

NJ-2009-004

## **JUNCTION BOX LID REDESIGN**

FINAL REPORT  
November 2009

Submitted By

Hugh Louch  
Cambridge Systematics, Inc.  
38 E. 32nd Street, 7th Floor, New York, NY 10016

Harry Baker  
KS Engineers, PC  
494 Broad Street, 4th Floor, Newark, NJ 07102



NJDOT Research Project Manager

Stefanie Potapa

In cooperation with

New Jersey  
Department of Transportation  
Bureau of Research

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## **EXECUTIVE SUMMARY**

The New Jersey Department of Transportation (DOT) has been experiencing electrical shorts and tripped circuit breakers caused by rodents chewing through electrical wires. The team conducted research with other DOTs to determine if there were existing solutions to this challenge. Based on telephone conversations with several DOTs, we were able to determine that there are similar problems in the neighboring states. Several options have been provided for New Jersey DOT to consider and a cross-sectional detail for implementing several solutions has been generated..

## **BACKGROUND**

The New Jersey Department of Transportation (DOT) has been experiencing rodents entering into junction boxes. Once in the conduit, the rodents begin to chew through the wire and cause electrical shorts, which trip circuit breakers. Over time, the electrical cables are damaged or severed.

## **OBJECTIVES**

The objective of this project was to assist the New Jersey Department of Transportation in identifying options to prevent rodents from entering electrical conduit and chewing on the electrical wires.

## **INTRODUCTION**

The objective of this project was to assist the New Jersey Department of Transportation in identifying options to prevent rodents from entering the traffic signal conduit and chewing on electrical wires, causing shorts, tripped circuit breakers, and damage to the wires. Other departments of transportation and possible vendors were contacted to determine how to prevent rodents from entering the conduit.

## **SUMMARY OF WORK PERFORMED**

Research team members reviewed information available from transportation agency websites and contacted several agencies by phone to identify potential solutions for NJDOT. Contacts were made with seven agencies, resulting in the following findings:

- New York State DOT experiences this problem in New York City. They use a two-fold solution. They wrap a mesh core around the cable inside the conduit and then use a duct seal around the cables. They have found that this solution prevents the rodents from getting into the conduits and chewing on the wires.
- Rhode Island DOT does not experience this problem.
- Massachusetts Highway Department uses a combination of a duct seal and poison. They find that the problem becomes exacerbated in the winter when the weather is colder and the rodents are looking for a warm place to stay.
- Connecticut DOT does not experience this problem.
- Pennsylvania DOT installs steel wires to prevent the rodents from damaging cables.
- City of Yonkers Traffic Department uses an epoxy compound placed several inches into the conduit. This solution requires maintenance follow up to ensure that the integrity of the seal is not compromised.

## CONCLUSIONS AND RECOMMENDATIONS

There are several options as noted above that NJDOT can use to prevent rodents from accessing the conduit and chewing on the wires, including:

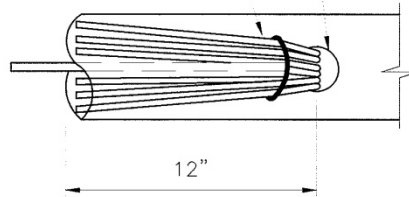
1. Install small steel wires into the conduit opening, reducing the opening so that rodents cannot enter into the conduit (see Figure 1).
2. Use a duct seal around the wires (see Figure 2). The duct seal is placed around the opening of the conduit providing a seal that the rodents cannot penetrate. This is the most common method to prevent rodents from entering the conduit.
3. Use an epoxy compound that is also placed on the outside and inside the conduit for approximately three-inches (see Figure 3). It is important to completely block the opening.
4. Use some combination of the first three options.
5. Use poison within the junction boxes to kill rodents that enter, ideally in combination with one or more of the other options. Poison creates a need to regularly maintain and remove dead rodents.

NJDOT could chose any individual option or a combination of the above. The work for each option is labor intensive; but would lengthen the life of the wires, reducing maintenance, replacement, and electrical outages.



TIE ENDS TOGETHER WITH STEEL  
WIRES AND WELD CLOSED  
CREATE ONE WHICH TRAPS  
RODENTS NOT ALLOWING THEM  
TO ENTER CONDUIT

1/4" STEEL WIRES —

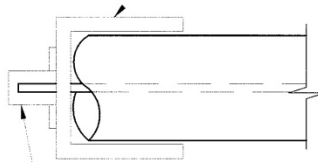


DETAIL 1  
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Figure 1. Steel Wires to Prevent Rodents from Entering Conduit

DUCTSEAL

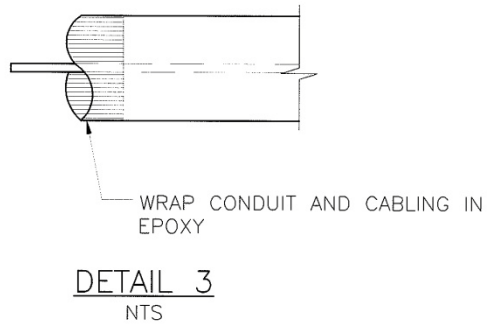


WRAP CONDUIT IN DUCT SEAL  
TO PREVENT RODENTS FROM  
EATING CABLE

DETAIL 2  
NTS

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Figure 2. Conduit Wrapped in Duct Seal



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Figure 3. Conduit and Cabling Wrapped in Epoxy