

# Predictable is Preventable: Tracking Pedestrian Near-miss Incidents



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# Acknowledgements

## **New Jersey Safe Routes to School**

The mission for the New Jersey Safe Routes to School Program is to empower communities to identify and overcome barriers to walking and cycling to school through the creation of partnerships and implementation of projects and programs that make walking and biking to and from school appealing and safe daily activity.

## **The New Jersey Safe Routes to School Resource Center**

The New Jersey Safe Routes to School Resource Center assists public officials, transportation and health professionals, and enables the general public in creating safer and more accessible walking and bicycling environments for children in New Jersey through education, training, and research. The Center is supported by the New Jersey Department of Transportation through funds provided by the Federal Highway Administration.

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# Background

As part of a recent study to identify, and gather information on, a list of challenging school crossings, researchers at the Voorhees Transportation Center (VTC) at Rutgers University surveyed municipal traffic safety officers (police) for information on school crossings that the officers considered most challenging for pedestrians. The survey sought to answer:

1. What school crossings do police officers feel are challenging or unsafe for pedestrians? Why?
2. How can we identify pedestrian crossings where near-miss incidents occur?

A key finding of the survey is the police officers' identification of challenging crossing locations by criteria other than the occurrence of crashes. Pedestrian crashes are relatively rare but pedestrians face challenging crossings every day. Near-miss occurrences, in particular, can be used to predict the potential for crashes and thereby increase the ability to prevent crashes. The information received from police officers can be used by state, county and municipal agencies to address the need for improvements at challenging school crossings to reduce pedestrian risk.

The Federal Highway Administration (FHWA) has identified New Jersey as a pedestrian and bicycle focus state. New Jersey ranks 3rd among all states, Puerto Rico and the District of Columbia, in pedestrian fatalities as a percentage of total fatalities. In addition:

- National Highway Traffic Safety Administration reports that while the nation's traffic fatalities declined by 1% in 2014 from the previous year, the number of pedestrian fatalities increased by 2%. (1)

- Nationally, child pedestrians, aged 14 and under, accounted for 19% of all pedestrians killed and 5% of all pedestrians injured. (1)
- In 2014, New Jersey had 168 pedestrian fatalities representing 30% of all motor vehicle fatalities. The national average is 15%. (1)
- New Jersey ranks 10<sup>th</sup> in pedestrian fatalities for all age groups per 100,000 population **(1)**.
- In New Jersey, between 2006 and 2011, child pedestrians aged 14 and under accounted for 4% of all pedestrians' fatalities and 9% of all fatal and severe injuries **(2)**.
- Since 1993, 16 New Jersey crossing guards have been killed by motor vehicle drivers while at work at school crossings.



# Pedestrian Crashes vs. Near-miss Incidents

Crash data has frequently been used as the basis for analysis in research into pedestrian safety issues (6,7,8). However, crash data alone may not be sufficiently descriptive to present an accurate map of hazardous locations for pedestrian crossings. Crash data is information recorded by police officers at the scene of a crash, and is therefore subject to variability in the police procedures for recording information, and potentially to inaccuracy and omission of detail (6,7,8).

Even though New Jersey is 3<sup>rd</sup> in the nation in pedestrian fatalities as a percentage of total fatalities, pedestrian crashes are relatively rare events and researchers may find zero or one crashes at a given location over several years (6). When crash data is segmented, for example by age in a study on youth pedestrian injury, crashes appear as extremely rare and the importance of each crash is amplified.

Crash data focuses attention on areas where a crash has occurred in the past. The reported information is dated, and any analysis reliant on these data may not reflect current conditions, including physical improvements that may have been implemented since the crash (8).

In light of the limitations of crash data, some researchers have looked at pedestrian-vehicle near misses to evaluate the effects of pedestrian safety countermeasures. Near-miss situations, synonymously referred to as pedestrian-vehicle conflicts, have been described as situations in which “a vehicle had to abruptly brake or swerve to avoid striking a pedestrian or a pedestrian had to take sudden evasive action to avoid being struck” (9).

Research into pedestrian-vehicle conflicts includes a look at factors that may contribute to crashes and can be used to provide a valid estimate of crashes (10). Factors such as vehicle speed management, pedestrian separation from vehicles, and pedestrian visibility and conspicuity enhancement measures have been found to influence the frequency of pedestrian-vehicle conflict incidents. Researchers have used the various techniques as crash data surrogates to provide situational and behavioral information in the assessment of the effectiveness of various traffic safety countermeasures (9).

Studies and data collection efforts such as surveys, interviews, or focus groups of police officers regarding pedestrian safety issues appear to be rare in the research.



# Traffic Safety Officer Survey

Although police officers have contributed to safety research on topics such as distracted and impaired driving (3,4,5), they rarely have been interviewed or surveyed in relation to pedestrian safety research. The experience and observations of police officers in the community can be critical to understanding pedestrian experiences.

In the VTC survey, respondents were able to provide details on three pedestrian crossing locations by answering questions on elements of the locations, what characteristics contribute to crossing challenges, and how the officer knew of challenging crossing locations.

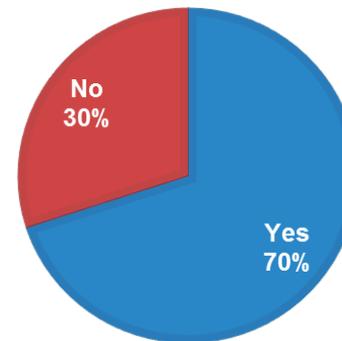
## Challenging vs. Dangerous

The word “challenging” was used in lieu of “dangerous” because “dangerous” may suggest that injury is considered a likely occurrence. “Challenging” is a broader term that acknowledges difficulty in pedestrian crossing although injuries or fatalities may not have occurred at a particular location.

Police officers identified, and provided details on, up to three challenging intersections or mid-block locations which they ranked by perceived challenge to pedestrians with the first crossing listed as the most challenging.

Two-thirds of the police officers who completed the survey

reported one to three challenging crossings while six percent of respondents reported ten or more. Officers reported on the jurisdiction (municipal, county, state) of the identified intersections or mid-block locations.



|       | Count | Percent |
|-------|-------|---------|
| Yes   | 124   | 70.5%   |
| No    | 52    | 29.5%   |
| Total | 176   | 100.0%  |

**Figure 1.** “Are there any school crossings you consider challenging for pedestrians in the municipality(s) you serve?”

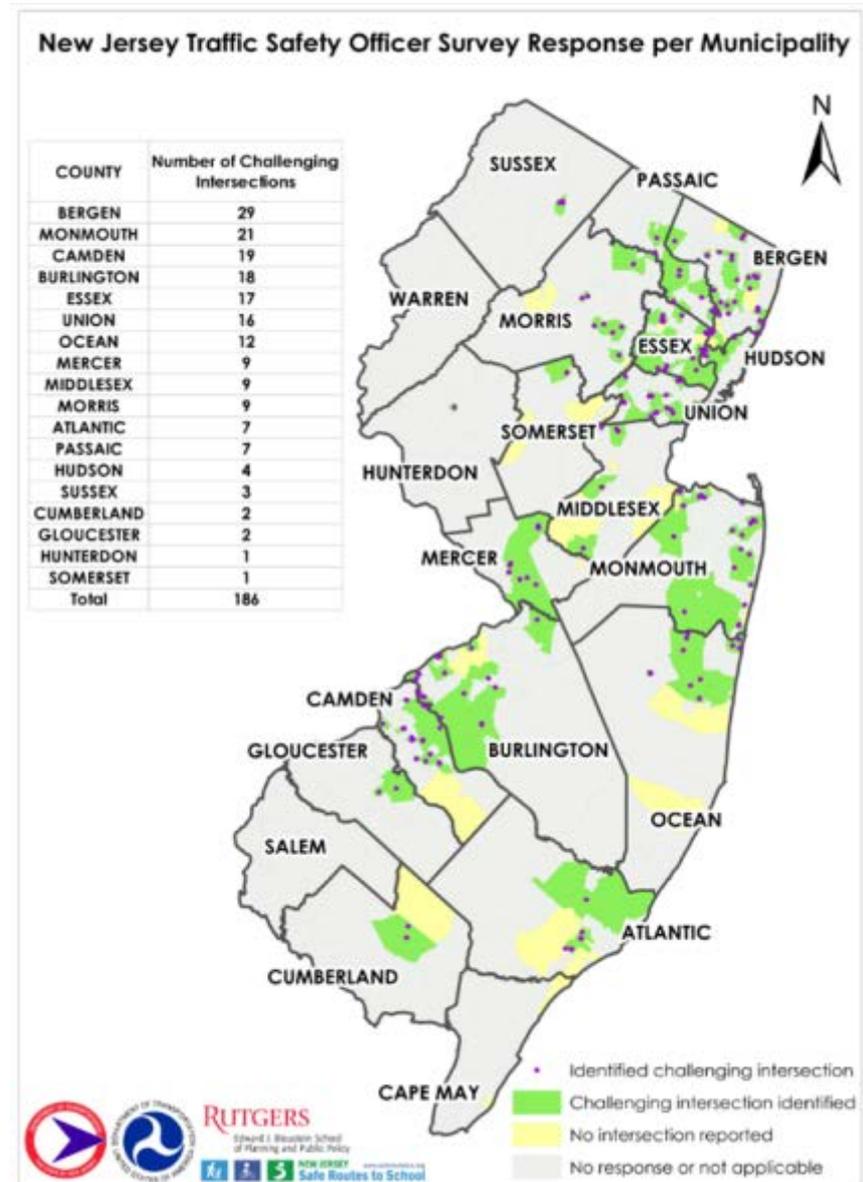
# Methodology

Police officers who are involved in traffic safety duties for their department completed the survey. A convenience sample of officers was used due to several factors:

- a complete list of all police officers in the State is difficult to obtain;
- some NJ municipalities lack police departments;
- some NJ municipalities lack school crossings;
- emails directed to the Chief of Police or a particular police officer may not have reached the officer best equipped to answer the survey questions.

The survey was conducted during November and December of 2015. VTC sent the survey to 231 municipal traffic safety officers who had participated in the NJ crossing guard train-the-trainer courses. The NJ Police Traffic Officers Association and the NJ State Association of Chiefs of Police also emailed their memberships encouraging participation in the survey. The Rutgers University Institutional Review Board approved the survey questionnaire and all responses were kept confidential. Participation was voluntary.

The survey effort received 176 valid responses, Figure 1. Nearly 30% of respondents reported that they did not have school crossings that were challenging for pedestrians in their municipalities. A total of 186 challenging locations were identified, Figure 2.



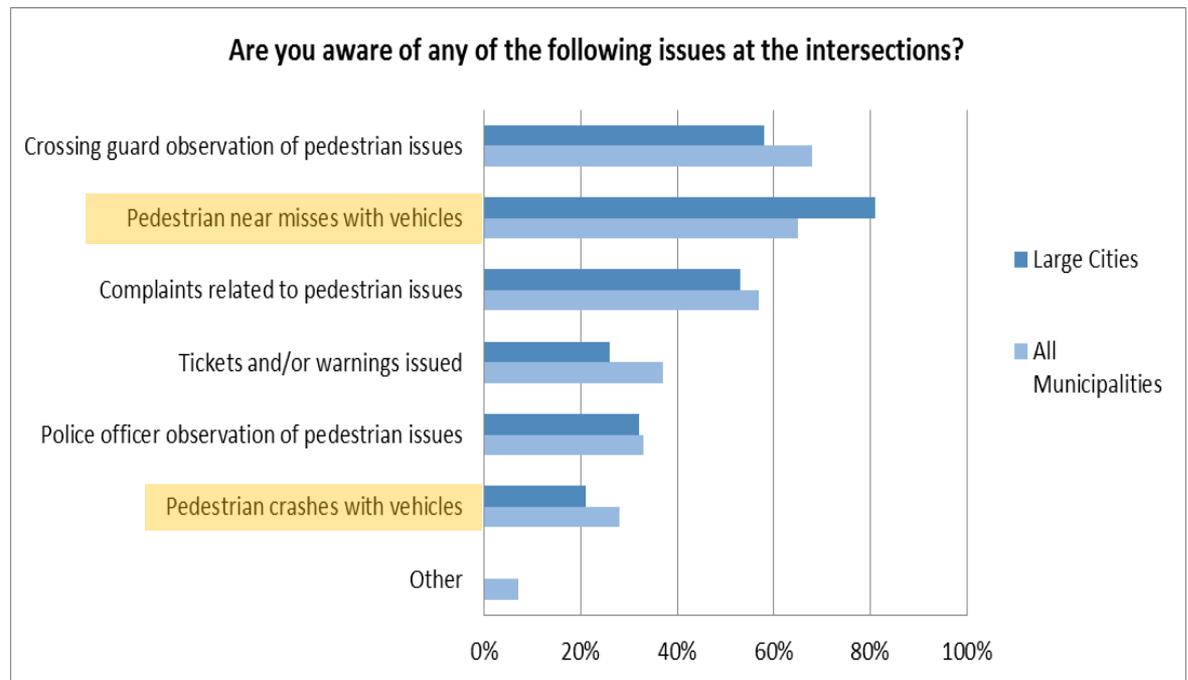
**Figure 2. Police Officer Survey Response per Municipality**

# Key Findings – Information Sources

Survey respondents identified pedestrian near misses with vehicles as significantly more common experiences than pedestrian crashes with vehicles at crossings identified as challenging. Police officers judge conditions at crossings based on their own experience of the locations, as well as documentation of traffic violations.

Due to their presence at over 90% of school crossings identified, crossing guards serve as important sources of information on conditions affecting pedestrian safety. Generally, crossing guards are directed to report concerns to their supervising police officers. Officers also receive complaints from other local sources, such as community members.

In large cities,\* police officers were aware of crashes at 21% of identified crossings but were aware of pedestrian near misses with vehicles at 81% of identified crossings.



**Figure 3.** Awareness of issues at pedestrian crossing locations

\* VTC examined responses from large cities separately to see if these responses varied significantly from the overall response. The communities included as large cities are: Cherry Hill, Hackensack, Kearny, Lakewood, Linden, Newark, Passaic, and Paterson with a total of 19 crossings identified.

# Key Findings – Road Jurisdiction

Almost 60% of the crossings identified as most challenging were located on County roads, followed by 57% of the second most challenging locations, and 43% of the third most challenging. In general, coordination between municipalities and counties to address road maintenance and remediation of challenging conditions at crossing locations is reportedly difficult.

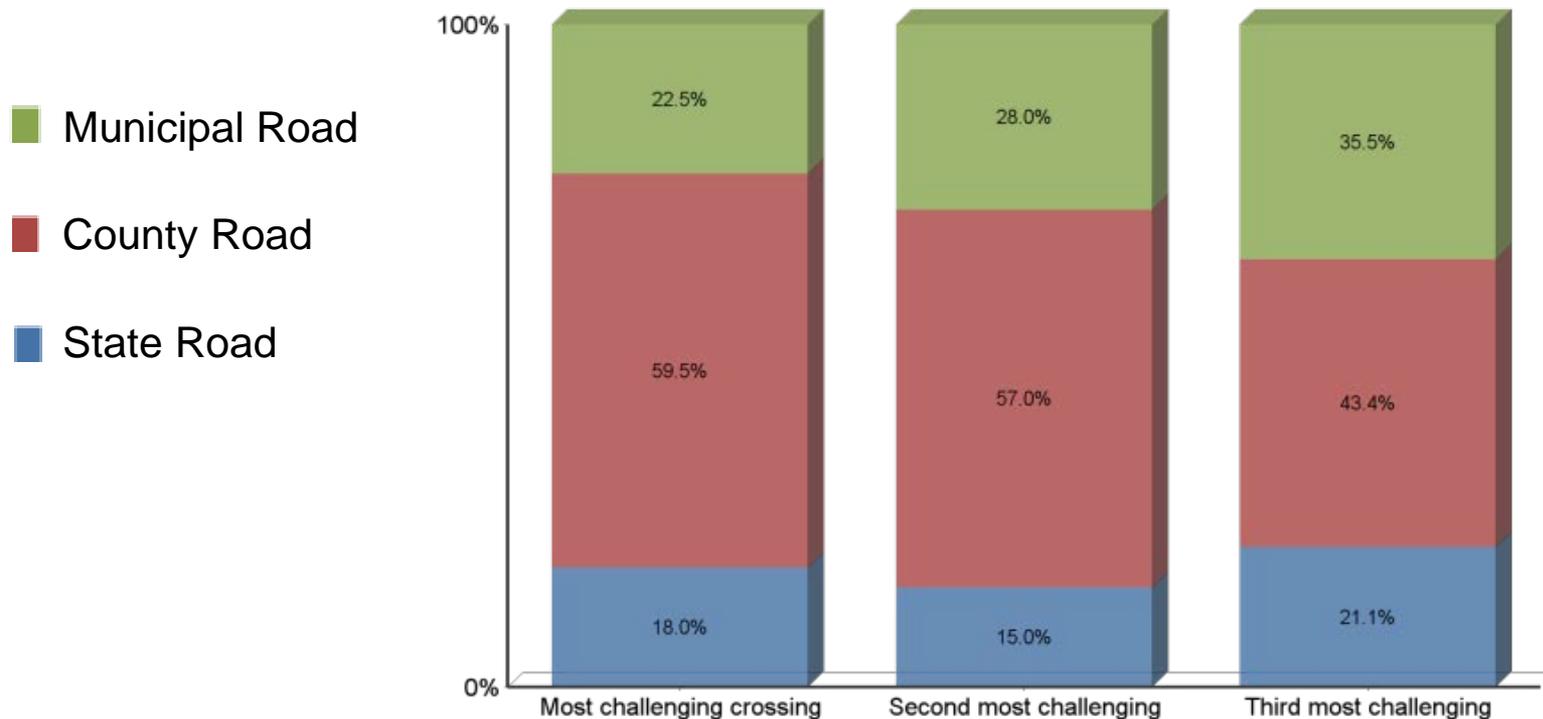
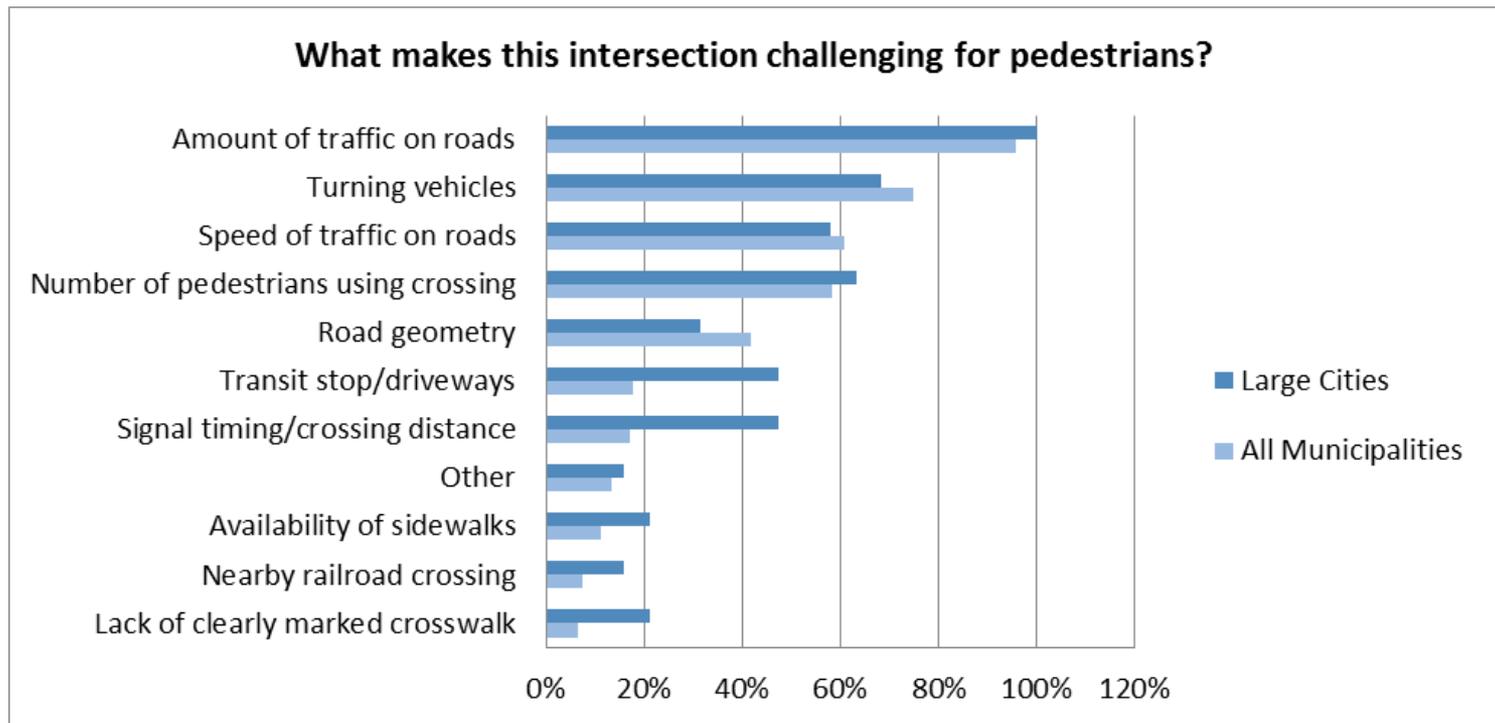


Figure 4. Road jurisdiction at challenging crossings

# Key Findings – Contributing Conditions

The most commonly identified factor contributing to pedestrian challenges at crossings was traffic volume, followed by turning vehicles, and traffic speed. About 60% of reported intersections were characterized by high pedestrian volumes. Almost two-thirds of police officers identified more than three of the listed characteristics at each of the reported crossings.

Responses from police officers in large cities varied in a few ways. As might be expected, transit stops and driveways posed more of a challenge in urban environments than at all locations. Signal timing and crossing distance was a greater challenge, as was the availability of sidewalks, (the absence of) clearly marked crosswalks, and nearby railroad crossings.



**Figure 5.** Conditions Contributing to Challenging Crossings

# Conclusion

In order to prioritize pedestrian crossings for evaluation and implementation of improvements, state DOTs, regional planning organizations, and other planning agencies could employ tools that supplement crash data. Pedestrian crashes are relatively rare and may not be an effective predictor of future conflict at a crossing. Near-miss data may be more predictive of future pedestrian-vehicle conflict at certain locations, and can support efforts to prevent serious pedestrian injury or death at these locations.

Planning organizations and other researchers may find it useful to use police officers as sources of information on pedestrian safety. Police officers, crossing guards, parents, and children with direct experience of pedestrian facilities at crossings can provide transportation professionals, engineers and planners with relevant information to make decisions about infrastructure improvements.

Police officers are experts with knowledge of local conditions from direct experience and observation, and from information gathered from their employees (e.g. crossing guards) and the public. Considering the relatively high percentage of officers who reported near-miss occurrences at the challenging crossings (65% overall and 81% in large cities), alternative methods of gathering information would be of value, as seen in the literature.

Although 20% of the reported challenging crossings involve a state road, 57% involve a county road. A means of sharing the findings of this research with state and county engineers and planners would be an important step toward addressing

pedestrian safety at these locations.

30% of the survey respondents indicated that there were no challenging crossings in their community. The identification of a pedestrian crossing as “challenging” can be a subjective decision. In addition, officers may have been reluctant to complete the survey. One survey respondent provided details on three challenging school crossings, but did not identify the locations by street name. In a follow-up interview, the officer explained that he did not want the locations to be labeled as challenging for pedestrians due to liability concerns.



# Next Steps

Predictable is preventable. Efforts to improve pedestrian safety should be proactive and not just reactive following pedestrian injury or death. Pedestrian crossing locations with frequent occurrences of near-miss incidents are more likely to be locations where injuries or fatalities will occur in the future. Prevention of these pedestrian-vehicle conflicts requires the use of near-miss data to prioritize crossing locations.

Crossing guard safety is often overlooked; however, the NJ Municipal Excess Liability Joint Insurance Fund considers crossing guard as one of the most dangerous occupation in municipal government **(11)**. School crossings, where a municipal employee works in the road and more vulnerable pedestrians such as children cross daily, should be prioritized for pedestrian safety improvements.

Tracking pedestrian near-miss incidents can be added to performance measures used to allocate pedestrian safety funds like Highway Safety Improvement Program (HSIP) funds.

Future research needs, not only to identify the limitations of reliance on pedestrian crash data, but also to identify ways to address pedestrian crossing safety that include leveraging expert knowledge to prevent future crashes.



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