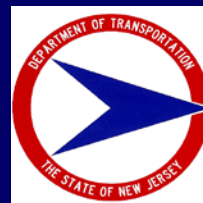


New Jersey Department of Transportation  
Bureau of Research

## Technical Brief



### Compatibility of Highway Railroad Crossing Gates with Overhead Catenary System High Voltage Power for Trains

*Historically, there have been some incidents where there has been contact between crossing gate arms and the overhead catenary system (OCS) in electrified portions of the New Jersey Transit rail system. The high voltage of the OCS potentially makes such contact a potential risk. This study evaluates each crossing in electrified territory for potential of contact, and makes recommendations to remediate grade crossings with the potential for contact.*

#### Background

New Jersey Transit operates several lines and branches that are electrified and utilize overhead catenary systems (OCS) to power trains. The catenary lines are electrified to a nominal 25 kV potential. In addition, signal power lines have a nominal 6.7 kV potential, and neutral or static lines are also present. Contact between these overhead lines and crossing gate arms have occurred in the past, sometimes leading to significant damage.

#### Research Objectives and Approach

The purpose of this study was to evaluate grade crossings in electrified territory for the possibility of contact between crossing gates and overhead lines, to identify ways to prevent these events, and to reduce the consequences of these events. Records of previous incidents were analyzed, and case studies of crossings with histories that suggested problems were performed. All of the crossing gate arms were evaluated for the potential to contact catenary, signal power, or static lines. Recommendations were made for all crossing gates identified as having the potential to contact overhead lines.



## Findings

An essential aspect of the findings for this report is the need to maintain a balance between the potential for contact with catenary lines, and the fundamental purpose of crossing gate arms: to prevent grade crossing accidents. A summary of the findings is as follows:

- The project identified 75 crossing gate arms with the possibility of contacting catenary lines, and 47 crossing gate arms with the possibility of contacting signal power or static lines.
- The most serious condition, contact with catenary lines, can only occur with a complex series of events, beginning with an automobile striking a gate arm in the down position. Because of this, these are rare events.
- Ensuring that the catenary lines are on the far side of tracks will reduce the number of gates with a possibility of contact from 75 to 42.
- Double testing of crossing gate arms in various states suggest there is no way to insulate a gate arm to allow for safe contact with a catenary line, as rainwater will provide a path for electrical conductivity.
- The use of gatesavers, possibly modified with failsafe switches that cut power when a gate arm is in the down position, is the best solution to prevent contact between gate arms and the overhead catenary lines.
- Ongoing efforts to reduce grade crossing fatalities, e.g., Operation Lifesaver, should be encouraged, as vehicles striking crossing gate arms are the first step in possible contact with catenary lines.

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A final report is available online at: <http://www.state.nj.us/transportation/refdata/research/>. If you would like a copy of the full report, send an e-mail to: Research.Bureau@dot.nj.gov.

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