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New Jersey Department of Transportation
Bureau of Research

Technical Brief

Drainage Information Mapping and Analysis System

This research study designed, developed, implemented, tested and trained staff to use a fully-functional, NJDOT-customized software program called the Drainage Information Analysis and Mapping System (DIAMS), that can utilize state-wide pipes and storm water infrastructure data, derived by uploaded inspection records, for report generation, financial analysis, and budget optimization.

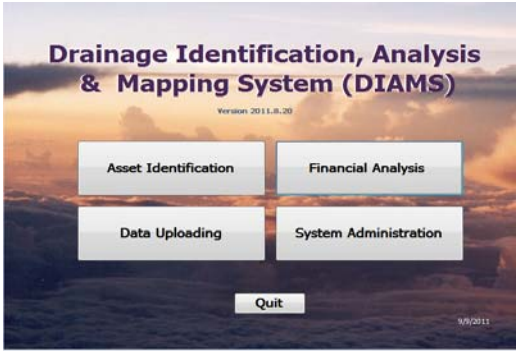
Background

Drainage infrastructure information, including analysis, and mapping data based on the condition states of pipe assets, plays a vital role in the ramifications of manually accessing pipe inspection records. Manually assessing the condition states is labor intensive, subjective, error prone, and carries a potential delayed response in an event of catastrophic failure. The current efforts of data mining and assessment of the condition and serviceability of the drainage infrastructure assets involve searches and analyses of hardcopies and video documentation of pipe inspections.

Inspection records were made available through the creation of the DIAMS system so that users can now quickly and easily identify assets, analyze the financial implications of rehabilitation versus replacement over the life cycle of the drainage asset, upload field data, and select the best possible management implementation choice for any selected drainage asset.

Research Objectives and Approach

The Drainage Information Analysis and Mapping System (DIAMS) was developed as a customized software tool for NJDOT operations maintenance staff. DIAMS addresses the problems of archiving, accessing, analyzing and optimizing drainage infrastructure asset data for a highly efficient reporting system.



Analysis ratings are used for the asset locations relative to the NJ roadway centerlines. NJDOT's drainage infrastructure asset management is analyzed from historical records and condition states of all assets in the system. The pipe condition state, from inspection records, and unit cost information, from 2010 rehabilitation/replacement projects, are used for cost analysis. Financial analyses of assets are performed by comparing inspection and/or rehabilitation costs with associated risks of failure.

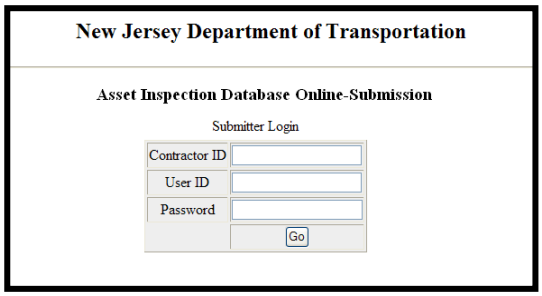
Findings

A unified infrastructure asset database was created, using Oracle version 2010, which contains all the vendor-produced elements and data records from field inspections. The data records include latitude and longitude GPS coordinates of the pipe inlet/outlets, storm water assets, manufactured treatment devices (MTDs), mile marker information, video imagery, and date of inspection. A significant improvement with DIAMS was realized by the successful migration of the Access database into a SQL database. An online submission portal and a financial analysis module were developed for the DIAMS software package.

The following information was used to compile and test a unified SQL database:

- Vendor-produced Access tables of pipe assets inspections
- Online and Hard copies of Inspection reports
- Assets Inspection Data on DVDs and updated Straight Line Diagram Database
- Old inspection contracts for cost and time estimates

Online Submission Portal, a browser-based web application that allows vendors to upload their field data and results were generated. The benefit of this module is in its data verification and reporting facility. The application could also automatically insert relevant information into different NJDOT databases per user requests.



Financial Analysis Module contained within DIAMS customized software allows users to search for optimal or near optimal solutions on budget allocations among various pipe material options. The pipe assessment and optimization process are the core components of DIAMS pipe financial analysis module.

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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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