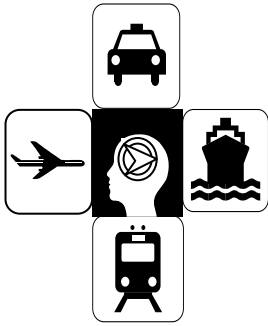


# JERSEY DOT'S

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## *Tech Brief*

### STUDY OF OPTIMAL TRAVEL SPEED LIMITS FOR SHARED TRAFFIC

FHWA-NJ-2004-12

July 2004

#### **SUMMARY**

The goal of this project is to identify safe operating speeds on residential and commercial roadways by identify proper speed limits for shared roadways or roadways that accommodate motor vehicles, pedestrians and bicycles. To achieve this purpose, the research team examined current criteria and procedure used for setting speed limits and developed an approach to determine appropriate speed limits for shared use of public rights of way by motor vehicle, bicycle and pedestrian traffic.

Based on New Jersey pedestrian/bicycle crash data, the team developed a logistical model that relates pedestrian/bicyclist injury severities in crashes with roadway speed limits and other geometric, traffic, and weather/light conditions. The model was then used to compute speed limits for given injury severities and roadway conditions. After taking into account of the operational impacts, the thus-computed speed limits would serve as guidelines for setting actual speed limits.

#### **INTRODUCTION/BACKGROUND**

Although guidelines are provided on the geometric design of shared-use roadways, little research has been performed on the appropriate speed limit for these roadways to ensure safety to all users of the roadway. In New Jersey, current regulations require the use of the low statutory speed of 25 mi/h in residential and business districts. No research has been performed, however, to determine whether this speed is appropriate on roadways in those districts where pedestrians and bicycles share the travelway with

motor vehicles. Research has shown substantial reduction in the severity of injuries and number of fatalities when the vehicle is traveling at less than 25 mi/h. This research examines current criteria and procedures used for setting speed limits and develops an approach to determine appropriate speed limits for shared use of public rights of way by motor vehicle, bicycle and pedestrian traffic.

## **RESEARCH APPROACH**

A statistical model was developed to relate pedestrian/bicyclist injury severities with speed limits and other roadway factors. Appropriate speed limits could subsequently be computed from the model for a roadway with given characteristics to target set pedestrian/bicyclist injury severity levels. The crash data for our model development purpose were from NJDOT's crash database on crashes involving pedestrians and bicycles in the years 1997 to 2000. An ordinal logistic regression was performed to detect the relationship between injury severities and other roadway characteristics. The regression was implemented using the commercial statistics software SAS.

The microscopic simulation tool CORSIM was used to study impacts of various speed limits on roadways' operational performances including total travel times, average vehicle delays, percent stops, fuel consumptions, and vehicle emissions. Only the combined use of the statistical model and this operational module would lead to well balanced roadway speed limits.

## **FINDINGS**

Relationships between pedestrian/bicyclist injury severity levels and speed limits along with other roadway characteristics were established. For any roadway with its given traits, for any targeted pedestrian/bicyclist injury severity level, a safety speed limit could be computed using one of the relationships. Operation impacts of these proposed speed limits could be evaluated using simulation in order to assess the feasibility of the targeted injury severity levels.

Using our developed models, safety speed limits were proposed for seven roadways based on their geometric and traffic conditions. The roadways used in the analysis included county road CR501 in Hudson County, Broad Street in the city of Newark, CR551 in Camden and Gloucester Counties, CR603 in Essex County, RT322 in Gloucester County, CR607 in Ocean County, and RT30 in Atlantic County.

## **CONCLUSIONS/RECOMMENDATIONS**

- When pedestrian/bicyclist safety is used as a primary criterion for setting speed limits, different safety standards should be used for urban and rural roadways.

- Factors other than geometric and traffic conditions, such as light condition and weather, can greatly affect the safety of a roadway; so differentiated speed limits for different light and weather conditions might be considered.
- Safety should be used in concert with other operational impacts including total travel times, average vehicle delays, percent stops, fuel consumptions, and vehicle emissions, to arrive to appropriate speed limits.
- A cost model encompassing impacts from vehicle-vehicle collisions, vehicle-pedestrian/bicycle crashes, and other operational factors may be the most appropriate one to be consulted with while setting speed limits for roadways.

<b>FOR MORE INFORMATION CONTACT:</b>	
NJDOT PROJECT MANAGER:	Nazhat Aboobaker, Ph.D., P.E.
PHONE NO.	609-530-4491
<b>e-mail</b>	Nazhat.Aboobaker@dot.state.nj.us
UNIVERSITY PRINCIPAL INVESTIGATOR	Jian Yang
UNIVERSITY:	New Jersey Institute of Technology
PHONE NO.	973-596-3658
<b>e-mail</b>	yang@adm.njit.edu

A final report is available online at <http://www.state.nj.us/transportation/research/research.html>

If you would like a copy of the full report, please FAX the NJDOT, Division of Research and Technology, Technology Transfer Group at (609) 530-3722 or send an e-mail to [Research.Division@dot.state.nj.us](mailto:Research.Division@dot.state.nj.us) and ask for:

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