A MODEL FOR BETTER CROSSWALK SAFETY

NITC researchers from Portland State University developed models to find what factors affected vehicles' compliance with pedestrian safety laws.

The Issue

Walking is recognized as a sustainable transportation mode that contributes to livable, healthy neighborhoods. The need for adequate pedestrian facilities is gaining recognition in the United States as more cities and states aim to provide walkable communities. In order to sustain and foster more walking in urban areas, communities need to be able to offer a secure and comfortable pedestrian environment. Traffic laws and regulations should provide a legal framework that protects pedestrians when they are most vulnerable.

Oregon law concentrates more on pedestrian safety than many states: Oregon drivers must stop for pedestrians as soon as they move onto the roadway in a crosswalk with the intent to proceed. In addition, Oregon state law determines that there is a crosswalk at every intersection with or without a marked "zebra crossing." Furthermore, Oregon requires that a driver, before crossing a crosswalk, stop and remain stopped for pedestrians until the pedestrians have cleared the lane in which the vehicle is traveling and the next lane—an area referred to as the "safety buffer."

The Research

When the focus is on motorized vehicle throughput, high vehicle speeds are desirable. However, high vehicle speeds are not desirable for pedestrians who have to cross urban arterials. This study from Miguel Figliozzi of Portland State University examines the tradeoffs between traffic mobility, transit performance, accessibility and the pedestrian experience. The research seeks to provide a better understanding of the complex interactions between cars, transit, traffic signal technologies and human roadway users.

NITC
NATIONAL INSTITUTE for TRANSPORTATION and COMMUNITIES
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THE ISSUE

Walking is encouraged as a sustainable mode that contributes to livable and healthy downtowns. Pedestrian safety is a necessary condition to sustain and foster more walking in urban areas.

THE RESEARCH

Researchers analyzed hours of video data looking for:

- Pedestrian-vehicle interactions;
- Pedestrian and vehicle volumes and speeds;
- Vehicle trajectories upstream of a crosswalk.

IMPLICATIONS

The results suggest that treatments discouraging accelerating toward a crosswalk could help increase pedestrian safety.

Photo: A pedestrian crosses at the study site, SW 4th Avenue and SW College Street in Portland, Oregon

The location chosen for this research was the intersection of SW 4th Avenue and SW College Street in Portland, Oregon. The intersection was chosen for two reasons: it had a high number of citations for failure to stop for pedestrians, and researchers had access to a university building rooftop to install video recording equipment. The team placed several cameras at different heights to analyze driver and vehicle trajectories up to 200 meters (650 feet) upstream of the crosswalk. The day before the data collection, the pavement was marked at predetermined distances to help researchers estimate the speed and distance of vehicles when a pedestrian entered the crosswalk.

Figliozzi and his team analyzed the video footage over a period of several weeks to measure pedestrian and vehicle volumes and speeds, the precise times of pedestrian-vehicle interactions, and detailed information about the vehicle trajectory, traffic conditions and pedestrian behavior. They developed models to elucidate the factors that affect non-compliance and stopping distance.

Implications

The modeling results indicate that speed and headway changes, as well as driving trajectory before reaching the crosswalk, are the most significant variables to predict crosswalk law compliance and stopping distance. Drivers who are coming from a freeway or who do not stop at an upstream traffic light are more likely to be less compliant and to stop closer to the crosswalk.

Results indicated that drivers are more likely to comply with the pedestrian law if the pedestrian stopped while crossing or had to speed up in response to approaching vehicles. Drivers of SUVs and pickups were found to comply less than smaller passenger vehicles. The focus of this research is not on the effectiveness of a particular treatment or specific design recommendations. However, based on the model results it is highly likely that measures that can be taken to reduce vehicle speeds are very likely to improve compliance rates. Additional signage may also result in higher compliance rates.

The results suggest that treatments or driver notifications that discourage accelerating towards the crosswalk would be most useful to increase compliance. It is also important to monitor vehicles' speed profiles near crosswalks in arterials with signal progression or in areas with a high number of pedestrians. Enforcement and education campaigns can be useful to lower noncompliance rates, but they should be complemented by appropriate engineering designs.

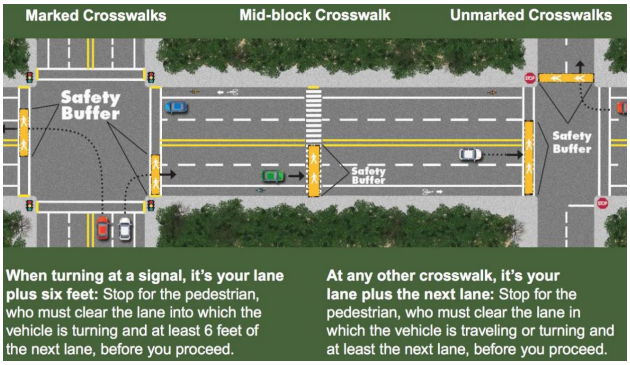

Illustration of safety buffers

This graphic from the Oregon Department of Transportation Safety Division shows the area that a pedestrian must clear before Oregon law permits the driver to move on.

PROJECT INFORMATION

TITLE: Modeling and Analyzing the Impact of Advanced Technologies on Livability and Multimodal Transportation Performance Measures in Arterial Corridors

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