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Breakaway Utility Poles

Feasibility of Energy Absorbing Utility Pole Installations in New Jersey

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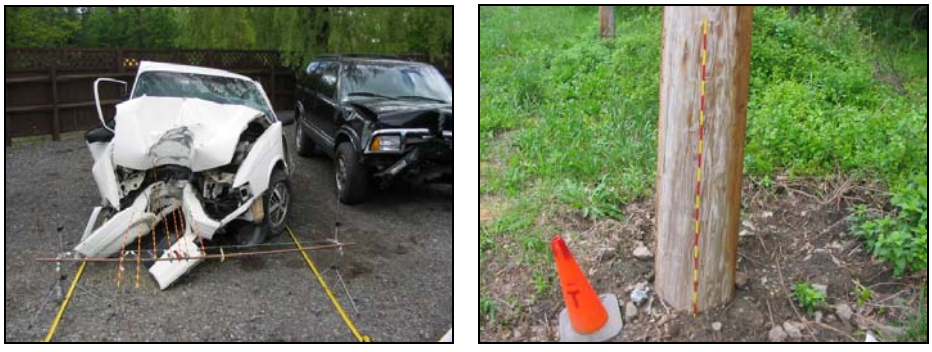
Summary

Each year in New Jersey, approximately 10,000 vehicle occupants are involved in a utility pole crash. Annually, these collisions result in 50-60 deaths and 200 persons who are incapacitated. The State of New Jersey has a particularly urgent utility pole problem. New Jersey is only 22nd among the states in number of traffic fatalities, but ranks 8th in number of fatalities resulting from utility pole impacts. In terms of utility pole crash fatalities as a percentage of all fatalities, NJ ranks 4th among all states.

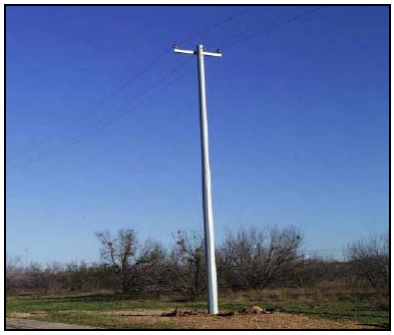


1991 Pontiac Grand Am (left) after a Collision with a Utility Pole (right)

The goal of this research program was to investigate and recommend methods to mitigate the fatalities and injuries that result from traffic crashes with utility poles in New Jersey. Recommendations include initiation of a formal utility pole crash mitigation program, modification to the current NJ Utility Accommodation Policy, and investigation of US 22 as a candidate for utility pole crash mitigation.

Introduction

Vehicle impacts with utility poles are one of the most unforgiving types of crashes to which motorists are exposed. The rigid design of a utility pole, which allows the pole to survive the high winds of a storm, unfortunately makes the pole particularly unyielding in a traffic accident. Vehicles which undergo pole impacts suffer large, frequently devastating, deformation of the occupant compartment which too frequently leads to serious or fatal injuries.



Shakespeare Energy Absorbing Utility Pole

Numerous utility pole collision countermeasures are available and include placing utility lines underground, increasing pole offset, increasing pole spacing, shielding poles with roadside safety devices, and delineating the pole. Another proposed countermeasure to lessen the severity of these collisions is breakaway or energy absorbing utility poles.

Research Approach

Rowan University and Virginia Tech were contracted by the New Jersey Department of Transportation to study utility pole collisions in New Jersey. The objective of this project was to investigate and recommend methods to mitigate the fatalities and injuries that result from traffic crashes with utility poles in New Jersey. To accomplish this objective, the research team (1) assembled previous and ongoing research on utility pole crash mitigation, (2) evaluated the current NJ Utility Accommodation Policy in light of current national practices, (3) analyzed NJ utility pole crash data, (4) identified high risk utility pole crash sites in NJ, and (5) developed a cost-benefit procedure for evaluating breakaway or energy absorbing utility poles.

FINDINGS

NJ Utility Accommodation Policy. The New Jersey Utilities Accommodation policy [1] focuses solely on pole placement for new construction or reconstruction. In general, the NJ Accommodation policy follows national guidelines closely, if not verbatim. There are however two important exceptions which should be considered for modification:

1. There is no specific mention of treatment of intersections in the New Jersey Accommodation Policy. National guidelines describe special considerations for utility pole placement at or near intersections.

2. There is no formal mechanism for remediation of existing high risk utility pole crash sites. The current NJ policy calls for a check only to sites that are planned for reconstruction.

NJ Utility Pole Crashes. To determine the characteristics of utility pole crashes in NJ, the research team analyzed data from the 2003-2005 New Jersey Crash Record system and the 2000-2004 Fatality Analysis Reporting System (FARS). The primary findings are summarized below:

1. 40% of all occupants exposed to utility pole crashes suffered some level of injury ranging from complaint of pain to death. Fortunately, fatal and incapacitating injuries were rare. Annually, 2.6% of occupants exposed to utility pole crashes received either a fatal or incapacitating injury.

2. County roads account for most utility pole crashes and most utility pole crash fatalities. State highways however are overrepresented in serious utility pole collisions. State highways account for 20% of all utility pole crashes, but 32% of all fatal and incapacitating utility pole crashes.

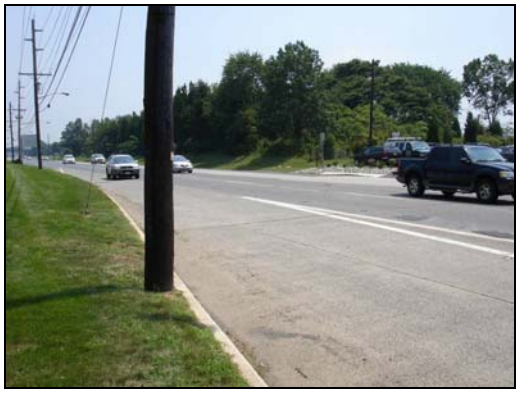
3. Frontal impacts are the most common type of pole impact, but side impacts are the most lethal crash mode. Side impacts are only 19% of all utility pole crashes, but result in 43% of all fatal utility pole crashes. Because energy-absorbing and breakaway poles are designed for frontal impacts, this countermeasure may not be as effective in protecting against side impacts into poles.

4. Motorcyclists are overrepresented in fatal utility pole crashes. Motorcycles are involved in less than one-half of a percent of utility pole crashes, but were the striking vehicle in 7% of all fatal crashes. Because energy-absorbing and breakaway poles are designed for activation by cars, it is unlikely that this countermeasure will be effective in protecting motorcyclists.

Identified High Risk Sites in NJ. Using New Jersey accident statistics, the research team identified high risk locations for utility pole impacts on state highways. This analysis is a common component of most state safety initiatives to reduce utility pole crash injuries, and is of enormous value in setting remediation priorities for existing utility pole sites. A total of four different methods were used to identify high risk sites:

1. Crash Frequency
2. Number of Seriously Injured Persons or Crashes with Serious Injuries
3. Weighted Ranking based on Occupant Injury Severity (KABCO Scale)
4. Social Cost - using FHWA costs of crashes normalized to the cost of a fatality

Based both upon these ranking methodologies, U.S. Highway 22 was ranked as having a very serious utility pole impact problem. This highway, especially the stretch between MP 46 and 56, should be considered for remediation of its utility pole crash problem.



Utility Pole Along US 22, Milepost 36 Westbound

Recommendations

Based upon our investigation of New Jersey crash experience in utility pole collisions, we make the following recommendations to reduce both the number of crashes and severity of crashes into utility poles.

1. Initiate a Formal Program to Mitigate Existing High Risk Utility Pole Crash Sites. AASHTO and TRB recommend an ongoing comprehensive crash reduction program which periodically analyzes crash data to identify, prioritize, and mitigate locations where pole crash risk is high. New Jersey should adopt this national guideline, and initiate a formalized program to regularly identify and remediate high risk utility pole crash sites. Remediation should not be limited to sites planned for or undergoing reconstruction.

2. Update the NJ Utility Pole Guidelines to reflect current national best practices. The New Jersey Utility Accommodation Policy and Roadway Design Guidelines should be updated to reflect current national best practices as recommended by AASHTO and TRB. This should include a policy for identifying and mitigating high risk sites and guidelines for placement of poles near intersections.

3. Investigate US Highway 22 as a candidate for utility pole crash mitigation. Using four different ranking schemes to identify high risk utility pole impact areas, several locations along U.S. Highway 22 consistently ranked in the top 20 high risk locations in New Jersey. Based on this analysis and site visits, we recommend that this highway, especially the stretch between MP 46 and MP 56, be considered for remediation of the pole impact problem.

4. Install Shakespeare composite energy absorbing poles as a new technology demonstration project in New Jersey. We recommend that Shakespeare composite energy absorbing poles be installed as a new technology demonstration project for a limited number of sites with a utility pole crash problem. Appropriate sites should be

selected using the cost-benefit methodology developed as part of this research effort.

5. Develop a NJDOT design standard to allow breakaway utility poles to be installed at high risk locations. Upon the completion of a successful demonstration project, consider revising NJDOT Design Manual to install breakaway or energy-absorbing pole installations at high risk locations, which could include horizontal curves with a safe speed less than the posted speed; or where design exceptions have been approved for substandard radius, cross slope, and shoulder width; or high posted speed limits with small pole offsets where utility companies are replacing poles that have been previously hit.

References

[1] Chapter 25, Utility Accommodation NJAC 16:25, R.2004 d34, effective December 22, 2003.

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