City of Tyler Hub-and-Spoke Bicycle Lane Network

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Objectives: Development of the Improved Bicycle Lane Engineered Scoring System (iBLESS), and to use this methodology to design a safe, efficient, and engineered bike network for Tyler, by providing the community with an alternative means of transportation.

Introduction

Worldwide, traffic congestion is becoming a serious issue for big cities, and it is now affecting mid-sized cities as well like Tyler. In 2013, traffic congestion cost Americans $124 billion in direct and indirect losses. For this reason, alternative modes of transportation are being developed in order to decrease and facilitate the traffic flow. Bicycles are widely utilized to provide a direct, safe, and reliable mode of transportation for short to medium distances within city limits. UT Tyler developed a numerical scoring system for bicycle lane route selection named Improved Bicycle Lane Engineered Scoring System (iBLESS). Where roads can be compared to provide the best route option for the bicycle lane development.

Background

The AASHTO Guide for the Development of Bicycle Facilities defines a bike lane as "a portion of a roadway which has been designated by striping, banning, and other markings for the preferential or exclusive use of bicyclists." According to the AASHTO Guide for the Development of Bicycle Facilities, the minimum width is 4 feet, but the recommended width is 5 feet from the face of a curb or guardrail to the bike lane stripe. The widths of vehicle lanes typically vary from 9 to 15 feet. The HUB Centralized Hub, placed in Tyler Downtown to provide a connection between spokes.

Road Diet and Lane Diet

Road Diet: the number of travel lanes of the road is reduced in order to achieve systemic improvements. Lane Diet: the effective width of the vehicle lane is reduced in order to achieve systemic improvements.

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Conclusions

The iBLESS system creates a simple way to analyze and compare different roads options that can be used to implement bicycle lanes. The iBLESS was proven to be a reliable tool for road comparison, indicating that different road types can accommodate bicycle lanes. Since the iBLESS will only select the best road candidates, users will feel more comfortable while using a road with designated bicycle lanes than sharing the road with motorized vehicles. The iBLESS can be slightly modified to be used at different cities across the State.

Recent Updates

Based on the outcome of this research study and the developed numerical scoring system, in 2017, the City of Tyler received a $1 million dollar grant from the Federal Highway Administration through the Texas Department of Transportation (TXDOT) Transportation Alternatives Set-Aside (TA Set-Aside) Program to implement the bicycle lanes developed utilizing the iBLESS. The construction is set to start by July 2019.

Improvised Bicycle Lane Engineered Scoring System (iBLESS)

- Generating a scoring system to compare possible spokes was determined by the research group. Safety overview of the area was important to ensure that the route provided users with security when riding. For this reason, the iBLESS was developed in order to choose the best option to develop bicycle lanes. The scoring system consists of:

1) Road Configuration Factors:
   • Number of vehicle lanes per direction (lane multiplier)
   • Presence of turning/passing lane (additional width)
   • Average lane width (width multiplier)
   • Presence of street parking (requires wider bike lanes for safety of the bicyclists)

2) Safety Factors:
   • Traffic volume (safety)
   • Street maximum grade (user comfort)
   • Street lighting (safety during night usage)
   • Distance difference (the shortest the better)
   • Presence of bicycle lanes (familiarity with bike lanes)
   • Maximum Velocity (the lower, the safer for bicyclists)

Design Process

Challenges:
- Comply with TXDOT design requirements.
- Provide accurate existing lane widths and stationing.

Future Work:
- Complete the drawings of all spokes, spoke connections, and HUB.
- Receive approval from the City of Tyler and TXDOT and start the stripping process.

Accomplishments:
- 11 Spokes, 7 Spoke Connections and the HUB are completed.
- Over 50.4 miles of bicycle lanes will be added to the City of Tyler.

Comparisons:
- Copenhagen-Denmark is known to be the most bicycle friendly city in the world, with 40 miles of bicycle lanes per 100,000 people. By 2019, the City of Tyler will have approximately 46.6 miles of bicycle lanes per 100,000 people.

Recent Changes:
- In order to increase the scoring system efficiency, maximum road velocity was tested and added to the current system (iBLESS).