



Identifying and Managing Utility Conflicts R15B Lessons Learned

Two critical factors that contribute to utility inefficiencies in the delivery of transportation projects are (a) the lack of adequate information about the location and attributes of utility facilities that might be affected by the project, and (b) the lack of an effective process to manage conflicts between those facilities and project features and phases.

Utility conflict management (UCM) is a comprehensive multi-stage process that involves the systematic identification and resolution of utility conflicts. Identifying utility conflicts as early as possible facilitates the implementation of optimum strategies to resolve those conflicts. The R15B second Strategic Highway Research Program (SHRP2) product, **Identifying and Managing Utility Conflicts**, includes several tools that agencies can incorporate in existing business practices to identify and resolve utility conflicts. These tools include a standalone template for utility conflict lists, a utility conflict data model and database, and a one-day UCM training course.

As part of the SHRP2 Implementation Assistance Program (IAP), 18 state departments of transportation (DOTs) received grants from the Federal Highway Administration (FHWA) to conduct pilot implementations of the R15B product tools (Table 1). The goals and scope of the implementations varied widely depending on the needs of the individual state DOTs, but generally ranged from implementation of the standalone utility conflict list at a sample of pilot projects to the development and implementation of enterprise system modules to automate specific UCM features. As part of the IAP, FHWA provided one session of the one-day UCM training course to each of the states.

Table 1. Agencies that Received Funds to Implement the R01A, R01B, and R15B Products

Round 3	Round 5	Round 6	Round 7
R15B: <ul style="list-style-type: none"> • Iowa • Kentucky • Michigan • New Hampshire • Oklahoma • South Dakota • Texas 	R01A: <ul style="list-style-type: none"> • California • DC • Kentucky • Texas • Utah 	R01B: <ul style="list-style-type: none"> • Arkansas • California • Ohio • Oregon R15B: <ul style="list-style-type: none"> • California • Delaware • Indiana • Maryland • Oregon • Utah 	R01A: <ul style="list-style-type: none"> • Indiana • Michigan • Montana • Oregon • Pennsylvania • Washington R01B: <ul style="list-style-type: none"> • California • Indiana • Montana R15B: <ul style="list-style-type: none"> • Montana • Pennsylvania • South Carolina • Utah • Vermont • Washington

Lessons Learned

It is critical to obtain and maintain buy-in from the administration

State DOTs that were able to maintain strong support from their administration throughout the pilot UCM implementation were generally more successful and had fewer issues than state DOTs for which UCM was not necessarily a high priority or other issues were more urgent. Leadership may not be necessarily aware of the importance of managing utility conflicts effectively or the connection between UCM and project schedules and costs. Identifying champions within the administration who understand these concepts is key to secure support for UCM initiatives and implementations.

State DOTs also reported on the need to integrate UCM more closely with other project delivery activities. A common observation was the perception, typically by project managers and designers, that UCM should primarily be the responsibility of utility coordinators. A paradigm shift made possible by the pilot UCM implementations was the strategic need for project managers and designers to take a more proactive role in the identification and resolution of utility conflicts and for these officials to recognize that they were actively managing conflicts. This needs to be understood and appreciated by decision makers. In many instances where a state DOT reported a positive benefit from the UCM implementation, project managers and designers were closely involved in identifying and resolving utility conflicts as early as possible. However, in some instances designers made changes to the project design without documenting that they were avoiding existing utility facilities.

When in doubt, pursue a standalone UCM implementation

State DOTs that pursued a standalone UCM implementation approach generally had fewer challenges than state DOTs that pursued an information technology (IT) solution. Most state DOTs that had an IT component as part of their UCM implementation faced challenges such as (a) how to engage and maintain the level of involvement by IT personnel and (b) how to schedule IT development phases within the structure and schedule of the UCM pilot implementation. This is not to suggest that state DOTs should abandon plans for IT-based implementations. IT solutions should always be an option. However, UCM is about changing business processes first. This means that UCM implementations that focus on changing practices and documenting lessons learned, even if no IT components are involved, are more likely to be successful than implementations that focus primarily on IT components while, at the same time, also attempting to change the business process.

Follow standard IT phases for developing an enterprise UCM system

Most state DOTs have highly structured processes to develop, deploy, and operate IT systems. UCM is a multi-stage process that involves multiple internal and external stakeholders to identify and resolve utility conflicts. State DOTs that used IAP funds to develop IT-based UCM solutions generally focused on specific aspects of the process instead of trying to develop a whole system from scratch. For example, some state DOTs used their IAP funds to prepare IT-related documents such as business cases, implementation plans, and software requirements. In other cases, the state DOT developed specific modules. For example, the Kentucky Transportation Cabinet (KYTC) already had a web-based system called the Kentucky Utilities and Rail Tracking System (KURTS). The system included functionality for reviewing and approving utility relocation plans, developing agreements, and tracking invoices. However, it did not have the capability to identify or track utility conflicts. KYTC used the R15B grant to develop a module to create and manage utility conflict records, as well as manage the process to resolve utility conflicts.

The economic benefits of UCM are substantial

Some state DOTs were able to quantify the benefits of implementing UCM. For example, at a pilot project in Vermont, officials identified 65 utility poles that were in conflict with the project. However, most poles did not

affect the construction schedule, which brought the number of relocations from 65 to 25 poles, saving the agency substantial time and money.

The Texas Department of Transportation (TxDOT) reported \$10 million in monetary savings and 34 months in project delivery time savings after implementing UCM at five pilot projects. The savings were primarily the result of identifying changes in project design that avoided utility relocations. TxDOT also reported additional benefits totaling \$13 million from projects elsewhere in the state that started using the UCM approach. In addition to the FHWA grant, TxDOT used internal resources to provide the one-day UCM training course throughout the state and implement a number of policy changes. It is not clear how much money TxDOT spent in total on the pilot UCM implementation. However, a conservative estimate indicates that the total investment was a fraction of the total estimated economic benefits, clearly resulting in high return on investment (ROI) levels.

Upfront cost to implement UCM are real, but should be looked at as an investment

Upfront costs to implement UCM should not be ignored. Examples of upfront costs include allocating adequate resources (both technical and staffing) to populate and maintain utility conflict lists throughout project delivery, as well as providing adequate UCM training to staff and other stakeholders. UCM implementations that involve IT components should also factor in the costs to develop, implement, and maintain those components. However, results emerging from state DOTs that have implemented UCM point to significant economic benefits, including a high probability of cost recovery in the short term.

UCM is a critical component, but other related utility process components are also critical

UCM is part of an integrated process that includes multiple elements. A fundamental requirement for identifying utility conflicts is to know the location and characteristics of all affected existing utility facilities. In other words, utility investigation outputs are a necessary input to UCM. In turn, UCM is a necessary input to project and utility design, both of which are needed for developing utility relocation plans and utility agreements. State DOTs that pursued UCM implementations frequently recognized the need to improve utility investigation practices and the connection between robust UCM practices and quality utility relocation plans and schedules. State DOTs also recognized the connection between UCM practices and the ability to reduce project risks, particularly during construction.

Providing UCM training is critical

Although the standalone utility conflict list template included in the R15B product is a valuable tool, learning how to use it effectively is not trivial. State DOTs that included multiple opportunities for hands-on UCM training generally reported more positive results during the UCM pilot implementation than state DOTs that only offered one session of the one-day UCM training course. Furthermore, state DOTs that made the course available to both internal and external stakeholders (including utility owners and consultants) reported more positive results than state DOTs that only made the course available internally to some DOT officials.

The one-day UCM training course has been offered multiple times throughout the country. Including both the research and implementation phases, the course has been offered more than 70 times. More than 2,500 people have taken the course, including project managers, designers, utility engineers and coordinators, DOT and utility consultants, utility owners, construction managers, surveyors, and right-of-way agents. The distribution of participants is roughly 60% state DOT officials and 40% external stakeholders (primarily consultants and utility owner representatives). This statistic does not include state DOTs that have customized the course to develop their own training UCM modules (such as South Carolina and Pennsylvania). It also does not include state DOTs where officials have used the course materials informally to provide training to internal and external stakeholders.

Participants are highly satisfied with the one-day UCM training course

Review forms provided by participants reveal a high level of satisfaction with the course. Most participants rated the instructional materials and quality of instruction as excellent or good. Comments added to the review form frequently highlighted the huge need to provide this kind of training, which is significant considering the lack of curricula on utility engineering topics at colleges and universities in the United States.

Participants were particularly satisfied with the hands-on exercise (Figure 1). In its current form, the course is divided into a morning session that teaches UCM fundamentals, techniques, and procedures, and an afternoon session in which participants work in groups to review materials from a real-world project to identify and resolve conflicts, as well as report on their findings to the rest of the class. Lessons learned from the use of this format included, but were not limited to, the following:

- To the extent possible, groups were diversified to include project managers, designers, utility coordinators, utility owner representatives, and other stakeholders. Working in groups enabled participants to offer ideas on how to best resolve conflicts and learn from each other's backgrounds and expertise.
- The short oral presentation at the end of the exercise enabled participants to learn from other groups about the process they followed to identify and resolve conflicts. This was particularly useful when different groups were evaluating the same utility conflicts.

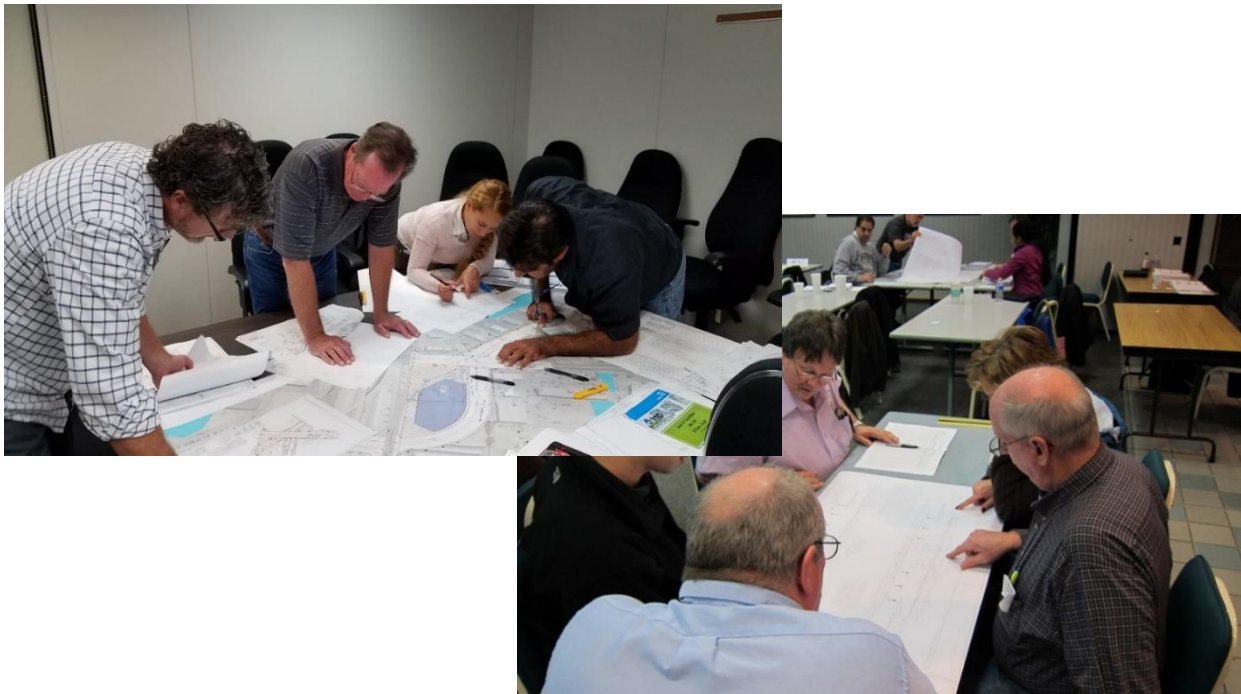


Figure 1. Hands-on UCM exercise.

UCM training should target project managers and designers

At some state DOTs, project managers and designers were skeptical at first about the need to take the UCM training course because of the perception that UCM should be primarily the responsibility of utility coordinators. After taking the course, the feedback from many project managers and designers was that the course opened their eyes about the need to look at utility issues differently. Many of them also commented that more project

managers and designers should take the course. This realization led some state DOTs to begin considering the possibility of making the UCM training course a requirement for prequalifying consultants who are in any way involved with utilities during project development and design.

The UCM training course brings increased awareness of the project delivery process

The UCM training course enabled participants, both internal and external, to develop a better understanding of the project delivery process and how utilities are involved in that process. It was not surprising to learn from utility owners about their lack of familiarity with the project delivery process. What was surprising was that internal stakeholders and state DOT consultants often had limited operational knowledge of the overall process to deliver projects at their own agency. UCM emphasizes early utility coordination and identification of conflicts. However, it was not immediately clear what “early” meant. This made it necessary to explain the various phases of project delivery and how utility investigations and UCM can play a significant role in each of those phases.

Sample project files revealed a need to improve utility data management practices

A review of sample project files provided by state DOTs for the hands-on exercise revealed a need to improve utility data documentation practices. Examples of areas where these practices could be improved and result in more effective utility processes at state DOTs include the following:

- Utility investigation timing, scope, quality, and completeness. Project files used for the hands-on exercise typically included project plan views, profiles, and cross sections; drainage design plan views and profiles; and utility investigation deliverables. Course participants noted that the utility investigation deliverables were often insufficient or inadequate to help them determine whether a potential utility conflict was indeed a conflict. In many cases, utility investigation deliverables included utility locations, but no information about the size, capacity, or operational characteristics of the utility facilities involved.
- Mapping and documentation of utility data on project files. Utility data management issues extended beyond the utility investigation phase. For example, it was common to find design files showing utility locations where critical information from the utility investigation phase had been removed to limit the amount of clutter. Unfortunately, the information was also lost to subsequent project file users, including contractors.
- Utility conflict locations on project files. UCM conflict lists are common. However, displaying utility conflict locations on project files is not, making the process to visualize and understand utility conflicts more difficult. State DOTs that use dedicated layers or levels to display utility conflict locations in their design software environment reported positive results in their understanding of utility conflicts and their ability to convey this information to internal and external stakeholders.

UCM standardization is critical

The R15B utility conflict list template includes columns that are commonly used to exchange information about utility conflicts with stakeholders (Figure 2). To manage utility conflicts, many more columns may be necessary. State DOTs frequently commented on the need to add columns such as critical parcel numbers, elevations, notification dates, reimbursement eligibility, and geographic coordinates. Realizing that data needs may vary by factors such as agency policies, project characteristics, and individual preferences, it was also clear that agencies would be better off in the long run by standardizing utility conflict list templates and by using these templates systematically throughout project delivery.

Specific recommendations for UCM standardization include the following:

- Develop and disseminate a standard utility conflict list template.
- Emphasize the use of the template for information exchange purposes, while emphasizing the need for complete documentation “behind the scenes” using the spreadsheet file or a database.
- Use dedicated layers or levels to display utility conflict locations in the project design software environment.
- Conduct utility conflict analysis at important project delivery milestones, such as preliminary design; beginning of detailed design; 30%, 60% 90%, and 100% design; and construction.

