An Overview of System Design Issues Related to Safety Aspects of Bicycle Infrastructure

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MTI Project WP 12-05

January 2016

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Bicyclists are significantly more exposed to death

Bicycling has been promoted based substantially on health benefits and the reduction of environmental impact without stating the risks of injury and death suffered in crashes as well as musculoskeletal injuries resulting from overuse. This promotion has led to an increase in the provision of bike paths and bicycle lanes, including re-designating general traffic lanes for exclusive use by bicyclists. The purpose of this report is to provide a critical review of the current practices and policies regarding infrastructure design for bicycling, with the principal focus on safety. The infrastructure is discussed primarily from a system perspective.

Study Methods

Some of the findings are based on literature review, but a very important aspect of the study was to bring existing theories to bear on the broad aspects of bicycle facilities planning and design. Bicycling is part of the overall transportation system and the appropriate allocation of scarce resources to bicycle infrastructure must be carried out in the context of all modes of travel. The principles of demand-supply analysis, benefit-cost analysis and systems design theory were used as a basis to discuss the allocation of scarce resources to bicycling. In addition, the safety of bicycling was discussed in the context of road design standards.

Findings

- Bicyclists are significantly more exposed to injury and death as compared to motor vehicle occupants. The sprawl of U.S. cities and towns, combined with scarce resources, often precludes adequate separation of bicyclists and motor vehicles.
- The wide range of bicyclists' physical characteristics (such as size, power, skill level, response to road and traffic conditions) makes it challenging to design bicycle facilities with the same sophistication and safety as facilities for motor vehicles.
- It is erroneous to consider bicycles as a zero emission vehicle in all circumstances, for example, re-designating general-use traffic lanes as bike lanes could cause congestion for motor vehicles, which could increase air pollution. When it comes to the allocation of funds, it may be more cost-efficient to remove pollutants by allocating funds to improve traffic flow and public transportation than allocating those funds to provide separate bicycle lanes or paths.
- Bicyclist safety could be substantially improved by increased education for bicyclists and motorists.

Policy Recommendations

- An attempt should be made to integrate the design standards for motor vehicles and bicycles into common design manuals. Such integration may clarify when separate facilities for bicyclists should be considered and when bicyclists should not be allowed on a particular road or street.
- Consideration should be given to promote bicycling for exercise and recreation on trails and to prohibit bicycling on roads and streets where large differences in speed and crossing maneuvers at high speed could occur, such as in the vicinity of busy traffic intersections.
- Before allocating lanes on existing arterial to specific modes, such as bicycles, bypass routes for displaced motor vehicles should be established to prevent them from causing safety problems by cutting through neighborhoods. An alternative would be to designate bike routes through the neighborhoods.
- Decreasing fatalities and injuries should be considered for the transportation system as a whole instead of trying to decrease the fatalities and injuries to bicyclists alone by implementing countermeasures.

About the Authors

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The author thanks Satnam Kaur and Marissa K. Neighbour for their help with editing and information collection.

To Learn More

For more details about the study, download the full report at ***transweb.sjsu.edu/project/1125.html***

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