

## **0-7043: Addressing Bicyclist Safety through the Development of Crash Modification Factors for Bikeways**

### **Background**

According to the Texas Department of Transportation (TxDOT) Crash Record Information System database, there have been 26,148 crashes involving bicyclists (pedal cyclists) from 2010 to 2018 in Texas, resulting in 2,885 fatalities and suspected serious injuries, and 22,937 non-incapacitating and possible injuries. Overall, bicycle crashes, as well as fatal and suspected serious injury crashes involving bicyclists, have been on the rise. Bicyclist safety concerns exist not only in cities and metropolitan areas but for the overall state highway network as well.

In this project, the research team developed crash modification factors (CMFs) for bikeway facilities implemented on Texas roadways to assess their safety and economic effectiveness. This research addressed the development of crash reduction factors for target crash types where sufficient bicycle facility information and crash information are available. To enable future cost-benefit assessments, the research included guidelines for assessing the benefit and cost of implementing such facilities.

### **What the Researchers Did**

In this project, the research team reviewed the existing literature and state-of-the-practice

safety implications of bikeway facilities. The review identified crash-contributing factors and types of bikeway facility designs for improving bicyclist safety. The research team then conducted an online survey to identify readily available data from agencies across Texas. Additionally, the research team collected field data and crowdsourced bicycle counts to estimate bicycle exposure. This information was then used to build a comprehensive safety database for developing the CMFs and reduction factors. The researchers finally conducted a benefit-cost assessment to develop guidelines for implementing the research results in TxDOT's Highway Safety Improvement Program (HSIP). The timeline of this project coincided with the COVID-19 pandemic as well as a major weather event (e.g., winter storm), affecting the field data collection.

#### **Research Performed by:**

Texas A&M Transportation Institute

#### **Research Supervisor:**

Bahar Dadashova, TTI

#### **Researchers:**

Karen Dixon, TTI  
Joan Hudson, TTI  
Robert Benz, TTI  
Boya Dai, TTI  
Xiao Li, TTI  
Ipek Sener, TTI  
Shawn Turner, TTI  
Soham Sarada, TTI

#### **Project Completed:**

4-30-2022

## What They Found

Using the information gathered from the agencies, the research team identified conventional bicycle lanes, buffered bicycle lanes, and separated bicycle lanes as some of the most implemented bikeway facilities in Texas. Some jurisdictions also implemented bicycle boxes, protected intersections, and bicycle signals as intersection-specific treatments. However, the sample size of such locations was very small and therefore not suitable for analysis. Consequently, the CMFs were developed for conventional, buffered, and separated bicycle lanes.

The findings of this project indicate that installation of bikeway facilities can significantly improve safety for bicyclists. Implementing conventional bicycle lanes can help reduce total, fatal and injury, and property-damage-only crashes by 41–49 percent. Buffered bicycle lanes can improve safety by 20–65 percent, and separated bicycle lanes can improve safety by 41–53 percent. The economic benefits of these treatments were also found to be significantly higher than the estimated cost of installing them.

## What This Means

Bicyclist crashes in Texas and across the country have been increasing. To address this safety concern, several jurisdictions have implemented various types of bikeway facility designs. However, their safety effectiveness has been evaluated in only a limited number of studies, and the existing research has provided conflicting findings. Therefore, CMFs are usually missing in TxDOT's HSIP. This project evaluated the safety effectiveness of frequently implemented bikeway facility designs for Texas using the data-driven safety analysis approach for the first time.

### For More Information

**Project Manager:**

Tom Schwerd, TxDOT, (512) 466-4186

**Research Supervisor:**

Bahar Dadashova, TTI, (979) 319-2055

Technical reports when published are available at <http://library.ctr.utexas.edu>.

Research and Technology Implementation Office  
Texas Department of Transportation  
125 E. 11th Street  
Austin, TX 78701-2483  
[www.txdot.gov](http://www.txdot.gov)  
Keyword: Research