

ABSTRACT

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Title: A Framework for the Detection of Utility Conflicts using Geo-Spatial Processing
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This thesis develops and demonstrates a framework for the detection of utility conflicts, to ease the burden of utility coordinators and utility permit engineers of transportation agencies. The increasing density of utilities within roadway right-of-way overburdens transportation agencies in two ways. In utility coordination, there is an increased difficulty in the manual identification of utility conflicts, while in utility permitting, there is an increased difficulty in the case-by-case review of utility permits for potential conflicts; due to lack of readily available, easily accessible and inter-operable utility location data. This study proposes the development of a utility conflict detection framework within a geo-spatial environment, using non-geospatial utility location data obtained from Indiana Department of Transportation's (INDOT) Electronic Permitting System (EPS), as a step towards addressing these challenges. The automatic detection of utility conflicts is demonstrated using spatial conflict detection models, wherein a conflict report and a visualization of conflict area/volume are generated. A data-entry GUI is developed to streamline data-entry of utility/highway project design parameters into a geodatabase, which is populated with existing highway and utility location information. The framework is designed to be implemented by state transportation agencies for: (1) early detection of utility conflicts in highway projects (before 60% design) and in utility permitting (before a permit is approved/denied), and (2) to automate the utility conflict detection process. Early detection provides opportunities for transportation agencies to make proactive design decisions, avoiding expensive utility relocation and preventing utility breaks/accidents. Automatic detection eases the burden of utility coordinators and utility permitting engineers, from manual identification of utility conflicts. Illustrative examples of a utility and highway project are used to demonstrate the performance of the framework in automatic detection of potential utility conflicts.