

New Jersey Department of Transportation
Bureau of Research

Technical Brief



Development and Implementation of a Segment/ Junction Box Level Database for the ITS Fiber Optic Conduit Network

This project is a follow-up to an initial study to determine the ability to locate underground Intelligent Transportation System infrastructure elements using innovative techniques. In order to properly track missing or damaged elements of the infrastructure, a database using an easy-to-access interface needed to be developed. The database was populated using junction box and fiber optic cable data from field investigations of prioritized locations.

Background

NJDOT operates and maintains a network of thousands of miles of Intelligent Transportation Systems (ITS) infrastructure. Approximately 600 miles of it consists of fiber optic cables that are vital to the state's communication system. These cables have to be located and marked prior to construction activities to avoid potential damages. Currently, NJDOT locates conduits using trace wires (TW) and radio frequency (RF) detection methods. However, a portion of the network has missing or damaged trace wires, which poses a significant problem. A recent project by the Team of TCNJ and NJIT, sponsored by NJDOT with partial support from UTRC, evaluated a variety of other detection techniques including acoustic transmission (AT), ground penetrating radar (GPR), ground penetrating sonar (GPSon), and the measurement of electro-magnetic impedance (EMI).

As part of the findings and recommendations of the original study, the development of a computerized database of junction boxes was considered as an essential component of a long-term solution to the detection problem, as the inventory of the ITS consists of sections of conduits of variable lengths, diameters and materials, and often crossing several junction boxes, which are not inventoried.

Research Objectives and Approach

The overall objective of this project is to start the development of a Computerized Database of All ITS Facilities, including conduits, Junction Boxes, Cameras, Connections, etc., with an initial focus on the junction box facilities currently missing from the current inventory system. The key thrust of the proposed work is to focus on pipes and junction boxes through the development of a detailed dynamically updated inventory of all Segment-Level conduits (Junction Box to Junction Box) and the Junction Boxes themselves. This also included, for a number of prioritized locations, identification for every facility of its location fields such as physical characteristics (diameter, length, material, depth of cover (starting, ending), etc.), its location characteristics (soil type/suitability for GPR, under asphalt/concrete/grass, contiguity to other utilities/clutter, etc.), as well as its history and frequency of inspection,

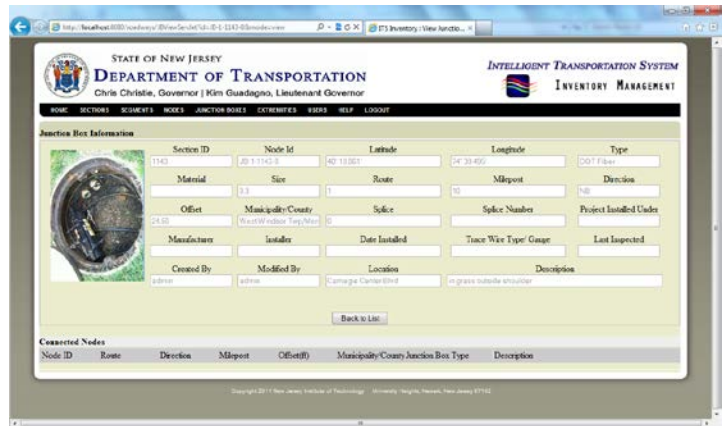
thus improving the quality and accuracy of inventory information for future construction and expansion of the network.

Findings

Through this work, an investigation of the current state of the ITS inventory was conducted. Based on this, a new inventory structure was developed, with a MySQL-based architecture and interface. This allows for easy user access to a wide variety of information regarding the ITS database as a whole and the junction box and fiber optic cable inventory in particular.



Also, the ITS database was reviewed, and field investigations were conducted that allowed the database to be updated and supplemented for a number of major state routes. This yielded an array of location and physical information for ITS facilities on over 400 miles of prioritized roadway locations, mainly in central New Jersey. Used to populate the demonstration version of the database, the database was shown to provide an easy-to-use and -organize interface to allow access to necessary information regarding the NJDOT ITS infrastructure.



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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.state.nj.us.

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