

Bikeways-A Transportation Alternative

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Introduction

Everyday life consists of many habits that are repeated day in and day out. We must all get up in the morning, go to work, and then come home to once again start the routine all over the next day. One aspect of this process is the fact we must all travel. There are many different modes of transportation available to commuters including cars, trains, airplanes, and buses. These forms are all useable and convenient, but there is another mode that many people do not see as a form of transportation. This means of transportation is also very beneficial to the environment, the rider, and the bank account. It is a bicycle.

Nationally, bicycles are seen to many as something used for recreational purposes. Yes, this is true that numerous amounts of people ride bikes for family time. However, many people also use bicycles to get to work, school, and to businesses. The benefits of cycling are very pleasing. These benefits can help the entire United States as well as the entire world. Riding bicycles helps reduce the amount of pollution in the atmosphere because more cars are off of the road, it helps promote fitness to the rider because they are exercising daily, and it helps save everyone money because you are helping to conserve our precious energy sources that are used to produce gasoline. With a population of 2,144,491, Houston, Texas is projected to be the fourth largest city in the United States (Population Division, United States Census Bureau, 2007). In order to get people to where they need to go, Houston must provide a massive transportation network. And in fact, it does. This network includes miles of highways, freeways, and bikeways which provide a way for citizens to commute daily. The Metropolitan Transit Authority, METRO, uses this network to manage and provide means of transportation for

the Houston area. METRO's services include buses, High Occupancy Vehicle (HOV) Lanes, and a light rail system. This light rail system provides over 30 miles of rail that offers transportation to various places including Downtown and the Texas Medical Center. By using the light rail, bikeways, and utilizing the HOV lanes by carpooling, we can help improve environmental conditions here in Houston. Amelia Williamson writes that according to Texas A&M associate professor Renyi Zhang, "Air pollution in Houston is 67 percent to 150 percent above the government's National Ambient Air Quality Standard (NAAQS)" (2004). With this knowledge and figures, the City of Houston was forced to do something about the drastic rates of pollution in the air. Additionally, they had to comply with the State Implementation Plan which is "an enforceable plan developed at the state level that explains how the state will comply with air quality standards according to the federal Clean Air Act" (Texas Commission on Environment Quality, 2008). One way to do this was to reduce the amount of cars that travel daily.

City of Houston Bikeway Program

On August 13, 1993, the City of Houston finalized its Comprehensive Bikeway Plan. The Bikeway Plan's primary focus is to "facilitate bicycle commuting in order to respond to increasing auto congestion, air quality issues, and mandates from the federal government to reduce reliance on the single occupant automobile" (Wilbur Smith Associates, 1993). This Plan was a preamble to the current version of the City of Houston Bikeway Program.

There are different aspects of the Bikeway Program such as planning/engineering, design/construction, education, and use by the community. There are many public events and promotions. For example, May of each year is Bike Month, a month long celebration of biking in the City of Houston. The Bikeway Program “kicks off a month-long challenge to ride your bike in the month of May” (City of Houston Bikeway Program, 2008). Bike Month helps promote the benefits and enjoyable experience biking offers. There is also a Bike to Work Day when Mayor Bill White and many other citizens take a Downtown bike ride to celebrate Bike Month. This program also encourages biking education. There are presentations offered to introduce the program and all of Houston’s bikeways to citizens. Safety and rules of roadways are also highlighted through these presentations. The other aspects of the Bikeway Program are the engineering and construction parts of it.

Engineering in the Bikeway Program

There are many different concentrations in the broad field of engineering. Some of these concentrations include chemical, mechanical, electrical, and civil engineering. A subcategory of civil engineering is transportation engineering. The American Society of Engineering Educators, ASEE, says “Transportation engineers design streets, highways, and other transit systems that allow people and goods to move safely and efficiently” (ASEE, 2007). Bikeways are generally designed by engineers proficient in transportation planning and engineering. When I think of the engineering occupation, I see people using math and science to make daily life better or more affordable. Engineers in the Bikeway Program absolutely fit this description. They are trying to make biking readily

accessible and enjoyable. In turn, citizens are saving money by not paying for gasoline and their time by not dealing with traffic congestion.

The daily routine of an engineer in the Bikeway Program differs from day to day. One day they may be in the office reviewing plans and dealing with consultants, while the next, they may be out in the field trying to analyze a situation dealing with a proposed bikeway. The engineers must also present updates to higher officials such as the Director of Public Works and Engineering and the Mayor of the City of Houston. The engineers also review plans periodically. There are many other projects initiated by the City of Houston such as waterline replacements, sanitary sewer replacements, or street reconstructions. The engineer must decide if these plans impact existing bikeways. If so, the engineer must follow procedures to ensure the existing bikeway will be preserved. Guidelines must be followed to restore the bikeway to its previous condition before the construction commences. If the plans do not impact existing bikeways, the engineer must decide if any bikeways can be created on the construction area to promote connectivity. In order to create a successful bikeway network, you must have connectivity between bikeways. As Ben Bansal says, “It is the intent of the Bikeway Program is to create a network. Every effort is made to connect the various elements of the Bikeway Program” (2008). In order to connect two segments of bikeways via the construction area, the engineer may propose a connector. To do this, the engineer must provide procedures regarding which type of bikeway for the connector and the specifications. These specifications are based on Guide for Development of Bicycle Facilities by the American Association of State Highway and Transportation Officials (AASHTO).

Types of Bikeways

The City of Houston offers its citizens four different types of bikeways. These are bike trails, shared lanes, bike lanes, and signed routes. These bikeways fall into two categories which are “on-street” and “off-street”. Trails are “off street” along bayous or abandoned railroad tracks. These bikeways are all different, but in the end, they all serve the same purpose: to obtain a higher population of cyclists.

Bike trails are not on the street and they often journey through parks or along bayous. Normally, these trails are shared between cyclists, pedestrians, and joggers. Some examples of bike trails in the City of Houston are the trails along Brays Bayou, Buffalo Bayou, and White Oak Bayou. These trails allow the users to enjoy the natural beauty of the City of Houston.

The next bikeway type is a shared lane. These are “on-street” bikeways where the motorist and the cyclist share the lane. For a four lane divided street here in Houston, each car lane is typically 12 feet wide. Therefore, for two lanes of traffic traveling in the same direction, the total width is 24 feet. If a shared lane is implemented, the outer lane (which the cyclist and motorist share) is then 14 feet wide and the inner lane is 10 feet wide. This still makes the roadway 24 feet wide. The Guide for the Development of Bicycle Facilities, which sets specifications for bikeways, says, “In general, 4.2 m (14 feet) of usable lane width is the recommend width for shared use in a wide curb lane” (AASHTO, 1999) (Appendix A, Fig. 1 and 2). These specifications are followed by engineers in the City of Houston. The next type of bikeway is the bike lane. The bike lane is a striped, designated lane. This lane is usually found to the right of the traffic lanes and can only be used by bicycles. This lane is normally four feet wide. The two

lanes of traffic flowing in the same direction are each ten feet wide. This still adds up to a typical 24 foot wide street (Appendix A, Fig. 1 and 3). Two of the many streets that have this type of bikeway are Cullen Street and Polk Street. The last type of bikeway is the signed route. This route does not have a designated striped lane and are on relatively narrow streets. You may find this hard to believe, but according to Subchapter B of Chapter 551 of the Texas Transportation Code, “Bicyclists have the rights and duties of other vehicle operators” (Texas Bicycle Coalition & Texas Bicycle Coalition Education Fund). This says a bicycle is considered a vehicle and must adhere to the same laws as a car. The appropriate bike signs are also installed for every type of bikeway.

To develop bikeway facilities, engineers all over the United States follow the guidelines set forth by AASHTO. AASHTO’s primary goal is to “foster the development, operation, and maintenance of an integrated national transportation system” (AASHTO, 2007). When proposing a bikeway system, engineers and consultants must use the latest edition of AASHTO’s Guide for the Development of Bicycle Facilities. Here in Texas, engineers must also follow guidelines from the Texas Department of Transportation (TxDOT).

Funding of Bikeway Projects

Generally, bikeways in Houston have been Federally funded with a local match from either the City of Houston or a sponsor. There must be a nominating agency to partner with Federal funds. The City of Houston, besides being a sponsor in some cases, has been the nominating agency for all Bikeway projects. The sponsor could be a private entity as well as a government agency. A typical project starts with Federal participation

of 80% and the sponsor at 20% (Ben Bansal). TxDOT is not a funding source. This organization only manages the money the State of Texas receives from the Federal Government. In the City of Houston Bikeway Program, in order for a bikeway to qualify for Federal funding, it must follow AASHTO's guidelines. There is a process that all projects go through to become a reality (Appendix B). This process includes the stages of planning, consultant selection, design, and construction.

Currently, the City of Houston has approximately 280 miles of on-street bikeways and approximately 70 miles of bike trails. The connected bikeway network totals over 350 miles. And in terms of area, the network spans over 500 square miles (Fig. 1).



(Fig. 1) (Bikeway Network Map)

The City of Houston is proud of the bikeways that are evolving in their transportation network and it is being noted. In 2007, the League of American Bicyclists presented

Houston with Honorable Mention in the Bicycle Friendly Community Awards (City of Houston Bikeway Program).

Engineering and Construction Challenges

Each of the two categories of bikeways has their own set of challenges engineers face. If engineers decide to place a bikeway on a certain street, the Level of Service (LOS) Analysis must be performed. If there is any distressed pavement where the bikeway is to be installed, this pavement must be repaired. The left hand turns must also be reanalyzed.

For off-street bikeways or trails, there are many more challenges that must be considered during design. Because trails are normally along bayous or other natural features, the connectivity to the network poses a different set of problems. Engineers must decide how this trail will be connected because the intent is to make a network. Also, when surveying the land that the trail is to be built upon, the shelf and banks must be evaluated. It must be decided if there is enough shelf width. Shelf width refers to the width of land that is available along the bayou. If the land is not at least 15 or 16 feet wide, you will not be able to construct the trail in this area and must find an alternate solution. The next thing that must be analyzed is the hydraulics of the bayou that you are proposing to build the trail near. Hydraulics is the science of liquid pressure and flow. Water levels and drainage facts are included in the hydraulic report. The Geotechnical aspect of the bayou must also be considered. This report includes soil conditions and possibly a slope stability analysis. Yet another challenge is the environmental report. The two different types of environmental reports are the Categorical Exclusion Report or

the Environmental Assessment. Normally here in Houston, we deal with the Categorical Exclusion Report. When building a trail along a bayou, the bank stability must be considered. The trail must be safe, and anything stable starts with a good, solid foundation. If the bank is unstable, measures must be taken to stabilize them. Additionally, the design must provide for landscaping, beautification, and lighting of the trail. These aspects represent, but not limited to, some of the most important considerations in the design of the trails along the bayous or abandoned railroad tracks.

Benefits of a Bikeway Network

By developing a Bikeway Program, the City of Houston has given its citizens yet another transportation alternative. Cycling as a means of transportation has many benefits for all. By providing bikeways, we are helping the environment by decreasing the pollution rate because there are fewer cars on the road. This helps the City “Go Green” and comply with the State Implementation Plan. Additionally, since there are fewer cars, traffic congestion is reduced. The fewer cars on the road, the less time it takes to get where you need to go. By riding a bicycle on the City of Houston’s connected bikeway network, you are saving yourself time. The network is designed for accessibility to local attractions, businesses, and your work place. We all know how many cars are on the freeways here in Houston and there is a problem that arises when driving. Once you arrive to your destination, you must then find a place to park. Parking could be very expensive when having to pay everyday. The City of Houston Bikeway Program provides bike racks as well as bike lids in various locations around the city for no cost parking. Not to mention cycling helps save money. With gas at four dollars a

gallon, we are all learning to manage our gas bill better. Cycling is an economical means of transportation. By cycling to destinations, cyclists are also promoting fitness in their daily lives. The United States is known for its obesity rates and by incorporating cycling in daily life, we can help reduce these rates. Research has also shown that bikeways increase property values. In some cities such as San Diego, Boston, Chicago, and Austin, hike and bike trails have helped to boost property values (City of Houston Bikeway Program, 2002). Bikeways also give the citizens of Houston a way to enjoy and see their city and all it has to offer. They provide recreational opportunities citizens can enjoy with family and friends.

Conclusion

As you can see, the Bikeway Program benefits all of the citizens of the City of Houston. The engineers use their knowledge to provide citizens with an alternate form of transportation that is economical, environmentally safe, and promotes fitness. Everyday the staff of the bikeway program is trying to expand and make the bikeway network have more riders. There are many more projects to work on and complete. Mayor Bill White confirms the hard work, importance, and benefits of the Bikeway Program by saying “Houston is a bike-friendly city and we’re working hard every day to make it more so” (City of Houston Bikeway Program Map).

Appendix A

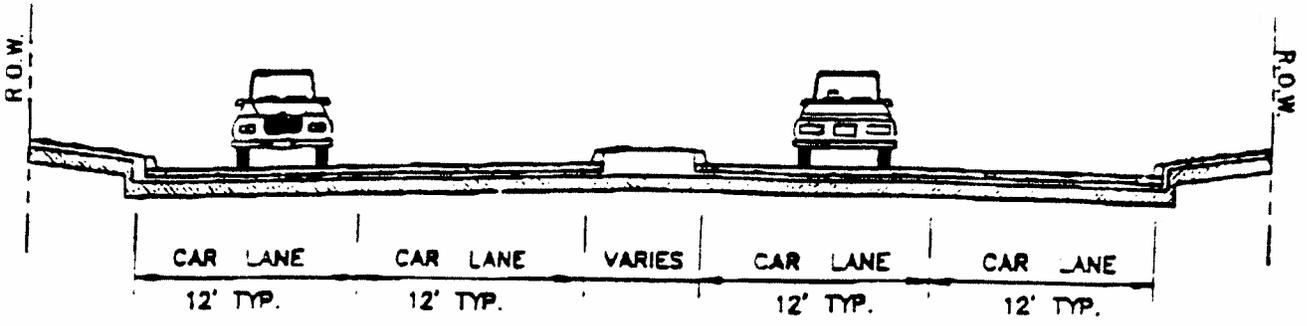


Fig. 1 FOUR-LANE DIVIDED STREET LANE CONFIGURATION EXISTING CONDITIONS

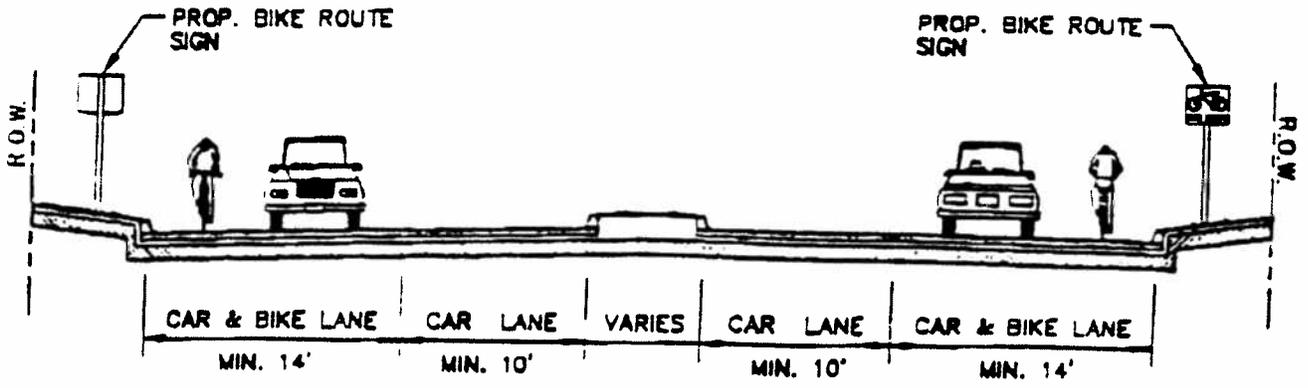


Fig. 2 PROPOSED LANE CONFIGURATION FOR ARTERIAL STREET WITH ASSIGNED BIKEWAY ROUTE

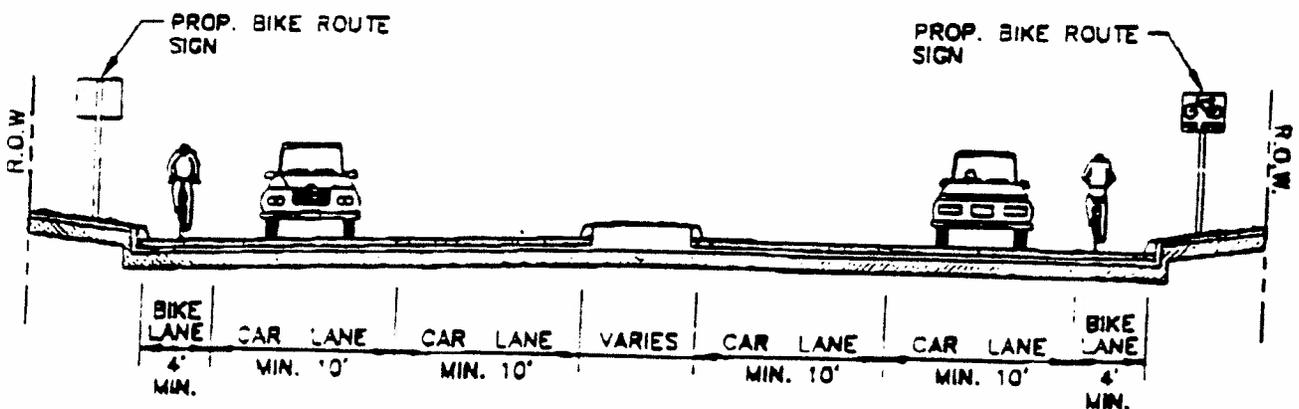
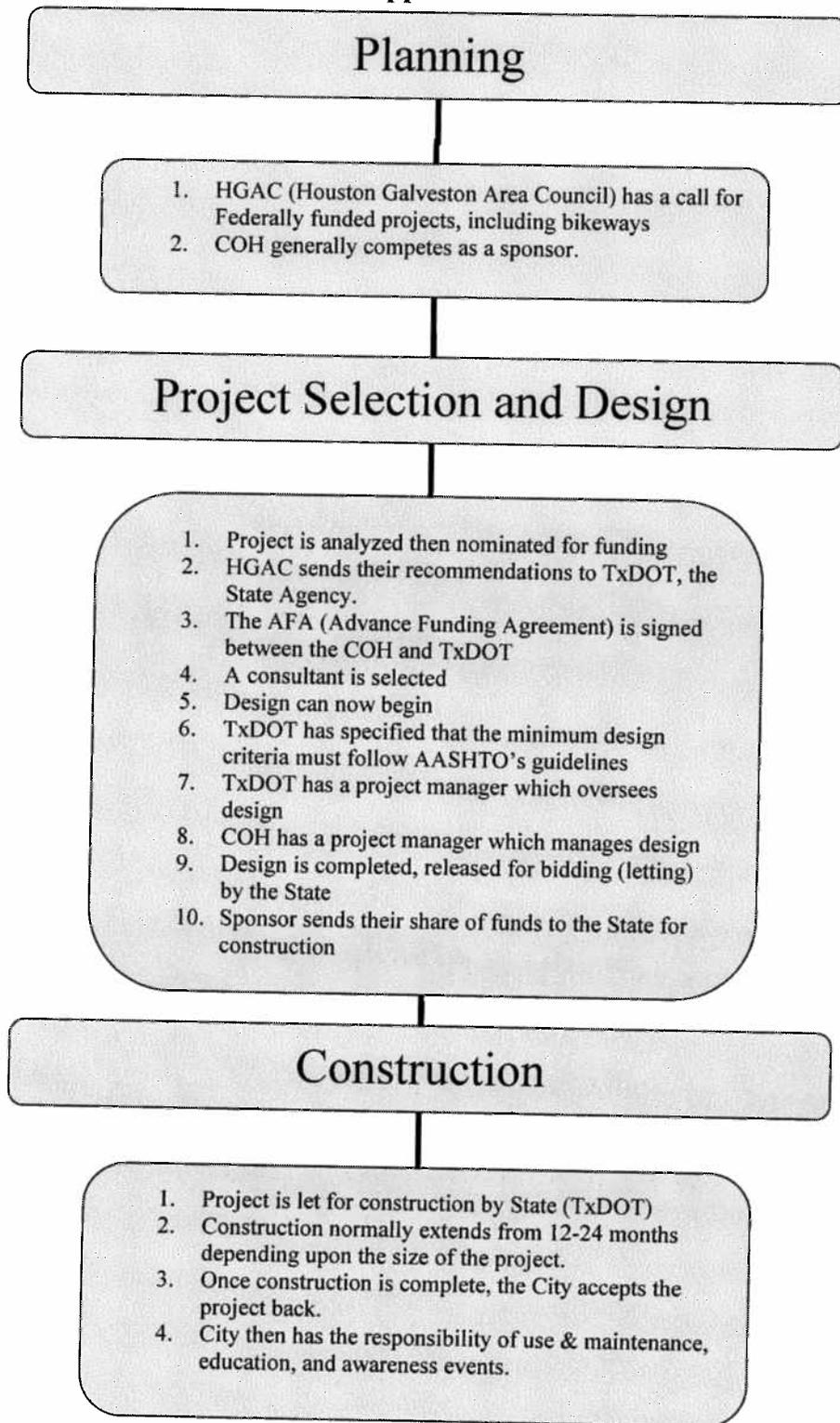


Fig. 3 PROPOSED LANE CONFIGURATION ARTERIAL STREET WITH ASSIGNED BIKEWAY LANE (5' MIN. IF MONOLITHIC C&G)

HOUSTON BIKEWAY PROGRAM
 TYPICAL BIKEWAY SECTION - DIVIDED ARTERIAL
 ON-STREET
 HOUSTON, TEXAS

Appendix B



The Cycle of Planning, Project Selection, and Construction is repeated for more projects.

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