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Spring 2019

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Recommended Citation

Fagundes, Arthur and Souliman, Mena, "City of Tyler Hub-and-Spoke Bicycle Lane Network" (2019).
Student Posters. Book 42.
<http://hdl.handle.net/10950/1874>

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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, signing, and pavement 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

HUB: Centralized Hub, placed in Tyler Downtown to provide a connection between spokes



SPOKE: Used to connect different regions of the city to the centralized hub

SPOKE CONNECTION: Used to connect a spoke to another spoke

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

Improved 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 BLESS 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)

Factor	Points							Score	
	3	2	1	0	-1	-2	-3	A	B
Lanes per Direction	3 or more lanes		2 lanes		1 lane			-1	1
Passing Lane		Yes				No		-2	-2
Avg. Lane Width	> 14ft		14ft to 13ft		13ft to 12ft		< 12ft	3	-3
Parking			None	One Side	Both Sides			-1	1
Traffic Volume	0 to 100	101 to 200	201 to 300	301 to 400	401 to 500	501 to 600	601 to 700	-2	-3
Max Grade	0% to 2%	2% to 4%	4% to 6%	6% to 8%	8% to 10%	10% to 12%	> 12%	1	2
Streets Lighting	Perfect		Good		Dark Spots		Without	1	1
Max Velocity	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	1	0
Distance Difference	Shortest Distance	>0.1 Miles Longer	>0.2 Miles Longer	>0.3 Miles Longer	>0.4 Miles Longer	>0.5 Miles Longer	>0.6 Miles Longer	0	3
Presence of Bicycle Lanes		Yes		No				2	0
Total Result								2	0

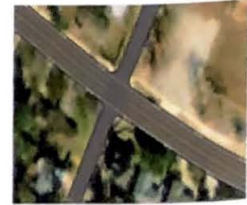
Design Process

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 striping process.



City of Tyler Hub-and-Spoke Bicycle Lane Network

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).



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.