected. The low share of commuter trips and lack of other data has made it difficult for local governments and transportation agencies to justify major expenditures on bicyclist facilities.

However, there are indications of a considerable bicycling population in the TMA. Numerous recreational bicyclist groups are also active within the region. The National Multiple Sclerosis Society sponsors the largest two-day bicycling event in the entire country: the annual Houston to Austin MS-150 ride. As the largest fundraiser event for the national organization, enrollment is limited to 13,000 participants for safety reasons. These largely experienced riders are prime candidates to commute or make other non-recreational bicycling trips if suitable facilities are available. There is also a population which bicycles out of necessity. The 2000 Census reported that 8% of TMA households did not have access to a car, ranging to as high as 40% in some neighborhoods. Bicycling can be a key component of personal mobility among members of these households. METRO's Bikes on Buses program has shown strong growth in the number of people who combine bicycle trips and transit trips since 2007 when bike racks were installed on most buses.

Bicycling is an excellent means of personal mobility and exercise for children. School age children below driving age (6-15 years) represent 16.2% of the TMA's population. Providing safe bicycle access to schools can reduce school-related congestion. The Texas Bicycle Coalition provides Super Cyclist training to school teachers to add bicycle safety to their physical education program.

Unfortunately, the Houston-Galveston region has one of the highest rates of crashes involving motorists and bicyclists in Texas. H-GAC identified crash 'hot spots', locations of concentrated crashes involving motorists and bicyclists. The highest crash rates occur in low income communities. Addressing this safety problem will likely require investments to improve facility designs and maintenance, as well as increased safety awareness on the part of both motorists and bicyclists.

Over the past 20 years, local governments and transportation agencies in the TMA have made considerable investment in bicyclist facilities. An extensive network of on-street bike lanes has been established in the City of Houston. Harris County has been a leader in developing an off-street network of shared use paths. The Texas Department of Transportation (TxDOT) has included bicyclist-suitable shoulders and 14 foot-wide outside lane widths on a number of state maintained roadways. State roadways may offer additional opportunities for establishing longer bikeways and have been identified in several Major Investment Studies. Comprehensive local bikeway networks exist or are in the planning stages in many other cities and master planned communities within the Houston-Galveston TMA.

Despite this progress, the TMA's bikeway system still leaves much to be desired. Numerous gaps exist and there is not a consistent approach to pedestrian and bicyclist facility design. These bikeways are often difficult to access safely from local street systems, and they fail to connect to some of the TMA's major activity centers. Many bikeways in the TMA region also suffer from a lack of maintenance, which is a major impediment to promoting safe bicycle travel. Maintenance plans are a key component to successful bikeway programs. As a result, H-GAC will require evidence that a maintenance plan exists for funding considerations on all candidate TIP bikeway projects.

This Regional Bikeway Plan sets forth goals, objectives and strategies to address these issues and increase the viability and safety of bicycling in the TMA.

Plan Goals and Objectives

The goals of the Regional Bikeway Plan are:

- Increase the share of trips in the TMA made by bicyclists
- Reduce the number of crashes involving bicyclists

The objectives toward achieving these goals are:

- Develop the regional bikeway system
- Support development of local bikeway networks
- Enhance bicyclist commuting centers and districts
- Improve bikeway design and maintenance
- Raise public awareness of bicycling and bicyclist safety

These objectives form the major elements of the bikeway plan, which are summarized as follows.

Regional Bikeways

The purpose of the Regional Bikeway System is to provide facilities designed for safe use by bicyclists on longer trips (4 miles or more), identify existing and planned bikeways, as well as encourage the development of safer, more convenient, and better connected bikeways. Figure 1 shows the existing and planned bikeways that fall into this category. The Regional Bikeway Plan provides a framework for identifying project investments to enhance the reach and connectivity of the bikeway system and providing transportation engineers and planners information about existing and proposed bikeways. Specific recommendations include:

- *Give priority funding to bikeway projects that complete missing sections of the regional bikeway system.*
- *Develop commitments to developing planned bicyclist facilities.*
- *Add shoulders to roadways with significant bicyclist activity.*

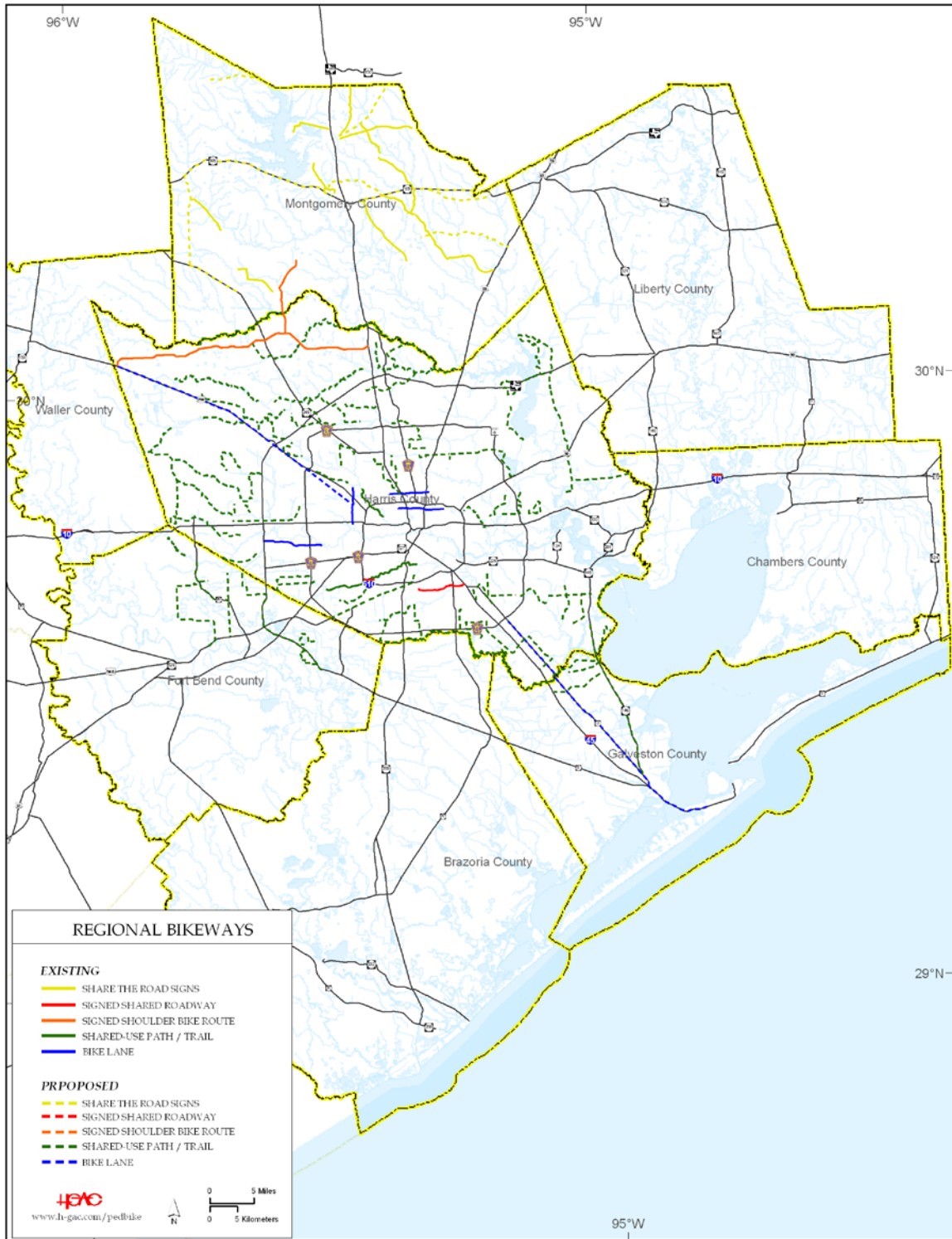


Figure 1: The Houston-Galveston Regional Bikeway System

Local Bikeways

The purpose of a local bikeway network is to facilitate the movement of bicyclists within the community and provide connectivity between residences and various destinations, such as schools, colleges, libraries, post offices and community centers, as well as commercial establishments, such as retail, shopping centers, and supermarkets. Local commuter bicyclist trips include similar destinations, including various local and regional employment centers. Enhancing opportunities for local residents to use a bicycle for short trips can improve the level of service on local roadways and may increase the availability of parking.

Numerous local bikeway networks exist or are in the planning stages throughout the TMA. These networks are good for shorter trips (< 4 miles) and for accessing local destinations. Notable examples of local bikeway networks include Alvin, Conroe, Houston, Lake Jackson, La Porte, Missouri City, Pasadena, Sugar Land, and The Woodlands. H-GAC plans to continue to work with local entities to identify projects that further the development of local bikeway networks as part of the overall regional transportation system. As with the regional system, roadway planning should be carefully coordinated with local bikeway network plans.

Bicyclist Commuting Centers

There are two employment centers within the TMA that generate a significant level of bicyclist commuters: the Texas Medical Center in Houston and the University of Texas Medical Branch (UTMB) in Galveston. There may be many reasons for the higher concentration of bicyclist trips (e.g., the medical community is more sensitive to healthy behavior, existence of bicyclist facilities, high concentration of students); however, the high cost of parking may be a key factor. These growing employment centers present opportunities for encouraging even greater use of walking and bicycling to relieve congestion and parking pressures.

Texas Medical Center

The Texas Medical Center (TMC) draws the greatest amount of commuter bicyclists of any employment center in the TMA. According to the 2000 census, there were 50,238 work trips, of which 36,973 drove alone, 7,927 carpooled, 4,018 took the bus, 430 walked, 379 biked, and 511 used other means (motorcycle, taxi, permanent telecommute).

The 430 walking trips and the 379 biking trips represent 0.9% and 0.8% respectively of all trips. The Texas Medical Center has the highest concentration of bicyclist trips within a census tract in the region (even greater than Downtown Houston), and the third highest concentration of walking trips in the region (after downtown and the University of Texas Medical Branch in Galveston). Recent observations made by H-GAC and TMC staff indicate that over 1,000 bicyclists now commute to the Texas Medical Center on a daily basis.

Figure 22 shows the major concentrations of trip origins to the TMC superimposed upon the existing local bikeways. While the network is extensive, there is a gap between bikeways and destinations, with a limited number of direct access points into TMC. Additional incentives for walking and bicycle commuting could be provided, including secure and weather-protected bicycle parking, continuous sidewalks, more frequent crosswalks, as well as access to showers and lockers for personal belongings. H-GAC plans to continue to work with the TMC and its transportation partners to identify the volume of commuter bicyclists and potential projects and amenities to support bicyclist commuting.

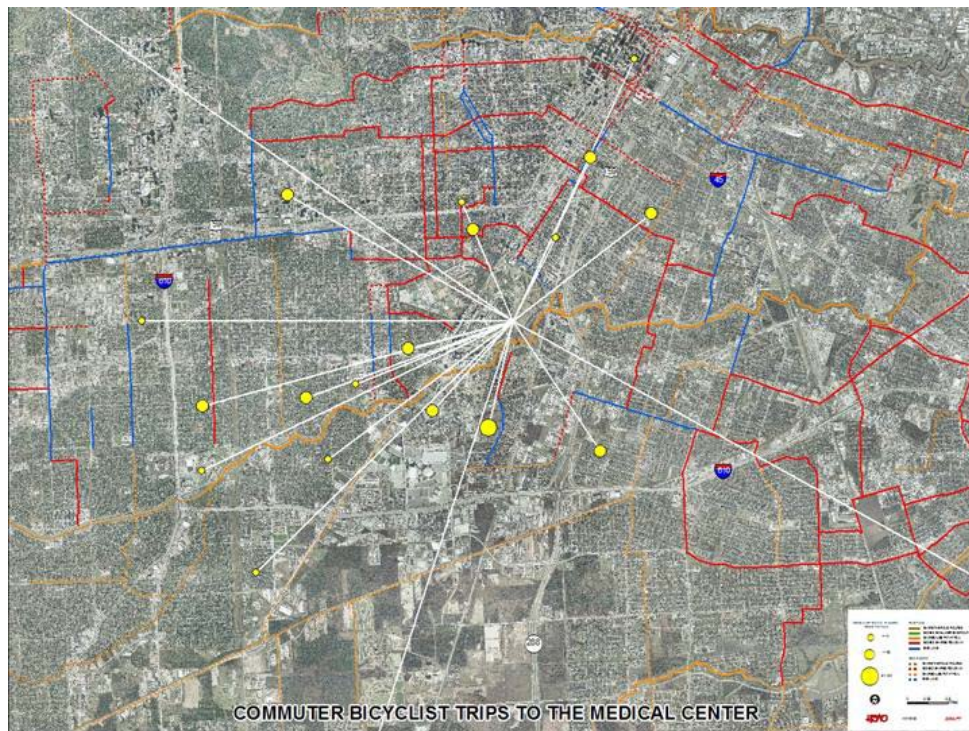


Figure 2: Commuter Bicyclist Trips to the Texas Medical Center.

University of Texas Medical Branch-Galveston

Bicycle commuting is considerable in the vicinity of the University of Texas Medical Branch (UTMB). The 2000 Census indicated that UTMB had 10,470 daily work trips. Of these 89% were by private vehicle, 1.3% were by bus, 2.2% were by bicycle and 5.3% were walking trips. These are much higher than the regional average of 0.3% by bicycling and 2.1% by walking.

The abundance of housing close to UTMB makes walking and biking very feasible. In particular, the 234 commute trips by bicyclists were nearly equal to the number of bicyclists commuting to the Texas Medical Center in Houston, a much larger campus. An analysis of the locations from which UTMB bicyclist commute trips showed that most lived in the vicinity, but many came from elsewhere on the island and some came from the mainland.

Pedestrian-Bicyclist Special Districts

The 2004 Pedestrian-Bicyclist Special Districts study identified geographic areas with the greatest potential demand for pedestrian and bicyclist travel. The study was recently updated in 2010 using newly available data. In both the 2004 and 2010 studies, the highest overall ranking districts in the TMA were within the City of Houston and the City of Galveston, where population and employment densities are high, a variety of land use mixes are found, and transit access is widespread. Outside of these areas, high scoring districts are found in older communities that have a traditional grid pattern and a concentration of destinations clustered together within a compact area. Figure 3 shows the 1,000 top-ranked districts in the region.

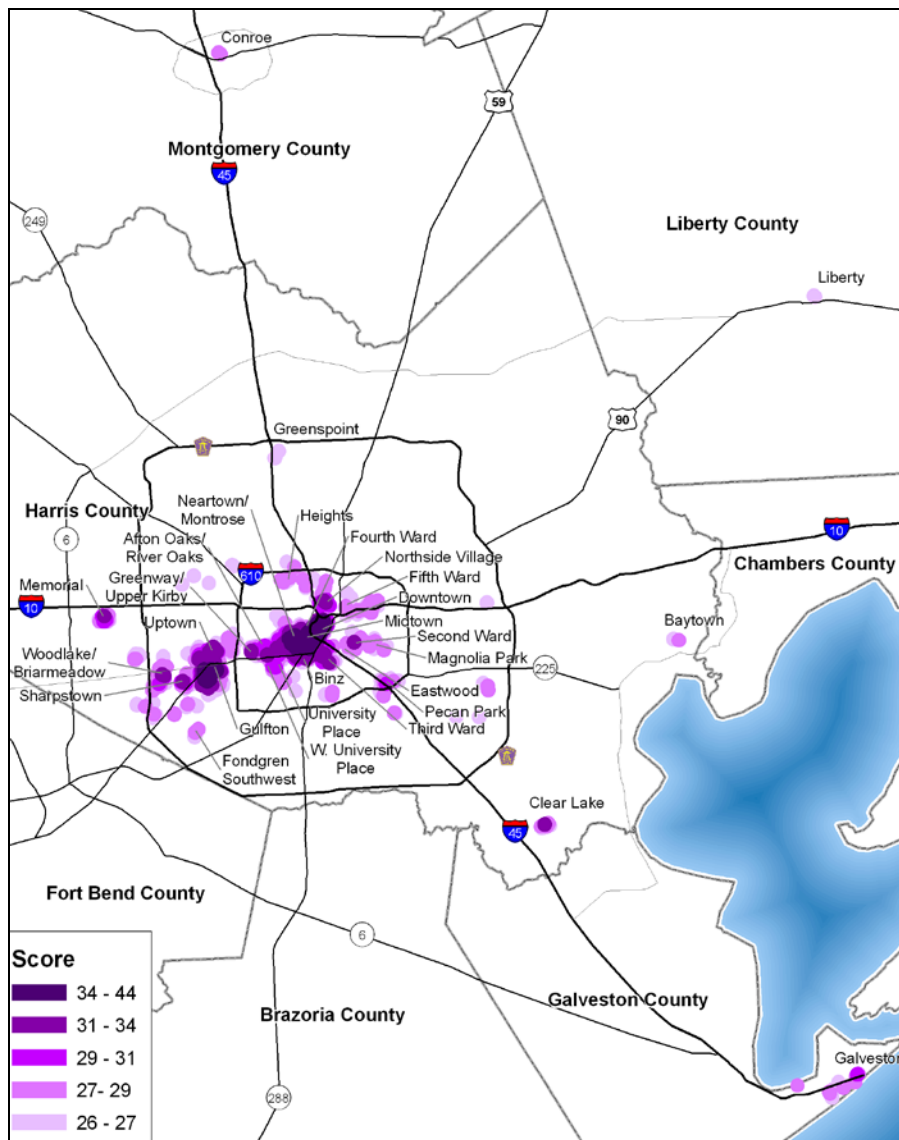


Figure 3: Highest Scoring 1,000 Districts within the H-GAC Region

After completing the initial study to identify high-priority districts, H-GAC approached local governments with an opportunity to partner and conduct a detailed pedestrian and bicycle master plan for top-ranking districts in the region. Most plans were funded through a 50-50 funding partnership between H-GAC and the local government sponsor.

The planning process provided opportunities for public input, analysis of opportunities and barriers, and identification of solutions to facilitate safe pedestrian and bicycle travel. A range of recommendations were identified in the plans including policies that could be implemented by the local jurisdiction as well as specific infrastructure improvements that could be funded with local and/or federal funds. To date, the following seven districts have worked in partnership with H-GAC to complete pedestrian and bicycle district master plans:

- Third Ward (Houston), 2004
- Gulfton Neighborhood (Houston), 2005

- Montrose Neighborhood (Houston), 2006
- Central Galveston, 2006
- Sugar Land Town Center, 2007
- Airline Improvement District (Harris County), 2009
- City of Missouri City, 2009

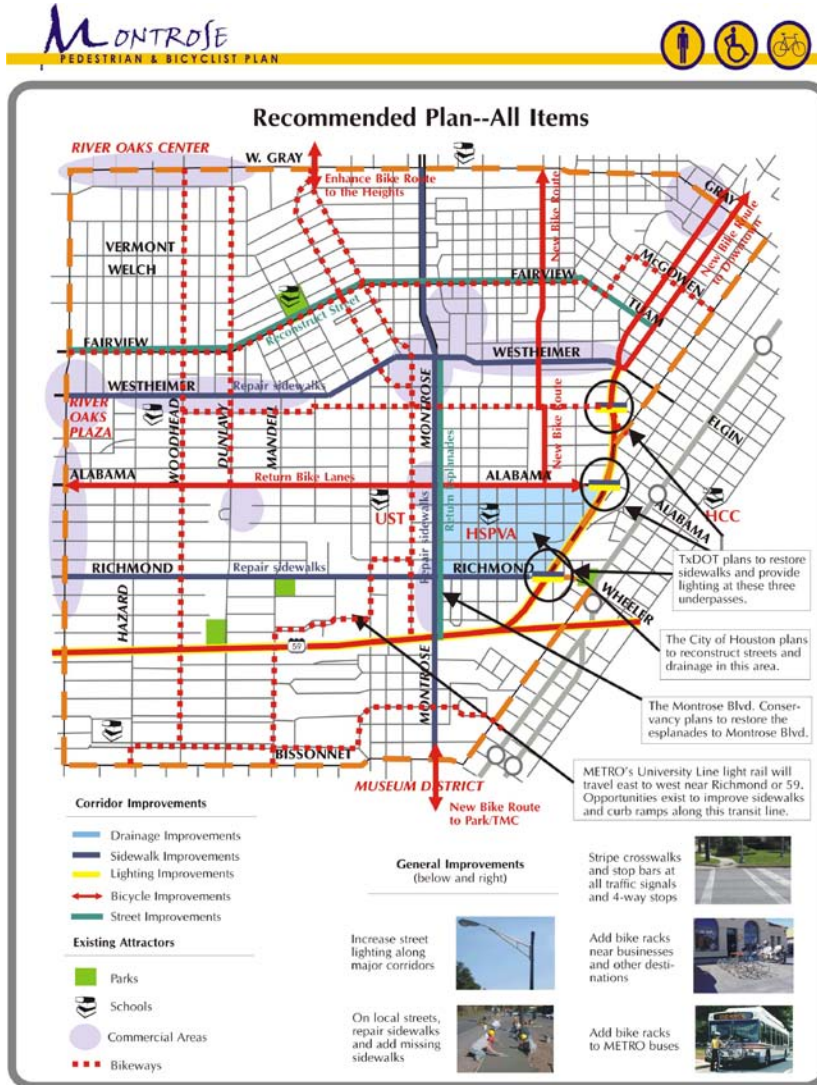


Figure 4: Conceptual plan illustrating the recommendations of the Montrose Special District Study.

These studies have facilitated the implementation of locally sponsored projects that will improve pedestrian and bicycle mobility in high-demand areas. Table 1 summarizes projects that have moved from the planning to implementation stages.

Table 1: Special District Implementation Projects, 2004-2010

Location	Project Sponsor	Description	Estimated Construction Date	Funding Source
Third Ward Houston	Greater Southeast Management District	Construct ADA accessible sidewalks at various locations and provide curb extensions and crossing islands at various locations.	2011	Congestion Mitigation Air Quality (CMAQ)
Airline Improvement District	Airline Improvement District	Construct sidewalks along major thoroughfares and improve crosswalks at various intersections. Install raised median along Airline Drive for access management and pedestrian refuge.	2012	CMAQ
Sugar Land Town Center	City of Sugar Land	Construct various pedestrian improvements and trails that connect the City's town center to surrounding neighborhoods and existing trail network.	2012	CMAQ
Montrose Houston	City of Houston	Construct sidewalks on north/south streets that connect to METRO Rail on Richmond Avenue to provide improved pedestrian access to transit.	2012	CMAQ
Galveston Island	City of Galveston/Island Transit	Improve ADA accessibility on sidewalks and pedestrian crossings that lead to transit.	2011	New Freedom Grant from the Federal Transit Administration
Texas Avenue	City of Missouri City	Install sidewalks from Cartwright Road to Buffalo Run and improve pedestrian crossings at various intersections providing access to community destinations.	2010	Local Funds

Facility Design and Maintenance

Bicyclists must often travel outside of the designated bikeway system or local network. Accordingly, some consideration should also be given to how bikeways can be accessed by bicyclists from other roadways. The Regional Bikeway Plan includes a set of guidelines for accommodating pedestrians and bicyclists in a variety of roadway conditions. Project sponsors are asked to consult these guidelines in their project planning. Upon request, H-GAC can provide assistance in the form of an accommodation review.

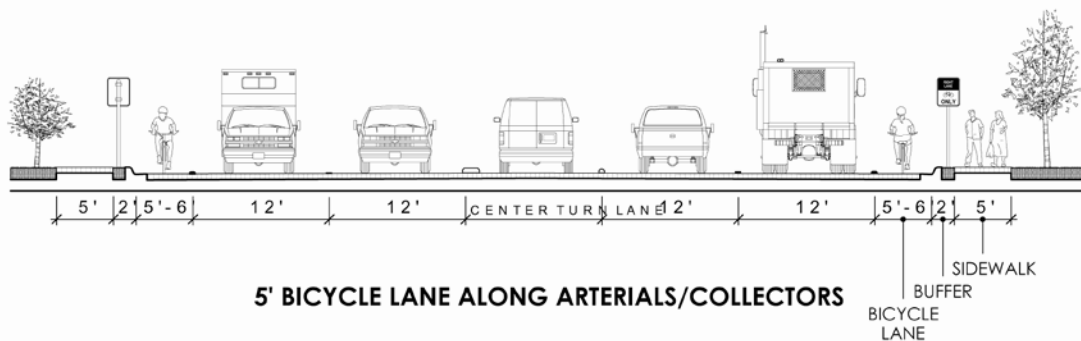


Figure 5. Designated bicycle lanes offer bicyclists a dedicated portion of the roadway.

In addition to the basic accommodations guidelines, the Regional Bikeway Plan also contains a list of best practices for better integrating bikeways, roadways and land uses. The plan also stresses the importance of bikeway maintenance. Minor roadway debris, cracks and potholes may not present a hazard for a motorist; however, such roadway hazards can be a major obstacle for a bicyclist.

Public Awareness

The perception of animosity between drivers of motor vehicles and bicyclists may be due to a lack of understanding and awareness of operating techniques between the different modes. Through public service announcements, drivers education, bicyclist safety classes and published materials, measures have been taken to educate the public about bicyclist activity and presence along and across roadways within the TMA. For example, Montgomery County has posted 'Share the Road' signage along many county roadways utilized by the Woodlands Cycling Club (WCC). Bicyclists representing WCC have been working with TxDOT to add 'Share the Road' signage to state roadways to alert motorists on roadways known to be frequented by bicyclists.

Implementation

Coordination between cities and transportation agencies is essential to accomplish the goals proposed in the Regional Bikeway Plan. One key component of coordination will be maintaining an up-to-date Regional Bikeway Map and supporting GIS files of the regional bikeway network. To ensure that the Regional Bikeway Plan can be easily updated, local agencies will be

encouraged to adopt standard nomenclature, mapping characteristics and GIS formats used by TxDOT and H-GAC to ensure this product can be easily updated.

Numerous bikeways in this plan have been submitted by sponsors as RTP and TIP projects. Maintaining sponsor commitments to bikeways in the Regional Transportation Plan (RTP) and Transportation Improvement Program is essential to the development of a comprehensive bikeway system. Underestimation of costs is often the cause of project delay. H-GAC will work with project sponsors and other partners to ensure that design requirements are understood and assigned appropriate costs.

The purpose of a Regional Bikeway Plan is to identify existing and planned bikeways and to encourage the development of safer, more convenient and better connected bikeways. The Regional Bikeway Plan may be used to prioritize pedestrian and bikeway investments and to review projects that may impact an existing or proposed bikeway.

In this update, H-GAC has addressed issues raised in the 2025 RTP. These issues are described below.

Consistent Bikeway Terminology and Mapping

Building a coordinated Regional Bikeway Plan is a challenging task. Adopting conventional bikeway terminology and mapping techniques will allow for greater information sharing and project coordination. H-GAC using standard bikeway terminology developed by the American Association of Transportation Officials (AASHTO) as written in the Guide for the Development of Bicycle Facilities (1999 edition or latest version). All federal-aid roadway and bikeway projects must be designed in accordance with AASHTO guidelines. H-GAC also advises the use of AASHTO guidelines on local projects. The AASHTO bikeway definitions are as follows:

Bikeway – A generic term for any road, street, path, or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Bike Route System – A system of bikeways designated by the jurisdiction having authority [over an area,] with appropriate directional and informational route markers, with or without specific route numbers. Bike routes should establish a continuous routing, but may be a combination of any and all types of bikeways.

On-Street Bikeways

- ***Bicycle Lane or Bike Lane*** - A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicycles.
- ***Signed Shared Roadway (Signed Bike Route)*** - A shared roadway which has been designated by signing as a preferred route for bicycle use.
- ***Shoulder*** – The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use and for lateral support of sub-base, base and surface courses. [In Texas, bicyclists are permitted to ride on the roadway's shoulder, and shoulders may be signed as bike routes.]

Off-Street Bikeways

- ***Shared Use Path*** - A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

Additional Term That May Be Used to Identify An On-Street Bikeways

Wide [Outside] Curb Lane (Signed as a Bike Route) – In general, 14 feet of usable lane width is the recommended width for shared use in a wide curb lane [no pavement markings necessary]. Usable width normally would be from edge stripe to lane stripe or from the longitudinal joint of the gutter pan to lane stripe (the gutter pan should not be included as usable width). On stretches of roadway with steep grades, where bicyclists need more maneuvering space, the wide curb lane should be slightly wider where practicable (15 feet is preferred).

In this update of H-GAC's Regional Bikeway Plan, H-GAC has incorporated this nomenclature and other facility information into its Geographic Information System (GIS). H-GAC's new GIS coverage will contain information on project status and is fully interactive with H-GAC's GIS network of existing and planned roadways. This should enable roadway project sponsors to determine whether their project limits include any designated bikeways and provide appropriate accommodations. It will also allow accommodation considerations to be considered at intersections, over/underpasses and interchanges where roadways traverse bikeways to allow for safe passage by bicyclists.

H-GAC will request that local entities provide bikeway project data in an electronic format to be compatible with H-GAC's GIS System. This should allow for more comprehensive updating. On-line project viewer capability will also be developed, similar to what is currently available for Transportation Improvement Program (TIP) and Regional Transportation Plan (RTP) projects.

It is important that project sponsors be aware that the perceived higher costs of building bikeways using AASHTO-guidelines may be offset by reduced maintenance costs over the life of the facility. For example, an asphalt trail path may cost less to build, but the asphalt path may require greater maintenance and have a shorter useful lifespan. Well-designed facilities are safer and will allow for higher levels of usage as demand grows.

The AASHTO bikeway guidelines are flexible, and cost-effective design alternatives are available, especially in areas not subject to flooding or where lower usage is projected. H-GAC's *Guidelines for Accommodating Pedestrians and Bicyclists* (Pages 31 to 38) provides a range of recommendations for off-road bikeways, based on AASHTO guidelines.

Progress since 2007 Adoption of 2035 RTP and Regional Bikeway Plan

H-GAC and local governments in the region have been actively working to improve the pedestrian and bicycle network throughout the region. The following accomplishments have been made since the 2007 adoption of the Regional Transportation Plan.

- Special Districts Pedestrian and Bicycle studies were completed in Sugar Land, the Airline Improvement District, and Missouri City.
- Implementation projects resulting from completed Special Districts planning studies have moved forward in the Third Ward, Montrose, Galveston, Sugar Land, the Airline Improvement District, and Missouri City. Several of these projects are included in H-GAC's 2011-2014 TIP.
- H-GAC updated the Pedestrian and Bicycle Special Districts Methodology report using updated and newly available data.
- H-GAC issued a call for planning studies to complete three additional Special District Pedestrian and Bicycle studies in partnership with local government sponsors in the region (studies will be completed in FY2011).

- H-GAC produced “Building Better Bikeways: A Planning Guide for the Houston-Galveston Region. The guide provides the fundamentals and best practices of bikeway planning to those interested in making their communities more bicycle friendly.
- H-GAC produced “Bicycling for Transportation: Your Guide to an Active Commute”. This 12-page booklet offers an overview of the benefits of bicycling for transportation and highlights some helpful tips for both convenience and safety.
- H-GAC hosted the workshop: “Making Connections: Realizing a Regional Bikeway Network” in September, 2009. Approximately 100 attendees from communities throughout the region attended this half-day workshop to learn about various elements of bikeway planning and implementation.
- H-GAC hosted a “traffic skills 101” League of American Bicyclists education course for planners and engineers.
- H-GAC served as the local host for a free 2-day course sponsored by FHWA titled “How to Develop a Pedestrian Safety Action Plan.”
- H-GAC worked with TxDOT to host a one-day workshop on Safe Routes to School.
- Houston METRO implemented its Bikes on Buses program, which allows bicyclists to carry their bikes on most METRO buses. The program has been extremely successful with more than 9,000 bicyclists using the system in recent months and numbers that continue to grow each year.
- The City of Houston completed several major segments of the regional bikeway network including the Halls Bayou Trail, Columbia Tap Trail, West Houston Trail Phase II, Little White Oak Bayou Trail, and the MKT Trail.