

Managing Utility Conflicts to Achieve the 3 C's

Communication, Coordination, and Cooperation

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When utility relocation is involved, highway construction projects often take longer and cost more. Identifying and resolving potential utility conflicts early in the design process can minimize these delays and costs. Research from SHRP 2's Renewal focus area (Identification of Utility Conflicts and Solutions Project R15B) developed a comprehensive approach and tools that public agency and utility professionals can use to resolve and manage utility conflicts with new efficiency. The tools developed include two utility conflict matrices (UCMs) that enable users to organize, track, and manage the conflicts that frequently arise: (a) a prototype UCM in Microsoft Excel, which has a main utility conflict table and a supporting worksheet to analyze utility conflict resolution strategies; and (b) a prototype utility conflict data model and database, which is a scalable UCM that provides the tools of a database environment for conflict management. This project also developed a 1-day training course to instruct end users on how to adopt the tools, strategies, and guidelines that include specific steps to start and continue implementation. This brief gives an overview of the products.



Leif Skoogfors/FEMA

Utility Conflicts

Two critical factors that contribute to inefficiencies in the transportation project development process are the lack of accurate, complete information about utility facilities that might be in conflict with the project and the resolution and overall management of those conflicts. These factors can cause a variety of problems:

- Disruptions when utility installations are encountered unexpectedly during construction, either because there was no previous information about those installations or because their stated location on the construction plans was incorrect;
- Damage to utility installations, which can disrupt utility service, damage the environment, and endanger the health and safety of construction workers and the public; and
- Delays that can extend the period of project development or delivery and increase total project costs.

The traditional approach for resolving utility conflicts at many state departments of transportation (DOTs) is to relocate the affected utility facilities—often at great expense to the utility owner or the DOT or both. Relocating a utility facility is not necessarily the only or best strategy to resolve a utility conflict. Other strategies include designing and constructing the transportation facility in such a way as to leave the affected utility facilities in place. This option requires effective management to avoid design changes with negative impact on costs and schedules.

Practices involving the use of UCMs to organize, track, and manage utility conflicts vary widely across the country and some are more successful than others. Recognizing that transportation agencies could deliver projects faster with streamlined and widely-accepted processes for resolving utility conflicts, SHRP 2 Renewal Project R15B addressed this need in the following ways:

- Reviewing trends around the country and identifying the best practices on the use of UCMs,
- Developing and testing a standardized UCM concept,
- Developing training materials, and
- Developing implementation guidelines.

Prototype 1: Utility Conflict Matrix

Prototype 1 is a stand-alone product in Microsoft Excel format that includes a main utility conflict table and a supporting worksheet to analyze utility conflict resolution strategies. Used most simply, Prototype 1 provides a basic, convenient mechanism to list all utility conflicts associated



Gas company employees repairing a utility line on a road in Alexandria, Virginia

Liz Roll/FEMA

with a project. However, for maximum benefit, the UCM can be used in conjunction with the alternative conflict resolution subsheet to identify, document, and track optimum utility conflict resolution strategies.

The training materials include a lesson with a hands-on exercise that describes an example process for documenting utility conflicts and identifying and comparing conflict resolution strategies using the UCM and the utility conflict resolution subsheet. The basic process is summarized as follows:

- Identify and list all potential conflicts in a project. This activity is continuous throughout the utility conflict management process. Use a separate line for each utility facility that may be in conflict at the same location. For example, for a conflict location that involves a water line and a gas line, create one record for the water line and a second record for the gas line. Assign a unique utility conflict ID to each record.
- Complete the UCM up to the column that identifies the type of utility investigation needed.
- For each conflict, determine the type of utility investigation needed.
- Collect utility data at the appropriate quality level (QLD, QLC, QLB, or QLA).
- For QLA data, add the test-hole number associated with the utility conflict(s) in question.
- Analyze potential conflict resolution strategies for each utility conflict record. If the available information is not sufficient to make a determination, it may be necessary to collect additional data. In this case, use the recommended action or resolution column to document the need for additional data collection.



Oregon Department of Transportation

- Use the conflict resolution subsheet to analyze and document the advantages, disadvantages, costs, feasibility, and decision of each alternative resolution considered.
- For the selected conflict resolution strategy, complete the recommended action or resolution, estimated resolution date, and resolution status cells in the UCM. This activity is iterative.
- Populate the control fields (name and date) at the top of the UCM.
- Create a historical record of UCM changes by saving the UCM under a different file name each time the information in the table changes.

Prototype 2: Utility Conflict Data Model and Database

Prototype 2 is a scalable UCM type that enables utility conflict management in a database environment. To facilitate implementation, the research team used industry-standard protocols in developing the data model (including a logical model, a physical model, and a data dictionary). The data model is in AllFusion ERwin Data Modeler format, which can be exported to databases such as Oracle and SQL Server. The prototype data model and the corresponding database in Microsoft Access format were tested using data from sample utility conflict tables from across the country.

Implementing a database for managing utility conflict data requires careful planning, experienced staff, and buy-in from multiple parties. The effort required to implement a database system is considerably higher than implementing a stand-alone spreadsheet. However, a database approach offers a multitude of advantages and benefits that a spreadsheet cannot offer.

The prototype database structure was based on a large number of state DOT UCMs and many diverse data items, and as a result, the prototype data model and resulting database are flexible and capable of accommodating most data items related to utility conflicts. This flexibility was proven through the process of replicating the sample UCMs described in the final report. Additionally, the prototype data model and database used standard database design principles to address the needs of a wide range of state DOTs, including linking to existing database systems to avoid data duplication. Further advantages of a database approach to managing utility conflicts include the following:

- The database can be adapted to address changes in DOT needs and business processes.



George Armstrong/FEMA

- The DOT can choose to implement all or selected portions of the complete system.
- The database is scalable to allow access by many users and store large datasets.
- Look-up tables can be easily expanded as needed to accommodate data items and descriptors unique to the DOT.
- The database can link to existing DOT data systems.

Once a database system is implemented, its real power lies in its ability to enable a wide range of queries and reports. In addition to the various UCMs replicated during the research, a short sample of reports the prototype database could enable includes the following:

- A report listing all utility conflicts associated with a company (for a specific project, corridor, or time frame);
- A report of all water facilities in conflict (for a specific project or corridor);
- A report summarizing average conflict resolution times for electric facilities statewide;
- A report providing average conflict resolution times for water facilities on project Z;
- A report listing all utility conflicts with resolution times of more than 100 days;
- A customized UCM report listing only the utility conflicts of a specific utility owner; and
- A listing of unresolved utility conflicts at time of letting for inclusion in the plan, specifications, and estimate package (sometimes called utility certification).

Utility Conflict Matrix Training Course and Pilot Tests

The training course includes a lesson plan and presentation materials to assist with the dissemination of research findings. Designed for a total of 7 hours and 15 minutes of instruction, the 1-day UCM training course is divided into six lessons. The seminar provides numerous opportunities for participant interaction and enables the instructor to adjust session and lesson start times and durations, depending on the audience and the level of participant engagement in the discussions. The training materials use National Highway Institute standards and templates.

During the project, two pilot training sessions were held, one in Little Rock at the Arkansas State Highway and Transportation Department and one in Pierre, South Dakota, at the SDDOT headquarters. In total, about 50

people participated in the two pilots, including representatives from federal, state, and county agencies with experience in project development, design, right-of-way, and utility coordination. More information about the training and the pilots is available in the final report.

SHRP 2 Contact

The SHRP 2 contact for this project is James Bryant, who can be reached at jbryant@nas.edu.

Product Availability

Identification of Utility Conflicts and Solutions (SHRP 2 Report S2-R15B-RW-1), the prototype UCMs, and the training materials are all available online at <http://www.trb.org/Main/Blurbs/166731.aspx>.

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