U.S. Department of Transportation

Federal Highway Administration

Office of Infrastructure

Program Review

National Utility Review:

Utility Coordination Process

Final Report

Revised October 2018

FHWA-HIF-18-039

U.S. Department of Transportation
Federal Highway Administration

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This report was originally published in June 2018 and was revised for clarification in September 2018.

The source of all images in this report is FHWA unless otherwise noted.

Definition of Terms

"Accurate" utility information: The word "accurate" means the utility information as surveyed includes the x-y-z horizontal and vertical coordinates.

As-built plans: The final set of drawings that depict the final location of constructed elements, such as utilities and drainage.

Change orders: Includes any changes to the original contract, including supplemental agreements, claims, pay items, overruns and underruns, and time extensions.

Contractor: All references to "contractor" refer to the prime contractor who is awarded the contract.

One-call: The generic term for the national subsurface utility locator service known by different names in each state (call811.com).

Preconstruction: The period from project inception (planning) through completion of final design plans (plans, specifications and estimate package).

Subsurface utility engineering (SUE): A process of systematically managing utility risks and identifying utility information needed to design a project. The use of SUE quality levels allows project owners to decide the level of risk they want to apply to a specific project or location within the project to ensure a certain level of accuracy and completeness has been provided.

Third-party contractors: A utility contractor that relocates utilities concurrent with the construction of the highway project.

X-Y-Z plane: The location of an object in a three dimensional plane, with x and y being the horizontal coordinates and the z being the vertical coordinate, as shown in figure 1.

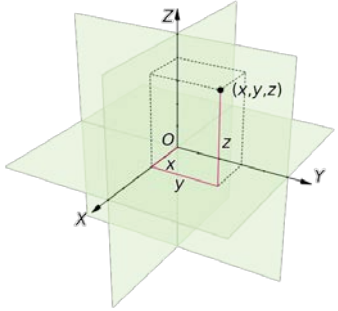

Figure 1. Diagram of an x-y-z plane. Source: Wikimedia Commons, public domain.

Executive Summary

Utility relocations have been cited for the past two decades and possibly longer as a leading cause of highway project construction cost-and-time overruns. This issue has been raised in multiple studies and internal Federal Highway Administration (FHWA) reviews, which have repeatedly identified utilities as one of the top causes of cost increases and schedule delays on transportation projects. These results prompted FHWA to conduct a national program review in 2016 to determine if utility coordination posed a risk to the Federal-aid Highway Program.

To evaluate this risk, the review team assessed the current state of utility coordination in all 50 States, the District of Columbia, and the Commonwealth of Puerto Rico. The review objectives focused on utility agreements; relocation plans, schedules and estimates; information in contract bid documents, and impacts during construction, such as time delays and cost increases.

The review team found that some States have implemented successful practices, which are listed at the end of the executive summary. However, several major program and project gaps prevent many State departments of transportation (DOTs) from achieving more effective utility coordination and relocation processes required by Federal regulations.

The review team found that many State DOTs conduct minimal preconstruction utility coordination and instead pass most, if not all, utility coordination and relocation responsibilities to the highway contractor. This conflicts with Federal regulations that require State DOTs to coordinate all utility relocations before construction to protect the investment in the highway project. Few State DOTs have implemented a comprehensive process with the policies, procedures, and practices stipulated in Federal regulations. Utility coordination gaps fall into several broad categories:

- Lack of accurate utility location information on plans
- Incomplete utility relocation plans
- Lack of justification for utility relocation estimates
- Lack of utility relocation schedules
- Lack of utility information in bid packages
- Inability to quantify utility cost-and-time increases on highway construction projects
- Lack of utility relocation oversight/inspection and source documents to support utility payments (utility final vouchers)

These gaps are often tied to underground utilities where subsurface utility engineering or SUE[1] is lacking. Most State DOTs do not adequately investigate underground utilities, especially vertical or depth (z coordinates), resulting in utility conflicts either being misidentified or not identified at all during the preconstruction phase. This results in contractors unexpectedly encountering utilities during construction, a situation that often increases project cost or causes delays, or sometimes both.

The lack of utility relocation plans and schedules results in minimal information available to contractors. During the bidding process, these unknowns increase project risks that lead to higher bids that can increase overall project costs significantly. When a contractor encounters unexpected utility conflicts and must do extra work, the State DOT typically grants the contractor time extensions rather than money. This process can delay or extend a transportation project by weeks or even months.

What Needs to Be Done at the FHWA Headquarters Level

- Include National Initiatives for utility coordination in FHWA's Strategic Implementation Plan (SIP).
- Identify and develop utility training that focuses on assisting DOTs and local public agencies (LPAs) in understanding the Federal requirements and utility coordination successful practices.
- Update FHWA's utility guidance manuals, such as the Utility Program Guide (UPG).
- Establish a utility working group within FHWA comprised of utility experts and practitioners to:
    - conduct educational and interactive webinars;
    - develop and implement utility related national strategic initiatives;
    - expand utility knowledge base; and
    - provide technical assistance to Divisions and DOTs.

[1] For more information, please see http://www.fhwa.dot.gov/programadmin/sueindex.cfm.

What Needs to Be Done at the FHWA Division Office Level

- Each Division to conduct a utility risk assessment during Performance Year (PY) 2020.
- Divisions with high utility risks to conduct a PY 2020 utility program review.
- Divisions with high utility risks to take quick corrective actions to improve the utility coordination process in their States.

Division offices should base their risk assessments on the program level Observations and Recommendations found within this report.

Successful Practices

The review team found that in mitigating the utility risks to highway projects, some State DOTs have implemented successful practices, which will be discussed in detail in the body of this report. These State DOTs are to be commended for their efforts to improve the utility coordination process. These practices should be used as benchmarks for other State DOTs to improve their utility coordination process in the following ways:

- Implement the Second Strategic Highway Research Program (SHRP2) Utility Conflict Management (UCM) (R15B) practice.[2]
- Develop detail utility schedules, such as the Massachusetts DOT's Project Utility Coordination (PUC) form explained in more detail in Observation 2B.
- Implement a risk-based subsurface utility engineering (SUE) process.
- Relocate utilities before the start of highway construction.
- Include utility relocation work in the highway contract.

The review team concludes that Federal-aid highway projects can be built faster, better, safer, and for less money by implementing the previously stated recommendations and those in the body of this report.

[2] More information about the SHRP2 "Techniques and resources for better managing utility conflicts in transportation projects -Utility Bundle (R01A/R01B/R15B)," can be found at http://www.fhwa.dot.gov/goshrp2/Solutions/Renewal/R01A_R01B_R15B/Utility_Bundle.

Background

All Federal-aid projects under section 635.309 of Title 23 of the Code of Federal Regulations (CFR) require completion of a utility statement (certification) to confirm that appropriate and adequate utility coordination occurred before highway project construction. If utility relocation work is required due to a project, a utility agreement is required (23 CFR 645.113) and any utility work must be coordinated with the construction work. The construction contract documents must communicate the utility work requirements to prospective contractors. The utility certification is submitted as a part of the project plans, specifications, and estimates (PS&E) package. Not complying with these requirements poses potential risks—typically, project delays and cost overruns—to utility relocations and the overall Federal-aid Highway Program.

Several studies and anecdotal evidence suggest that utility coordination has become a major issue in executing the Federal-aid Highway Program. A 2014 Report to Congress on FHWA's *Oversight Program Evaluation for Cost and Schedule Overruns* showed that 15 percent of Federal-aid projects reported delays due to utilities and other third-party issues. The most prominent reasons given for project delays stemmed from delays with utility companies, railroads, or inclement weather.

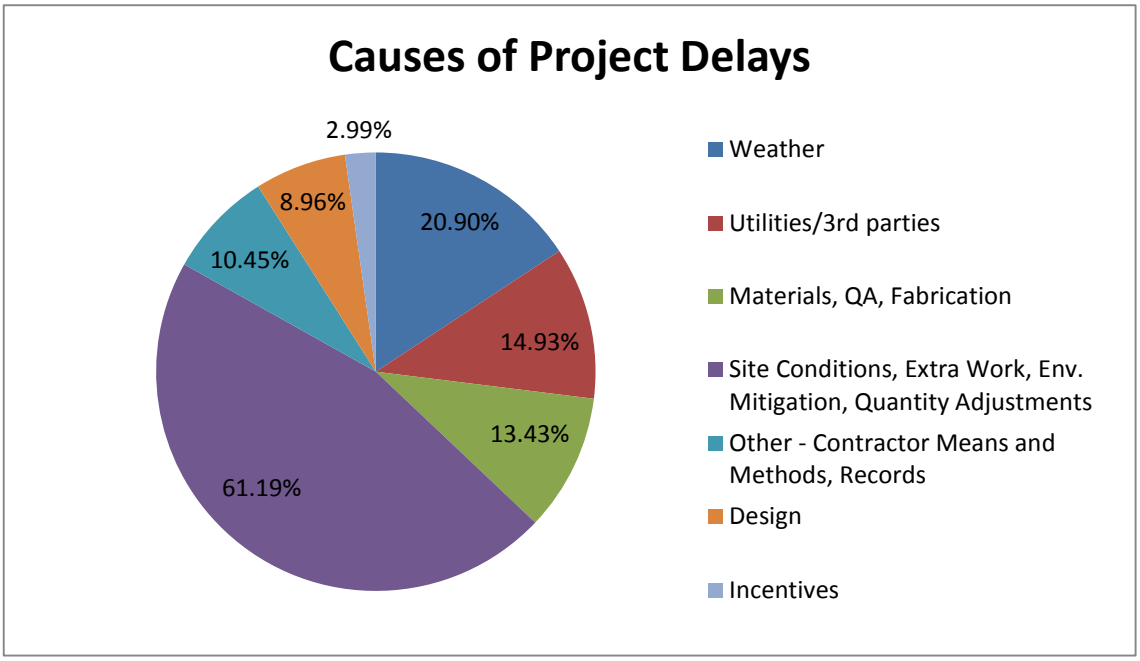

Figure 2. Chart of Federal-aid project delay causes.

Several additional national studies have identified utility issues as one of the top causes of cost increases and time delays to transportation projects:

- An October 2001 National Cooperative Highway Research Program (NCHRP) report, *Avoiding Delays During the Construction Phase of Highway Projects*, found that unforeseen underground utilities and untimely utility relocations were

among the more common root causes of delays affecting most of the transportation agencies visited during the study.[3, 4]

- A 2002 Transportation Research Board (TRB) report, *The Root Causes of Delays in Highway Construction*, found that utility relocation delays were the number-one reason for delays in highway construction. Utility conflicts were also named by both contractors and State DOTs as the No. 2 and No. 3 respectively for highway construction delays.[5]
- A 2009 Second Strategic Highway Research Program (SHRP2) report, *Encouraging Innovation in Locating and Characterizing Underground Utilities*, stated that "the untimely discovery of an unknown underground utility needing relocation is one of the major causes of delay during highway renewal projects and, as such, one of the major contributors to traffic disruptions and budget overruns. Decision makers in both transportation agencies and utility companies need timely access to accurate utility location information in order to minimize the risk of disruption during highway renewal activities." [6]
- A July 2011 Office of Inspector General (OIG) audit found that utility agreements and reimbursements were one of 12 key project activities where reoccurring non-compliance with Federal regulations took place during FHWA's oversight of the American Recovery and Reinvestment Act (ARRA). The audit found that 67 percent of the projects studied in the "utility agreement and reimbursement" category had errors and other non-compliance issues in the utility agreements.[7]

On a State level, a 2015 report to the Texas House Transportation Committee found that TxDOT had spent $25 million on 70 projects because one major telecommunications company failed to timely move utility lines. TxDOT officials said that the delays were a growing problem, often leading to payments to contractors because

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[3] Ellis, Ralph D. and Thomas, H. Randolph; *Avoiding Delays During the Construction Phase of Highway Projects*, National Cooperative Highway Research Program, October 2001, pages xiv-xv, retrieved from http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24(12)_FR.pdf.

[4] In transportation research, "root" causes are generally distinguished from "apparent" or "suspected" causes through additional in-depth research, investigation, and analyses.

[5] Ellis, Ralph D. and Thomas, H. Randolph; *The Root Causes of Delays in Highway Construction*, Transportation Research Board, Washington, D.C, July 2002, pages 1-2, retrieved from http://www.ltrc.lsu.edu/TRB_82/TRB2003-000646.pdf.

[6] Sterling, R.L., et.al.; SHRP2 Report S2-R01-RW, *Encouraging Innovation in Locating and Characterizing Underground Utilities*, Transportation Research Board, 2009, Forward by Monica Starnes, Ph.D., retrieved from http://www.trb.org/Main/Blurbs/162489.aspx.

[7] Office of Inspector General Audit Report, Federal Highway Administration's Oversight of Federal-Aid and Recovery Act Projects Administered by Local Public Agencies Needs Strengthening, Federal Highway Administration Report Number: MH-2011-146, July 15, 2011, page 5.

contractors had to wait long periods—sometimes up to two years—for utility work to be completed.[8]

Cursory reviews of utility agreements by FHWA's Office of Infrastructure and empirical evidence at the DOT and FHWA Division levels indicate a lack of fundamental knowledge of the Federal requirements under 23 CFR 645.113 in preparing and documenting the critical components of the utility agreement, namely, utility relocation plans, estimates, and relocation schedules.

[8] Begley, Dug; "Lawmakers demand fix for utility-related road delays," *Houston Chronicle*, August 12, 2015, retrieved from http://www.houstonchronicle.com/news/transportation/article/Lawmakers-demand-fix-for-utility-related-road-6441050.php.

Purpose and Objectives

The purpose of this review was to determine if utility coordination poses a high risk to FHWA and whether utility coordination should be included as a "program risk" in the agency's Strategic Implementation Plan.

To determine this risk, the review sought to answer the following six fundamental questions:

Objective 1: What is the state of utility investigations nationwide?[9]

Objective 2: What is the level of detail (relocation plans, estimates, and relocation schedules) in the utility agreement, and is it adequate to effectively coordinate the utility work with the construction contract?

Objective 3: What utility relocation information is communicated to the contractor in the contract bidding documents?

Objective 4: How does utility coordination, prior to opening of bids, impact construction cost and time?

Objective 5: What is the level of oversight for utility relocations and are source documents provided to validate Federal payments?[10]

Objective 6: Do State DOTs have the guidance necessary to prepare utility agreements, communicate the utility relocation requirements in the contract documents, and capture utility-related cost-and-time change orders?[11]

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[9] This objective was unanticipated and was observed during the site visit stage of the review.

[10] This objective was unanticipated and was observed during the site visit stage of the review.

[11] The review team deleted Objective 6 based on the state of the nation related to utility coordination. As will be discussed throughout this report, many State DOTs are missing many elements related to utility agreements, bid package utility information, and reporting cost-and-time impacts. Therefore, we determined it best to work toward improving the process first to ensure that State DOTs develop the missing elements. We expect the guidance documents will be modified as the processes are improved.

Scope and Methodology

This program review involved an analysis of utility coordination on transportation improvement projects in all 50 States, the District of Columbia, and the Commonwealth of Puerto Rico. Additionally, this review evaluated utility-related cost-and-time change orders during construction as an indicator of the quality of preconstruction utility coordination.

The program review team used a two-phase methodology:

Phase 1 – National Perspective

- The review team selected projects that routinely require utility relocations, for example, capacity improvement projects. These projects were coded in FHWA's Financial Management Information System (FMIS) as improvement code 03. The list was narrowed by selecting projects where construction was active, closed, or closed pending expenditure status (final voucher) between June 1, 2009 and September 30, 2014. Two projects from each State were randomly selected from a list generated using the above criteria.
- Each FHWA Division was asked to submit one federally reimbursable and one non-federally reimbursable utility agreement and the corresponding utility statements (utility certifications).
- In cases where the Division had difficulty providing the information for the randomly selected project, the review team worked with the Division to select a replacement project that aligned with the review objectives.
- Additionally, each Division was asked to complete a survey of seven utility program-related questions (see Appendix 3).
- The review team evaluated the utility agreements, statements, and program questions to determine:
    - Alignment with Federal regulations
    - Strengths and weaknesses
    - Overall strength or quality of the program
- The review team used the analysis from this phase to determine national trends and observations from a national perspective.
- The review team then selected five State DOTs for site visits to provide a more detailed analysis of utility coordination and to verify the initial observations. These five States served as a national representative sample.

Phase 2 – Site Visits

- After completing the Phase 1 analysis, five State DOTs were identified to conduct site visits and to serve as a national representative sample based on the following criteria: Director of Field Services (DFS) area of responsibility, size of the Federal-aid program, utility program practices, and utility agreement compliance with Federal regulations. The five State DOTs were:
  - **Florida** – DFS South, large Federal-aid program.
  - **Massachusetts** – DFS North, medium-size Federal-aid program.
  - **North Dakota** – DFS Mid-America, small Federal-aid program.
  - **Oklahoma** – DFS Mid-America, small Federal-aid program.
  - **Washington** – DFS West, medium-size Federal-aid program.

- In this phase, utility agreements, contract documents, and utility-related construction cost-and-time change orders were reviewed, followed by lengthy and detailed interviews with key Division and State DOT personnel, utility company executives, and construction contractors.
- In this phase, the review team delved deeper into State DOT practices to identify the current situation: relevant State laws; regulations and policies; as well as reasons and causes of both positive and negative utility coordination performance. This led to uncovering and developing the review's observations, successful practices, and recommendations.

Observations and Recommendations

Some State DOTs relocate utilities before the start of the highway project to minimize utility-related disruptions during construction. Sometimes the utility relocation work is included in the highway project, primarily for public works utilities such as storm or water systems. Many State DOTs have found that having the highway contractor be responsible for the utility relocation work allows them to integrate the utility work into the construction schedule, thus minimizing utility-related cost-and-time impacts on the project. These two types of approaches are not common practice nationwide, but should be considered successful practices to be replicated by State DOTs when appropriate.[12]

All other utility relocations, which account for the majority of utility relocations nationally, are performed by a third party, concurrent with project construction. Based on research, these types of utility relocations pose the greatest threat to highway projects. The following observations are based on relocations completed concurrent with the highway project and by a third party, either a utility contractor or utility company.

Since design-bid-build is the main construction method that State DOTs use to deliver projects, the following observations are limited to design-bid-build method of project delivery.

Objective 1: What is the state of utility investigations nationwide?

Observation 1: Few States Conduct Accurate Utility Investigations

Identifying the location of utilities within the right-of-way (ROW) is a critical part of every planned highway improvement project. The process of locating and defining these existing utilities is called utility investigation and includes an iterative process designed to positively locate utilities that may conflict with the proposed highway improvement. Existing utilities on a highway project generally fall within two distinct categories:

- those that are easily seen, such as aerial and utilities located on the surface
- those that cannot be seen, such as those buried underground

Aerial and surface utility investigations are usually conducted well since the utilities are easily located and, therefore, accurately surveyed. The primary challenge and example in Observation 1 deals with existing utilities that are difficult to locate, the below-ground utilities, more commonly known as subsurface utilities.

Many in the transportation industry incorrectly assume that utility companies know the precise location of their underground utilities. The utility company might have a general idea of where its utilities are in the horizontal x and y planes, but these locations are imprecise. Further, utility companies have little to no information related to the vertical or

[12] The FHWA has adopted a Risk Based Stewardship and Oversight (RBSO) system, which authorizes State DOTs to act on behalf of FHWA in certain instances. If this report states that certain approvals are required by FHWA or the agency's designee, refer to a specific State's RBSO agreement to determine whether FHWA or the State DOT is responsible for the specific approval.

depth (z plane) of utility lines. Many utilities on highway rights of way have been in place for many years. Some may go back 20 to 30 years or much longer. Utility companies did not, and still do not, keep accurate records of the location of utility lines. Accurate records have not been a requirement placed on utility companies.

One reason why utility conflicts are unknown and thus increase project risk is that few DOTs methodically use subsurface utility engineering (SUE)[13] as a common practice. One of the program review survey questions collected during Phase 1 of this review asked State DOTs to briefly explain their process for locating utilities and whether they used SUE, utility company input, or as-built plans—those that depict the final location of the utilities. According to the survey, 27 State DOTs (53 percent) indicated that their primary method of utility investigation was as-built plans and the national subsurface utility locator service known as Call-811 or One-Call.

Contractors, utility owners, and State DOT staff all indicated that as-built location data are unreliable and, at best, may provide a general indication of utility locations in the x and y planes, with no z component or depth. One-Call services generally have a reliability of plus or minus 2 feet on either side of a paint line on the ground. Furthermore, One-Call does not provide any depth data. This means that designers are provided only an indication that a utility conflict exists within the design plans.

Phase 2 site visits further substantiated that SUE is not regularly used to accurately locate utilities. The survey indicated that only 12 State DOTs (23 percent) use a risk-based SUE approach to locate utilities. Most DOTs conduct preliminary investigations using as-built plans, One-Call, and utility company data. For most State DOTs, this is the limit of the utility investigation and does not provide the detailed location information necessary to identify conflicts. Rarely do DOTs conduct more detailed investigations to accurately locate utilities. If State DOTs conduct more detailed investigations, these are usually limited to high-profile urban projects where the risks of utility conflicts are greatest.

Two recent studies substantiate what the team noted in the Phases 1 and 2. According to the October 2001 NCHRP report *Avoiding Delays During the Construction Phase of Highway Projects*, unforeseen and incorrectly located utilities were a leading cause of construction delays. According to this study, many small utility companies had no as-built plans and what as-built plans the small companies did have were often incorrect. To save money, the utility companies often located only for the x and y position using as-built drawings. The study also found that utility information found on drawings was not always clear, especially for complex intersections. The standard of practice for designers was not always clear as to how to communicate information and protection standards.[14]

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[13] Additional information can be found at http://www.fhwa.dot.gov/programadmin/sueindex.cfm.

[14] Ellis, Ralph D. and Thomas, H. Randolph; *Avoiding Delay During the Construction Phase of Highway Projects*, National Cooperative Highway Research Program, October 2001, Appendix C: Root Causes of Delays, retrieved from http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-24(12)_FR.pdf.

The 2009 SHRP2 Report *Encouraging Innovation in Locating and Characterizing Underground Utilities* found that even as-built plans frequently lacked the detail and accuracy needed for design purposes in a utility congested environment. Furthermore, referenced depth measurements are rarely given to a recognized elevation data. The amount of ground cover over a utility can change without obvious visual indications due to interim construction activity, erosion, etc., creating errors on records where "depth of cover" is the sole reference to vertical position.

The SHRP2 report stated that the problem has grown worse since 1995. The increasing use of GIS systems for utility recordkeeping, coupled with the easy integration of data from computer-aided design and drafting (CADD systems), has led to a proliferation of utility data. Sometimes original data were scrapped once the data were digitalized. Digitizing mistakes are common, as are misinterpretations of the original record data. Without verification, it is impossible to know the accuracy or completeness of these utility location and characterization data.[15]

Per 23 CFR 645.113, State DOTs must prepare utility relocation plans when the utilities conflict with the highway project. To develop the plans, agencies must locate utilities that are potentially in conflict with the highway design. The only way to know if there is a utility conflict is to know the accurate location.

According to interviews with State DOT officials, the primary reason State DOTs don't accurately locate utilities on highway projects is increased time and costs during the design phase of project development. But several studies have concluded that the cost of detailed utility investigations more than offset the impacts of inaccurate utility location information. A Purdue University study, for example, found that construction projects saved $4.62 in expenditures for every $1.00 spent on SUE.[16]

The time needed to locate utilities is a secondary cause of poor utility investigation. Often, State DOTs fail to provide enough time in project schedules to allow for proper utility relocation investigation after the 60-percent final project plans milestone. The 60 percent-final plans are generally considered the time when project details have advanced enough to identify utility conflicts. State DOTs are responsible for establishing project delivery schedules and can adjust schedules to account for the time it takes to adequately locate utilities.

The effects of not accurately locating subsurface utilities undermine the entire utility coordination process. Without the accurate location of utilities, designers have to make an educated guess or assume the location and therefore are unable to accurately identify and manage utility conflicts. Inaccurate utility location data during the preconstruction phase has a detrimental effect on construction and leads to:

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[15] Sterling, R. L., et al.; *Encouraging Innovation in Locating and Characterizing Underground Utilities,* Second Strategic Highway Research Program, Transportation Research Board, Washington D.C., 2009, page 18, retrieved from http://www.trb.org/Main/Blurbs/162489.aspx.

[16] *Cost Savings On Highway Projects Utilizing Subsurface Utility Engineering*, FHWA, December 1999, Abstract section, retrieved from http://www.fhwa.dot.gov/programadmin/pus.cfm.

- Increased risks for contractors
- Increased contract bids
- Increased costs due to change orders and claims
- Project delays
- Increased safety risks to contractors and the traveling public because of longer-lasting work zones and the threat of hitting live utility lines, gas, and power

Successful Practices

State DOTs are addressing utility investigations in multiple ways:

- Some State DOTs have developed, documented, and implemented a risk-based approach to utility investigations, investigating only those utilities where there is a high probability of conflict with the highway project. The benefits of using a risk-based approach is to spread limited resources, funds, and staff to collect three-dimensional utility data on those utilities showing the highest risk for conflicts.
- Some State DOTs have implemented an indefinite delivery-indefinite quantity (ID/IQ) or task order approach to using SUE consultants, in essence having an on-call consultant to quickly provide additional SUE resources.
- A few State DOTs are investigating the use of marker balls and tracer wire, which allows the utility to be accurately and easily located in the future without the need to excavate.
- A few State DOTs require the utility company to locate its utilities in the x-y-z planes using test holes (highway project delivery process).
- Some State DOTs require, through State law or through the State permitting process, that utility companies provide accurate x-y-z location data at the conclusion of new or relocated utility installations.
- Some State DOTs show in the plans where test holes accurately locate the utility line. Florida DOT, for example, uses the note VvH (verified vertical and horizontal). Contractors told the review team that they trusted data on the plans when shown as a VvH because they know the data have been verified.

Recommendation 1[17]

FHWA Division offices should determine if their State DOT is obtaining accurate utility location information to prepare utility relocation plans as required by 23 CFR 645.113. If accurate utility information is not being obtained, the following examples are ways to improve the accuracy:

[17] This review contains two levels of recommendations: one set associated with a specific observation and a set of global recommendations found at the end of this report.

- Collecting accurate utility location data during the preconstruction phase using a risk-based approach. A risk-based approach identifies areas where additional investigation and data collection are warranted based on the areas demonstrating the greatest potential for utility and design conflicts. For example, if there is a high probability that a utility line is in conflict with a design feature, the State DOT should conduct a "hard locate," such as test holes, using SUE principles.
- Hiring an "on call" SUE provider, which can be used to quickly and accurately conduct utility investigations.
- Require utility owners to conduct accurate utility investigations during the preconstruction phase of a project. These requirements could include the use of marker balls, tracer wire, test holes, etc. State legislative authority may be necessary to implement these requirements.

Objective 2: What is the level of detail in the utility agreement, and is it adequate to effectively coordinate the utility work with the construction contract?

To discuss this objective, some background information on utility relocation plans, estimate, and schedule is needed.

When the need arises to improve a highway segment, the State DOT begins the process of considering environmental impacts and preparing design plans. Highway improvements that may impact utilities take many forms, such as intersection expansion, roadway widenings, or highway reconstruction and restoration. If the proposed design conflicts with an existing utility line and the conflicts are unavoidable, the utility owner is typically required to relocate to another location outside of the proposed highway improvement (23 CFR 645.205).

Federal regulations stipulate that if a utility relocation is required on a federally funded highway project, a utility agreement must be executed between the State DOT and the utility company (23 CFR 645.113(a) and 645.203(b)). Agreements are required for all relocations on a federally funded highway project regardless of whether the utility relocation is federally reimbursable.[18] This protects the Federal government's financial investment in transportation projects and ensures that utility relocations are completed properly and on time with minimal risk to taxpayers and public safety.

The agreements are an essential component of the overall utility coordination process. They document the negotiations between the State DOT and utility owner when existing utilities are in conflict with the proposed design of a transportation improvement project. A utility agreement identifies what work is needed to relocate the utility, which party will perform the work, and defines the cost-sharing arrangements for the work.

[18] The agreement follows 23 CFR 645.113 requirements in situations where Federal-aid participation will be sought for the relocation activity. The agreement follows the requirements in 23 CFR 645.203(b), 645.209(i), and 645.213 in situations where there will be no Federal-aid participation.

A utility agreement is required even if Federal-aid participation will not be sought (23 CFR 203(b); 645.209(i); and 645.213). These agreements must provide, among other requirements:

- A description of the requirements for relocation, construction, protection of traffic, maintenance, access restriction, and any special conditions applicable to the installation;
- A general description of the size, type, nature, and extent of the facilities being relocated; and
- Adequate drawings and sketches showing the existing and/or proposed location with respect to the existing and/or planned highway improvements.

If Federal-aid participation would be sought, then the utility agreement must include the information required in 23 CFR 645.113. This includes three supporting documents:

- Utility relocation plans
- Utility relocation cost estimate
- Utility relocation schedule

Utility Relocation Plans

Utility relocation plans serve multiple purposes. First, they identify the location of existing utilities within the limits of construction, preferably in the x-y-z planes. On the same plans, the proposed design is overlaid, preferably in the x-y-z planes, and compared with the existing utilities; where these two elements, intersect a utility conflict exists. For each utility conflict, the State DOT works with the utility owners to avoid, minimize, or mitigate it. If the conflict cannot be avoided, then a relocation is required. Plans should show where the utilities will be relocated to ensure no further conflicts exists with the proposed construction project or with other proposed utility relocations.

The utility relocation plans are then used as the foundation to identify the scope, schedule, and budget of the required relocation. The plans can then be used to communicate to potential contractors during the project bidding process what relocation work is required during the construction of the transportation improvement project. This requirement of communicating utility information is covered later in this report under Observation 3, which deals with utility information in the construction bid package.

Utility Relocation Estimate

The second important supporting document of a utility agreement is the utility relocation estimate. The estimate must reflect the utility work required for the relocation (23 CFR 645.113(c)). The State DOT must verify the estimate's accuracy before approving the utility relocation. Without a detailed estimate, it is difficult—if not impossible—to verify the estimate's accuracy. After the utility relocation work is complete, the estimate is used as a baseline to compare the final relocation costs to the original estimate.

Utility Relocation Schedule

The third document of the agreement is the utility relocation schedule. When preparing the schedule, it is important to consider the following:

- What work is necessary to prepare the site for the utility relocation work to begin?
- How long the utility work will take place (duration can be date-specific or number of days)?
- What site access restrictions exist during the utility relocation work?
- What other requirements apply during construction?

Since utility schedules may vary from site to site (there may be several utility relocation areas throughout the project with differing requirements), a site-specific schedule might be warranted for each location. The schedule is important for prospective contractors during the bidding process because contractors need to integrate the utility relocation work into their master highway contract schedule.

The agreement serves as supporting documentation for the authorization of Federal funds to proceed with the utility relocation. State DOTs are only authorized to do the work in accordance with the relocation plans, cost estimates, and construction schedules defined in the approved utility agreement.

Observation 2A: Broad Discrepancies Exist Nationwide on the Use and Content of Utility Agreements

Overall, State DOTs are developing utility agreements for federally reimbursable utility relocations. However, critical information is lacking in many of these agreements. For example, many of the agreements examined only contained the boilerplate legal language necessary to protect and define the requirements for each party. The review team also found that most agreements contained the utility relocation cost and who is responsible to pay for the relocation. However, none of the agreements reviewed had a cost estimate in accordance with 23 CFR 645.113.

Additionally, the agreements frequently contained just two pieces of information related to the schedule:

- the required advanced notification to utility owners to coordinate their utility relocation work
- the time it will take to complete the relocation

There were no schedules provided in the utility agreements reviewed. Furthermore, most relocation plans showed existing utilities only, rather than show conflicts or final relocation information. Therefore, the utility agreements reviewed did not meet the minimum Federal requirements in 23 CFR 645 Subpart A.

In addition, State DOTs generally were not preparing utility agreements for non-reimbursable utility relocations, even though a utility agreement is required on Federal-

aid highway projects for all utility accommodations (including relocations).[19] The purpose of utility agreements is to protect the Federal investment in the highway project and ensure adequate construction, safe operation, and maintenance of the highway.

Recommendation 2A

FHWA Division offices must ensure that State DOTs are executing a utility agreement even if Federal-aid participation will not be sought (23 CFR 203(b); 645.209(i); and 645.213). These agreements must provide, among other requirements:

- A description of the requirements for relocation, construction, protection of traffic, maintenance, access restriction, and any special conditions applicable to the installation;
- A general description of the size, type, nature, and extent of the facilities being relocated; and
- Adequate drawings and sketches showing the existing and/or proposed location with respect to the existing and/or planned highway improvements.

Observation 2B: Most State DOTs Do Not Develop Comprehensive Utility Relocation Plans

Utility relocation plans may be the most important supporting document for the preparation and development of the utility agreement. These plans serve as the foundation to define the scope of the utility relocation work and assist with the preparation and justification of the relocation estimate, development of the activity-based schedule, and the communication of relocation work required during construction.

Utility relocation plans should include the following critical elements:

- Accurate location of existing utilities within the limits of construction, such as x-y-z coordinates.
- Identifying utility conflicts with the proposed construction.
- Location of the proposed relocated utilities.
- Who is responsible for moving proposed relocated utilities.
- Existing utilities that are to remain that need special protections to keep the line from being damaged, known as “protect-in-place.”
- Plan notes that provide specific guidance to contractors during construction.

[19] State DOTs may use different terminology to refer to utility agreements. Some terms used include “utility agreements,” “agreements,” “work orders,” or “utility permits.” FHWA’s interest is to ensure only that utility agreements meet the requirements outlined in Federal regulations.

During Phase 1 of the review, 26 out of 52 State DOTs (50 percent) included utility plans in the utility agreements sent to the review team for analysis. However, a closer look showed that in the majority of the 26 States, plans were missing many of these critical elements. Many State DOTs do not prepare any utility relocation plans and leave complete utility coordination for the contractor to handle during the construction phase.

During Phase 2, all five State DOTs visited showed some type of utility plans. However, all the plans reviewed were missing critical elements. Three out of the five State DOTs had plans that did not provide accurate existing utility information, such as the x-y-z coordinates. This practice increases project risks, such as the potential for contractor delays and cost increases, and threats to worker and public safety due to potential utility line hits and longer-lasting work zones.

Requirements for utility relocation plans for situations where Federal-aid reimbursement will be sought are codified at 23 CFR 645.113(c), which requires that utility agreements have the support of plans and specifications that are sufficiently informative and complete to provide the State DOT and FHWA with a clear description of the work required. Further, 23 CFR 645.113(g) stipulates that the State DOT may not proceed with the physical relocation until the plans have been reviewed and approved by FHWA or its designee.

During the review, it was discovered that State DOTs fail to develop effective utility relocation plans for several reasons:

- The problem begins with the lack of accurate utility location data as discussed in Observation 1. Because State DOTs don't have accurate utility data, they are unable to clearly identify if there is a design and utility conflict. Currently, inaccurate horizontal x-y plane data are shown on plans for existing utility lines, and if vertical z plane data are shown, most State DOTs use an assumed depth for the utility line. Because the utility location data is unreliable, State DOTs do not feel it necessary to develop detailed utility relocation plans.
- Many State DOTs don't consider the development of effective utility relocation plans a project priority, according to the review surveys and interviews with staff. A prevailing attitude is that because utility companies are on the highway rights of way at no cost, they should move when necessary to avoid impacting construction. However, according to most national reports on utility impacts during construction, this attitude does not translate into reality. As discussed in the Background section, several studies and anecdotal evidence suggest that utility coordination has become a major issue in executing the Federal-aid Highway Program. State DOTs often shift utility relocation risks to contractors through special provisions and plan notes. Again, this can negatively impact the project through potential cost increases and construction delays.
- Developing utility relocation plans may increase the cost and time to produce the highway design plans set. As a result, State DOTs often do not provide

sufficient time or funds to integrate the utility relocation work into the highway project.

- Identifying utility conflicts on highway plans is cumbersome and labor intensive because most State DOTs don't design in 3D. As documented in the SHRP2 utility products research (R01A), collecting and importing accurate utility data into the design file may help a State DOT quickly identify utility conflicts with the design. State DOTs then would be better positioned to develop utility relocation plans once utility conflicts are identified. As the transportation industry and State DOTs move to 3D design, this should become less of an issue.

There are four major impacts of not producing effective utility relocation plans:

- Plans are used to clearly define the scope of the necessary utility relocation work. Without accurate utility relocation plans, the scope of the work may be incomplete, resulting in unknown changes during the construction phase.
- Effective plans provide the basis for an accurate utility relocation estimate.
- Effective plans are used to determine the sequence of activities needed to complete the utility relocation. Often, site-preparation work needs to be completed. Staging requirements may be needed for materials, equipment, and work-site requirements. Other limitations may occur for contractor work near the utility work, and the utility contractor may have to do restoration work that requires the site to be handed back to the highway contractor. Without reliable utility relocation plans, these activities might go unnoticed, resulting in a poor utility relocation schedule.
- Utility relocation plans are used to communicate to the contractor during the bidding process what work is going to be done by others during the highway construction phase of the project. This issue is important and is covered in more detail in Observation 3.

Successful Practices

- A few State DOTs develop accurate, detailed utility relocation plans. They take the time and adequately fund the preconstruction utility coordination process to ensure accurate detailed utility relocation plans are developed. Contractors told the review team that when they get detailed relocation plans, project risks decrease, and they can provide lower bids.
- Florida DOT conducts a reasonable amount of test holes for locations where there is a potential utility conflict with the project. This information, the x-y-z data, is indicated on the plans as a verified vertical and horizontal (VvH). Contractors stated they trust data on the plans that are shown as a VvH because they know the data has been verified.

Recommendation 2B

FHWA Division offices should review the State DOT's utility relocation plans included in utility agreements and bid packages. Utility relocation plans should include the following primary elements:

- Accurate location of existing utilities within the limits of construction.
- Identification of utility conflicts (the x-y-z coordinates) with the proposed construction.
- Location of proposed relocated utilities.
- Determination of responsibility for moving proposed relocated utilities.
- Existing utilities that are to remain that need special protections to keep the line from being damaged, known as "protect-in-place."
- Notes that provide specific guidance to contractors during construction.

Observation 2C: Most State DOTs Fail to Prepare Utility Relocation Schedules

Utility relocation schedules are critical during the bidding process so that contractors understand what work will be completed by others during the construction of the project. Contractors are required to integrate all work related to the project into one master schedule that the "prime" contractor sees that all activities are addressed. The most effective utility schedule is one that is site-specific; for example, a separate schedule for each work location. Therefore, utility schedules are critical during the bidding process to reduce contractor risks.

Few State DOTs develop a utility relocation schedule during the preconstruction phase of a project. Generally, most State DOTs identify an "advance notice," which consists of the time the contractor must provide to utility owners to prepare for the utility work and the time needed to complete the utility relocation, either duration or a specific date. In most cases, no other scheduling information is offered.

Generally, little consideration is given for either multiple or site-specific utility relocations within a highway project. All site-specific utility relocations are typically grouped, with one-time duration provided to cover the entire project. On several occasions, it was observed that a utility relocation duration had been established for much longer than the utility work should take to complete. For instance, some State DOTs have used an arbitrary duration of one year (for example, January 1, 2014, to January 1, 2015) for the utility relocation. These practices provide little to no information to understand the utility work needed or the time required to complete the relocation.

Most State DOTs completely shift the responsibility of coordinating utility relocation schedules to the highway contractor in direct conflict with Federal regulations (23 CFR 645 Subpart A and 23 CFR 635 Subpart C). Refining the schedule is often necessary during the construction phase, but some basis must be established to begin utility coordination during that phase.

Phase 1 of the review found more than 60 percent of the State DOTs did not include any type of a utility schedule in the utility agreements sent to the review team. Nearly all State DOTs provided an advance-notice requirement and an overall utility relocation work duration, either the number of days or a specific deadline for the work to be completed, with no other scheduling details provided. This is not enough information for contractors to integrate the utility schedules into their master schedule.

Phase 2 of the review confirmed what was found in Phase 1. Only one out of five State DOTs visited provided a utility schedule. Three out of the five State DOTs provided advance notification and durations only, and one provided no schedule information.

These results conflict with 23 CFR 645.113(g) for situations where Federal-aid reimbursement will be sought, which stipulates that the State DOT may not proceed with the physical relocation until FHWA or its designee has been furnished a schedule for accomplishing the utility work.

During site visits, the review team learned there are multiple reasons why State DOTs don't develop more utility relocation schedules:

- Highway designers often incorrectly assume that utility schedules are a construction activity, and therefore responsibility for coordinating schedules belongs to the contractor. As discussed previously, utility schedules during contractor bidding are critical to understand the work and time necessary to complete the relocation.
- There is a lack of sufficient guidance to use as references or benchmarks regarding utility relocation scheduling practices nationally. This includes training in how to develop schedules and expectations for meeting the Federal requirements.
- Utility relocation plans serve as a foundation for developing an effective schedule. Because State DOTs often do not develop utility relocation plans, utility schedules are either inadequate or nonexistent in utility agreements.

Utility relocation schedules are used to determine the potential impacts to highway projects prior to construction. They can be used to determine if mitigations or other construction strategies should be implemented. For instance, if utility relocation impacts are too severe, the State DOT can choose to complete the relocation work prior to construction of the highway project. Or the utility relocation work could be included in the highway construction contract so that the highway contractor would be responsible for completing both the highway and utility work. Without a utility relocation schedule, the impacts to the highway project are unknown—and in violation of 23 CFR 645.113(g) for situations where Federal-aid reimbursement will be sought.

Utility relocation schedules are also used to communicate to the contractor during the bidding process what sequence of events needs to occur. Inadequate schedule information during the bidding process creates a potential risk to contractors. The review team learned through contractor interviews during the Phase 2 site visits that

contractors frequently mitigate the uncertainties by increasing their bid, which increases project costs. This issue will be covered in more detail in Observation 3.

Successful Practice

- The Massachusetts Department of Transportation (MassDOT) developed a detailed utility scheduling process known as the Project Utility Coordination (PUC) form. The PUC form integrates all utility work by location from all utility owners on the project and provides a sequential list of all related utility relocation activities. The State DOT construction office, contractors, and utility owners have praised the MassDOT utility section for implementing the PUC form. The review team believes that the PUC form provides the most comprehensive utility relocation scheduling process nationally.

Recommendation 2C

FHWA Division offices should encourage their State DOTs to develop effective utility relocation schedules which can be integrated into the contractor's master schedule. State DOTs should develop a process to develop these schedules during the preconstruction phase. The relocation schedule should be site-specific and activity based and include all the necessary activates to complete the utility relocation work. At a minimum, State DOTs need to develop utility relocation schedules that meet the requirements of 23 CFR 645.113 for situations where Federal-aid reimbursement will be sought.

Observation 2D: Most DOTs Do Not Develop Utility Relocation Cost Estimates

The purpose of the utility relocation cost estimate is to clearly define and establish the expected cost of the relocation to ensure adequate funding is available for the overall highway project. The State DOT is then responsible to validate or verify that the estimated cost accurately reflects the agreed-upon utility relocation work. Most State DOTs do not develop cost estimates that can be verified as accurately reflecting the relocation work to be performed.

Most State DOTs develop some type of utility relocation estimate for their utility agreements. Often these are one-to-three-line lump-sum amounts that represent the total cost of the utility relocation. These three-line estimates may represent utility work that costs in the hundreds of thousands of dollars. The three lines generally included labor, equipment, and materials, all of which represent the categories FHWA would expect in an estimate. However, when each category contains only a lump-sum amount with no details, it is nearly impossible to evaluate the accuracy of the estimate.

Phase 1 of the review found that 27 percent of the State DOTs included some detail for their utility relocation cost estimate. However, most of these were not detailed enough to validate the estimate. During Phase 2, only two out of the five State DOTs visited provided estimates.

Federal regulations clearly outline how relocation costs should be developed for situations where Federal-aid reimbursement will be sought. Per 23 CFR 645.113(a), the method for developing relocation costs must be acceptable to both the State DOT and FHWA. The regulation further states that the preferred method for developing relocation costs is based on actual direct and related indirect costs in accordance with a work order accounting procedure. Per 23 CFR 645.113(c), the agreement must be supported by an itemized cost estimate of the work agreed upon, including appropriate credits to the project, and sufficiently informative and complete to provide the State with a clear description of the work required.

State DOTs generally fail to develop utility relocation cost estimates due to several circumstances. Utility relocation work is highly specialized requiring a unique set of skills. Most State DOTs do not have in-house staff with the necessary skill set to develop or review utility relocation cost estimates. The result is that State DOTs do not hold utility companies responsible for developing cost estimates, in violation of 23 CFR 645.113(g).

As described above, many State DOTs fail to develop a utility relocation plan that can serve as the foundation for developing a cost estimate. The plans can be used to identify the materials and quantities needed for the relocation. Plans can also be used to generate a “take off” of the labor and equipment needed for each utility relocation site.

Many State DOTs indicated that they require an invoice after the relocation work is completed. The State DOTs argue that it doesn’t matter what is estimated before the work because the State only pays for the work completed. Several problems emerge with this logic, including:

- Several Federal requirements stipulate that obligating Federal funds must be based on a reasonable estimate and that the estimate must be validated (23 CFR 630 Subparts A and B; 635.114; 635.115; and 645.113). Further, in situations where the utility work will be performed by the contract method, the State DOTs must develop an independent estimate before receiving an estimate from the utility company to serve as a basis for negotiations (23 CFR 630 Subparts A and B).
- The FHWA authorizes funding based on the original estimate. If there are changes to the utility work, the utility agreement must be updated and approved (23 CFR 645.113(e)).
- The original or updated estimate is used as a basis for the final payment. When the State DOT fails to validate the original estimate, the State may be overpaying for the utility work.
- Upon a cursory review of invoices after the utility work was complete, only one of the five State DOTs visited required invoices. Most State DOTs had the same problem with invoices that they did with estimates. The estimates could not be broken down into discrete elements; thus, it was nearly impossible to validate the accuracy of the invoices.

The review team found that most State DOTs lack the in-house expertise to adequately review utility cost estimates. State DOT officials repeatedly told the team that they rely on the utility company because they don't have experience in reviewing utility relocation estimates.

In summary, the team found that State DOTs are requesting, and FHWA Divisions are authorizing, funds to relocate utilities without determining if the work is eligible and reasonable as required by Federal regulations (23 CFR 645.113; 645.115; and 645.117; 2 CFR 200.403). This lack of adequate verification poses a financial risk to the Federal-aid Highway Program.

Successful Practices

Some DOTs have developed successful practices related to utility relocation cost estimates:

- Some State DOTs have developed a database of common utility relocation materials. As each estimate is developed, the database is updated with the latest information, creating a historical database of utility relocation materials that can be used to validate the unit costs of materials used.
- Likewise, some State DOTs have negotiated a unit price method for estimating work. This method is similar to the way estimates are used in standard highway contracts where the unit prices of each material include the cost of labor, material, and equipment for each unit installed. Generally, the State DOT and utility owner identify the common materials used on typical utility relocations for the specific utility company. Then using historical data and common estimating practices, unit prices are developed, negotiated, and agreed upon. These agreed-upon unit prices and the process for estimating utility relocations are typically documented in a master agreement. The master agreement should include a process to periodically update the agreed-upon unit prices.
- Some State DOTs have developed guidance to assist the State and utility owner to develop the utility relocation estimate. This guidance usually includes estimate forms and instructions of how to fill out the forms.

Recommendation 2D

FHWA Division offices must ensure that State DOTs are preparing a documented cost estimate based on the State's best estimate of costs as required by 23 CFR 630.106(a)(3)). If the State DOT lacks the experience for developing and reviewing utility relocation costs estimates, they may consider the following:

- Develop internal staff expertise or hire a consultant that has the expertise to review utility cost estimates. The indefinite delivery-indefinite quantity (ID/IQ) contracting method may be an option to hire a qualified consultant.

- Develop a historical and market database to capture the cost of common utility materials. This could supplement or expand an existing construction pay item database already in use by State DOT.
- Negotiate a unit-cost method of payment for utility relocation of common materials. This master list of pay items can be incorporated into a master agreement between the State DOT and each utility company.

Objective 3: What utility relocation information is communicated to the contractor in the contract bidding documents?

Observation 3: Most State DOTs Fail to Include Adequate Utility Information in the Construction Bid Package, Resulting in Invalid Utility Statements (Certifications)

Highway contractors interested in constructing a State DOT project must bid the project during the letting phase. State DOTs prepare a bid package that defines what is to be constructed, including the quality level, restrictions, requirements, and standards necessary to complete the project. The bid package is usually the only tool a State DOT has to communicate project requirements to the contractor. Sometimes a State DOT may hold a pre-bid meeting for prospective contractors to communicate critical information contained in the bid package. The bid package becomes the contract that defines the work to be accomplished on the project.

If a third party will complete utility relocation work concurrent with the highway project, the highway contractor must coordinate highway activities with the third-party utility contractor. Because a utility and highway contractor are working within the same project limits, they must coordinate activities; otherwise, they risk potential impacts during the construction phase of the highway project. Per the contract, the highway contractor must meet the deadline for completing the highway project and provide a bid amount to be paid for constructing the project as defined in the bidding documents.

The majority of highway contracts reviewed contain standard language stating that the contractor is responsible for coordinating all utility work with utility owners, and any utility-related cost-and-time impacts are to be borne by the highway contractor.

This means that cost-and-time increases are not typically granted to highway contractors for utility cost increases or delays, even if the contractor was not responsible for the cost impact or the delay. Under these conditions, the highway contractor has no means to recover costs due to utility delays. Therefore, the only mechanism for contractors to avoid potential losses due to increased utility risks is to make an educated guess as to what potential utility impacts may arise during construction.

Contractors told us during site-visit interviews that this utility risk typically translates into a bid increase and is included in the contractor's winning bid, which will be paid regardless of whether utility impacts occur. This is why accurate and complete information in the bid package is so important: the more and better information contained in the bid package, the less risk to the contractor. In other words, as the

amount and quality of utility information increases in the bid package, the contractor risks and bid amount related to utilities decreases, potentially resulting in lower overall project costs.

To reduce risks, State DOTS should give highway contractors as much utility information as possible during the bidding process. Basic utility information in the bid package can lower contract risk and bids, including:

- Utility plans that show:
  - Accurate existing utility locations (x-y-z plane data)
  - Utility conflicts with the design
  - Final location of proposed utility relocations
  - Who will perform the utility relocation work
  - Special instructions for protect-in-place-utilities
  - Utility-related plan notes
- Activity-based schedules for each utility work area that define:
  - Preparing the site for the utility work
  - Advance notice requirements
  - The time, either duration or a specific date, needed to complete the utility relocation
  - Contractor restrictions during utility relocation
  - Contractor final inspection of the site
- Special provisions, plan notes, or both in the bid package that provide specific utility information to contractors on project requirements:
  - Utility company contact information
  - Listing of utility conflicts with design
  - Final location of relocated utilities
  - Instructions for protect-in-place utilities
  - Special site-specific issues for the contractor to consider
  - Activity-based schedule
  - Requirements to integrate utilities into the project master schedule

This information, if properly communicated, covers the work will be completed by a third-party contractor and the proposed schedule for completion.

The utility information included in the bid package varies among State DOTs. One problem, as shown in observations under Objective 2, is that State DOTs typically fail to develop utility relocation plans or schedules. The lack of these elements in the utility

agreement translates into the information being unavailable for inclusion in the bid package. This leads to increased contractor risks that can result in increased bids due to uncertainties with utilities. This increases the financial burden on the Federal-aid Highway Program through increased project costs and raises public safety risks due to longer-lasting work zones and exposure to worker strikes of utility lines (power and gas lines).

Striking a utility line occurs nearly every minute somewhere in the United States. Although most utility strikes result in minimal local damage, many others result in fatalities, injuries, significant collateral damage, or all of these. The costs of repairing the damaged utility line must be considered, as well as the costs associated with disruption of services, traffic patterns, project delays, contractor claims, and litigation.[20]

During Phase 1 of the review, 29 State DOTs (55 percent) indicated they provided utility location data to contractors during the bidding process, and 37 State DOTs (71 percent) indicated they provided utility special provisions or notes to contractors during the bidding process. However, the plans often only showed some existing utilities with questionable accuracy, and the special provisions merely indicated the contractor was responsible for coordinating all utility issues on the project. Few State DOTs offered the utility information needed to minimize contractor risks.

During Phase 2, only one of the five State DOTs visited provided utility relocation plans in the bid package. However, that one State DOT did not provide enough information for the contractor to know what utility work was required during the construction phase. Most State DOTs provided some type of utility special provisions or notes, which shifted utility coordination risks to the contractor. As shown above, this practice translates into increased bids and inefficient utility coordination practices.

The review team learned during Phase 2 interviews with contractors that, although the contractors felt generally positive about overall State DOT utility coordination efforts and understood how difficult the task can be, they believe the utility information provided during the bidding process is woefully inadequate. Most contractors agreed that:

- Utility plans do not provide the necessary information to know what work will be done or by whom during the construction phase of the project. Plans showing the existing utility locations were unreliable. Plans don't generally show the final location of relocated utilities. If utilities are moved before the highway project, their new locations are not shown on the highway project plans.
- Because State DOTs do not accurately locate existing utilities and give unreliable as-built information during the preconstruction phase, contractors can't trust the plans information. Contractors are required to locate utilities during the construction phase that may be in conflict with the work. When contractors find utility conflicts with the proposed highway project—conflicts that were unidentified

[20] Sterling, R.L., et al.; SHRP2 Report S2-R01-RW, *Encouraging Innovation in Locating and Characterizing Underground Utilities*, Transportation Research Board, 2009, page 52, retrieved from http://www.trb.org/Main/Blurbs/162489.aspx.

in the original bid package—they are required to coordinate new utility relocations. This may result in unreimbursable costs impacts for the highway contractor. Some State DOTs may provide additional time for impacts to controlling operations. However, this is done on a very limited basis.

- The bid package often does not provide any useful utility schedule information. As stated previously, the utility schedule provided in the bid package includes only advanced notification and the duration for the time it takes to complete the relocation work. The duration is not tied to any other construction activities and is generally a standard time set for relocation work. For example, 60 to 90 days is a standard timeframe, regardless of the amount of utility work needed. The review team also observed in another instance, a one-year duration was used that was not based on the actual time needed to complete the work. Because no basis exists for the period of utility work, contractors are forced to make assumptions related to the time and effort it will take and then increase the bid to account for the assumptions made. After award, the contractor is required to negotiate a reasonable schedule with utility owners during the construction phase, which can increase contractor risks.
- Contractors feel they are at the mercy of utility owners because they have no leverage to influence utility companies to be responsive to contractor schedule. Contractors stated they may have to account for double shifts and premium pay to overcome unknown utility impacts, resulting in increased bids. Contractors generally believe the responsibility for utility coordination rests with the owner of the facility—the State DOT.

The review team found conflicts with 23 CFR 635.309(a), which requires that prior to project authorization, the State DOT must provide a utility statement (certification) stipulating that (1) all utility work has been completed or (2) that all necessary arrangements have been made for utility work to be undertaken and completed.

When the utility relocation work cannot be completed before construction, appropriate notification shall be provided in the bid proposals identifying the utility work that will be completed concurrent with the highway construction. Per 23 CFR 635.301 and 635.307(a), a State DOT may advance a highway project to construction only if the utility work is coordinated with the physical construction so that no unnecessary delay or cost will occur to the project.

The primary cause of incomplete utility information in the bid package is that many State DOTs do not prepare or require the development of complete plans or schedules during the project's preconstruction phase. Because the required utility information has not been developed by the State DOT, it is not available at the time of advertisement of the project. These issues were discussed in Observations 2A and 2B.

Successful Practices

- **Utility Schedules:** MassDOT has developed the previously mentioned PUC form that's shared with the contractor during the bidding process.

- **Special Provisions:** Some DOTs have developed sound special provisions that identify each utility conflict on the project, what work is required, and where the utility will be relocated. These are then provided in the highway construction bid package.
- **Utility Plans:** Some DOTs have developed utility relocation plans that identify what work is required, the specific location of the work, who will be doing the work, and where the utility will be relocated. These are a mix of plans and profile sheets, plan notes, and call-outs.
- **Test Hole Data:** Some DOTs will identify in the utility relocation plans the specific location where the State has collected x-y-z plane data, which are usually collected using test holes where survey data is collected. This information is useful to the contractor to help understand the accuracy of the utility location data.
- **Test Hole Pay Item in Construction Contract:** Some DOTs have included a test hole pay item in the contract for contractors to use at the direction of the State DOT resident engineer. This shifts some of the risks from the highway contractor in locating utilities during the construction phase.

Recommendation 3

FHWA Division offices must ensure that the State DOT is meeting the requirements of 23 CFR 635.309(a) as outlined below:

- State DOTs must provide a utility statement (certification), prior to project authorization, stipulating that
  - all utility work has been completed or
  - that all necessary arrangements have been made for utility work to be undertaken and completed (23 CFR 635.309(a)).
- State DOTs must develop a process to incorporate effective utility information, including utility relocation plans, special provisions, and utility relocation schedules, into the bid package.

Objective 4: How does utility coordination, prior to opening of bids, impact construction cost and time?

Observation 4: Few State DOTs Know the Cost-and-Time Impacts that Utilities Have on Construction Projects

To understand the impacts of utility relocations on highway projects, State DOTs first should collect and then quantify utility-related cost-and-time increases during the construction phase.[21] During Phase 1 of the review, all State DOTs said they

[21] According to U.S. Office of Management and Budget (OMB), tracking and measuring specific program data can help agencies diagnose problems, identify drivers of future performance, evaluate risk, support

documented and quantified construction cost changes. However, only six State DOTs (11 percent) indicated that they track utility-related cost-and-time impacts during construction.

State DOTs document and quantify construction cost-and-time changes during the preparation of change orders. However, few State DOTs (11 percent) tracked utility-related change orders during construction because they did not have the data readily accessible. To quantify the magnitude of utility-related change orders, the review team concluded that State DOTs would have to do a labor-intensive word search and scan hundreds, if not thousands, of change-order documents. Because most of these State DOTs don't use keyword search processes, the results of such an effort would be unreliable at best.

State DOT utility programs should be measured in a way that will help FHWA improve program outcomes, share lessons learned, and spread the adoption of promising practices. The FHWA has provided guidance on how DOTs can accomplish these goals through the 2009 FHWA National Change Order review.[22] State DOTs should develop a tracking system using reason codes for construction change orders, including definitions, to identify common causes for contract changes. This type of system is needed to understand:

- the utility coordination process,
- utility-related corrective actions,
- utility-related lessons learned,
- and utility-related successful practices that can be shared with others.

There are several reasons why the majority of State DOTs do not collect and track construction change order performance data:

- Collecting utility-related performance data adds work to an already overloaded workforce. State DOTs have routinely reduced their construction management workforce by applying a risk-based approach to the construction oversight process. While this may be an accepted business practice, the result is that collecting construction performance data often becomes a low priority and is unreliable.
- Because utilities represent a third party to the construction project, State DOTs believe there is little they can do to effectively manage the process.
- Many State DOTs do not understand the need to collect performance data; therefore, little priority is placed on the data collection and tracking.

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collaboration, and develop follow-up actions. See OMB's Performance.Gov website (www.performance.gov) and http://goals.performance.gov/measuring-and-analyzing-performance-find-what-works.

[22] *Management of Construction Contract Changes*, Final Report, Office of Corporate and Professional Development, Program Improvement Team, FHWA-HPC-10, June 2009, page 13.

- State DOTs, FHWA, and legislators have grown accustomed to status quo. Utility issues have always caused impacts during the construction phase and few believe that the process can be improved.

If utility impacts during construction are not quantified, no data exist to support a reason to change the utility coordination process.

During Phase 2 of the review, the team found that two out of the five State DOTs visited (40 percent) used utility reason codes to track utility-related cost-and-time impacts on highway projects. This percentage is much higher than was seen in Phase 1 of the review. This is attributed to the review team wanting to explore how State DOTs use reason codes; thus, State DOTs that track change orders during construction were selected for site visits. Of the two State DOTs that used reason codes, one did not consider the data reliable for the following reasons:

- A low priority is placed on collecting utility-related change order data. Without a high priority placed on this collection, any data called out from change orders are unreliable.
- Several reason codes could have been used for utility-related change orders, such as unforeseen conditions, third-party impacts, and design change. The results of utility-related impacts are scattered among several reason codes and can't be quantified without conducting a word search.
- Multiple construction issues are often bundled into one change order to simplify construction project administration. The process of bundling multiple change orders can hide the individual issue, making pulling out and quantifying a single issue difficult, if not impossible.

A Texas Transportation Institute (TTI) report was in line with the review team's observation that utility conflicts with highway construction contracts routinely are identified as a primary reason for cost-and-time increases on construction projects. The TTI report, *Assessing the Costs Attributed to Project Delays*, found that in a review of 868 TxDOT projects, 424 of the projects experienced delays. Of the 424 projects delayed, 72 projects (16.9 percent) were delayed because of "untimely utility relocation." The study also found that "untimely utility delays" accounted for the third highest percentage (13.2 percent) of work days delayed.[23]

Several Federal regulations and policies stipulate the criteria for dealing with cost-and-time issues:

- 23 CFR 635.120, Changes and extra work: After FHWA authorizes a State DOT to proceed with a construction project, all major changes in the plans and contract provisions must be approved by the State or FHWA, based on the State stewardship and oversight agreement. The State DOT must conduct and

[23] Beaty, Curtis, et al., *Assessing the Costs Attributed to Project Delays*, Texas Transportation Institute, September 2011, page E-5-E7, retrieved from https://ftp.dot.state.tx.us/pub/txdot-info/fed/project-delay-summary.pdf.

document an independent review of the cost for each change order separate from the contractor's price proposal.

- 23 CFR 635.121, Contract Time and contract time extensions describes FHWA's approval procedures for the review and approval of time extensions. Managing impacts on contract time, as contract changes occur and are resolved, enables the contractor to manage the project more successfully and avoid the possibility of a claim for constructive acceleration due to the added volume of work without a commensurate extension in contract time. For the State DOT to properly assess the impact of a contractor's schedule, project staff should ensure that the contractor provides timely updates of any required project schedule information. In the absence of a critical path or activity schedule, the project staff should determine what the controlling operations are and assess the potential impact of the proposed work. Depending on the contract, a time extension request due to a conflict with utility, railroad, or right-of-way clearances generally will be denied by FHWA due to the assurances provided in the utility statement by the State DOT.
- 23 CFR 645.113(g) Agreements and Authorizations, In the event there are changes in the scope of work, extra work or major changes in the planned work covered by the approved agreement, plans, and estimates, Federal participation shall be limited to costs covered by a modification of the agreement, a written change, or extra work order approved by the Transportation Department and the FHWA.

Successful Practice

The TTI report identified TxDOT as having developed one of the most comprehensive reporting systems used nationally. The TxDOT's change-order system and use of reason codes are considered a successful practice.[24]

Recommendation 4

FHWA Division offices should work with their State DOTs to understand the impacts of utility relocations on highway projects. State DOTs should collect and then quantify utility-related cost-and-time increases during the construction phase. State DOTs should consider developing a tracking system using reason codes for construction change orders, including definitions, to identify common causes for contract changes related to utilities. At a minimum the State DOT must meet the requirements of 23 CFR 635.120 and 23 CFR 645.113(g) for utility related changes.

Objective 5: What is the level of oversight for utility relocations and are source documents provided to validate Federal payment?

[24] Beaty, Curtis, et al., *Assessing the Costs Attributed to Project Delays*, Texas Transportation Institute, September 2011, retrieved from https://ftp.dot.state.tx.us/pub/txdot-info/fed/project-delay-summary.pdf. For more information about TxDOT's reporting system, go to http://www.txdot.gov/inside-txdot.html.

Observation 5: State Dots Are Not Performing Quality Assurance on Utility Relocation Work and Lack Required Documentation to Support Final Payment.

The majority of utility relocation work is accomplished by either the utility company or a utility contractor hired by the utility company. The third-party utility relocation work is completed outside of the State-administered highway contract. State DOTs do a good job of providing oversight on highway contracts. However, since the utility relocation work is performed outside of the highway contract, very little attention is given to third-party utility relocations in the form of oversight, including field verification; collection of source documentation; and verification of materials, labor, and equipment. Few State DOTs provide contractor oversight and quality assurance during utility relocations. This results in a lack of required documentation to support the final voucher payment. For a cost to be reimbursable the cost must be adequately documented as provided under 2 CFR 200.403(g). Without adequate documentation of cost that represents a significant internal control weakness and risk of potential for overpayment. Compounding the problem of poor documentation to support the final voucher is the lack of detail in the development of the original estimate, which was discussed in observation 2C. This lack of utility relocation cost estimate detail and oversight extends into the final voucher, leading to insufficient documentation to support the payment to the utility company as required by 23 CFR 645.113 and 23 CFR 645.117.

During phase 2 of the utility review, a cursory review of State DOT oversight and documentation practices was done. Only one of the five DOTs visited required invoices and conducted sufficient oversight of the utility work. Most State DOTs had the same problem with the invoice as they had with the estimate. The estimate could not be broken down into discrete elements. It was nearly impossible to validate the accuracy of the invoice, and there was little to no documentation of State DOT oversight of the utility relocation work.

State DOTs are responsible for ensuring that projects, including utility relocations, receive adequate supervision and inspection to ensure that projects are completed in conformance with approved plans and specifications (23 CFR 635.105). The State DOT must have procedures in effect that will provide adequate assurance that the quantities of completed work are determined accurately and on a uniform basis throughout the State. The State DOT must have records of all source documents upon which payment is based (23 CFR 635.123).

There are a number of reasons that State DOTs do not provide oversight or prepare the necessary documentation to properly close out utility relocation work, including:

- Needed resources are lacking to provide effective oversight/inspection of the utility relocation work.
- State DOTs do not exercise control over utility companies located within the highway rights of way. As such, utility owners routinely fail to notify State DOTs when they will conduct utility relocations.

- Utility work is highly specialized, and many State DOTs lack resources. Therefore, evaluating utility estimates poses a unique problem for States.[25]
- State DOTs may not understand Federal requirements for proper documentation of final payments.

Per 23 CFR 637.205, each state must develop a quality assurance program to assure that the materials and workmanship incorporated into each Federal-aid highway project on the National Highway System (NHS) conform with approved plans and specifications. Further, the State DOT must maintain adequate, qualified staff to administer its quality assurance program.

Many State DOTs and contractors stated there is very little oversight/inspection of third-party utility relocations. This results in problems such as:

- The utility not being relocated in a clear area, which may result in the utility having to relocate again.
- No documentation that the utility was relocated.
- The utility not relocating according to construction plans. This could cause a safety risk to workers.

In addition to these State DOT issues, without proper inspection and documentation of work completed, there is a high risk of improper payments of Federal funds. As was discussed in observation 2C, many State DOTs do not adequately document the initial estimate of utility relocation work. Many State DOTs use this poorly prepared initial estimate as the basis for the final payment.

Recommendation 5

- FHWA Division Offices should conduct a Financial Integrity Review and Evaluation (FIRE) Review on a sample of utility relocation final payments to determine if there is sufficient documentation to support the final payment. Sufficient documentation for utility relocations should include inspector dailies, source documents, invoices, force account records, and verification that relocation work was done in accordance with the utility permit.
- FHWA Division offices must ensure that their State DOTs develop a quality assurance program to assure that the materials and workmanship incorporated into each Federal-aid highway project on the National Highway System (NHS) conform with approved plans and specifications (23 CFR 637.205). Further, Division offices must ensure the State DOTs maintain adequate, qualified staff to administer their quality assurance program.

[25] Some State DOTs have overcome this by hiring utility experts as support staff or contracting with consultants for specialized utility services.

Global Recommendations

This report contains two sets of recommendations. If there was a recommendation unique to the specific observation, the recommendation was captured at the end of the corresponding section. Here, the second set includes global recommendations that focus on improving all areas within the report.

- **Increase educational opportunities.**
  - Develop a National Highway Institute (NHI) training course to assist State DOTs and local public agencies (LPAs) in understanding the Federal requirements and successful practices for developing:[26]
    - Utility agreements and their supporting documents (plans, estimate and schedule).
    - Bid package utility information.
    - Utility statements (certifications).
  - Build on SHRP2 Utility Bundle sustainability efforts. This includes developing NHI training for the SHRP2 products and developing SHRP2 utility product web pages.
- **Increase awareness within FHWA and with partners on the risks that utilities pose to transportation project delivery.**
  - Include utility program action items in the FHWA Performance Year Strategic Implementation Plan (SIP)
  - Strongly encourage Divisions to assess the level of risk due to the utility program at the State level.
  - Conduct a utility program review at the State DOT level if the Division determines utilities to be one of its top-10 risks.
  - Include the review of supporting documentation for Federal-aid utility relocation payments to ensure compliance with Federal regulations. An option could be to include this as a Financial Integrity Review and Evaluation (FIRE) review.
  - Update FHWA's utility guidance manuals, such as the Utility Program Guide (UPG).
  - Look at other opportunities within FHWA's strategic planning process at the national, resource center and division levels to evaluate and deal with utility risks.
- **Expand utilities knowledge base.** This initiative is intended to engage Divisions and FHWA Resource Center employees, broaden their utility knowledge base,

[26] This course is expected to be available in late 2018.

share expertise, and draw upon a larger group to assist in utility program improvements.

  - Set up a utilities working group to meet regularly, communicate emerging issues, work on improvement opportunities, and expand knowledge base.
  - Conduct national instructional webinars.
  - Increase awareness of the Federal requirements through regular communications among FHWA and its State and local partners.
  - Provide regular utility outreach that could include newsletters, and share articles on proper utility location techniques.

- **Issue guidance and "how to" on the requirements** to collect construction change orders, claims, and performance data globally, as well as collect and track utility-related change-order performance data.

Conclusion

Utility investigations are the foundation of the utility coordination process. The entire utility coordination process will significantly suffer without effectively locating and characterizing utilities on transportation projects. According to interviews with State DOT officials, the primary reason that State DOTs fail to accurately locate utilities on highway projects is due to increased project costs. But several studies have concluded that the cost of utility investigations more than offset the impacts of inaccurate utility location information. Despite this, many State DOTs continue to ignore the significance of accurately locating utilities within a highway project.

Based on research and anecdotal evidence, the team has determined that utility coordination is one of the leading causes of highway construction delays and cost overruns. This program review demonstrated that, although many sound utility coordination practices are in use nationwide, many gaps exist. Few State DOTs have implemented a comprehensive process that contains all the necessary policies, procedures, and practices for effective utility coordination and required by Federal regulations. Therefore, the review team concludes that these gaps in the utility coordination process pose financial and legal risks to the Federal-aid Highway Program.

Each FHWA Division should conduct a utility risk assessment, which could reveal valuable insights into utility strengths and weaknesses in each State DOT. Those State DOTs that demonstrate high utility risk should conduct a statewide utility program review, which would likely reveal even more insights that could improve the utility coordination process in their State. If the recommendations in this review are implemented, transportation projects could be built faster, better, and safer.

Appendixes

Appendix 1: Review Charter

Appendix 2: Review Plan

Appendix 3: Phase 1 Division Office Survey

Appendix 4: Code of Federal Regulations Entries Related to Utility Coordination

Appendix 5: Utility Agreement Review Checklist

Appendix 1: Review Charter

Phase 1 – Nationwide Utility Agreement Review

- The review team has developed a sample of projects that includes at least one project from each State DOT.
- From this list, each Division will be asked to submit one federally reimbursable and one non-federally reimbursable, state administered utility agreement.
- The Division will be asked to complete a simple survey consisting of about seven questions. The review team will then evaluate the utility agreements to determine compliance with utility coordination Federal requirements in 23 CFR 645.113. The questions will be used to compare the results of the utility agreement review with specific State utility program practices. The purpose of this phase is to determine if there are national trends and major findings or observations. The results of this phase will be included in the final report.
- This phase will be used to determine which States the review team will visit to conduct Phase 2.

Phase 2 – Site Visits

- The review team will use the analysis from Phase I to identify up to five States to conduct site visits.
- This phase will include interviews with key Division and State DOT personnel and detailed reviews of utility agreements, contract documents, and utility-related construction cost and time-change orders.
- The review team will select at least one State from each DFS area of responsibility. Additional criteria to be used in the selection of States could include size of State, utility program practices, and utility agreement compliance with Federal regulations.
- This phase delves deeper into State DOT practices to identify reasons and causes of good or poor performance, or both. This phase also will explore and develop successful practices and recommendations. The results of this phase will be included in the final report.

Review Team Leader:					
Ken Leuderalbert, Office of Infrastructure (HIPA), Utilities Program Manager					
Team Members:					
George Jones, PMIT, Construction Lead		Jeff Lewis, Resource Center, Utility and Construction Coordination		Steve Moler, Office of Public Affairs (HPA), Review Planning and Report Writing	
Team Sponsor: Thomas D Everett, Director, Office of Program Administration					
Office of Infrastructure					
Budget:					
$30,000 (Pending availability of Funds.) [redacted]					
Estimated Time Frame:	11 months	**Starting Date:**	July 1, , 2015	**Estimated Completion Date:**	June 1, 2016
Potential Constraints:					
1. Getting accurate construction cost and time change orders could be difficult. The team may be able to overcome this if it selects States that have good change-order performance metrics. 2. While the CFR includes the requirements necessary for the documentation of utility agreements, there is little policy guidance on the subject. Therefore, a risk for this review could be that the CFR could be open to interpretation.					
Timing of Progress Reports:					
Progress reports will be provided to the Office of Infrastructure, PMIT, and Resource Center via a performance report at least quarterly.					
Sponsor Signature and Date:					
~~By signing and dating the Charter, the Sponsor indicates approval of it as written.~~ Thomas D Everett 7/1/15					

Appendix 2: Review Plan

The following Review Plan was used to set the course for Phase 2 of the review. The primary fields necessary to assist the team were developed. The other fields remained blank.

Review Plan			
Review Subject:			
What are we reviewing? Copy the information from the first block in the charter.			
Purpose of Review:			
Why are you doing the review? Summarize the information from the charter here.			
Scope of Review:			
What is the scope? What locations are you going to visit? Who are you going to interview? What data are you reviewing? As the team completes the data collection and schedule, you will want to clarify the scope beyond the information in the charter.			
Team Member	Title, Office	Role	Time Commitment
Ken Leuderalbert	Office of infrastructure: Utilities Program Manager	Review leader	50%
Jeff Lewis	Resource Center: Construction and Contract Administration Engineer	Utility and Construction Liaison	30%
George Jones	PMIT	Construction Expert	30%
Steve Moler	Office of Public Affairs ; Communications Specialist	Communications Expert	50%
Resources:			
Dollars	What is the budget for the review? (See Charter.)		
Advisor/Expertise Available	Who, besides the members of the team, could provide additional expertise or assistance with the topic?		
Stakeholders	Who are the people that may have an interest in the outcome of the review or may be affected by it?		
Equipment	What type of specialized equipment or software, if any, will you need to conduct the review? (The team likely will complete this block after determining the data collection methods.)		

Information Data Collection			
Objectives/Sub-Objectives	Data Needed	Source of Data	Method to Collect
1. Do State DOTs have:		We will have to determine specific offices by state prior to review.	
a. Guidance necessary to prepare utility agreements:	Guidance documents with specific instructions for the preparation of utility agreements (plan, estimate and schedule)	Manager(s) responsible for the utility agreement process	Some prep work to acquaint team with guidance document (request specific guidance reference(s) from division)(30 days out from review). Review on site with specific guidance available. Interview to determine application and knowledge of process.
b. Guidance for communicating (what goes in the bid documents) the utility relocation requirements in the contract documents	Guidance documents for communicating utility requirements in contract documents.	Contracts unit, office responsible for providing utility information.	Some prep work to acquaint team with guidance document (request specific guidance reference(s) from division)(30 days out from review). Review on site with specific guidance available. Interview to determine application and knowledge of process.

c. Guidance for how DOTs capture utility-related cost and time change orders (reason code for utilities?)	Construction manual, bulletins, procedures or other guidance document(s).	Construction office (probably district)(need to work with division to determine district for review)	Some prep work to acquaint team with guidance document (request specific guidance reference(s) from division)(30 days out from review). Review on site with specific guidance available. Interview to determine application and knowledge of process.
Reorder 2,3,4 in reverse order.			
2. What is the level of detail (relocation plans, estimate, and schedule) in the utility agreement and is it adequate to effectively coordinate the utility work with the construction contract?	All executed Utility Agreements with supporting documentation (plans, estimate, schedule, etc) from the projects in objective #4.Utility certification/statement.	Design Project Manager, Utility Project Manager or Consultant.	At review site (central office or district as appropriate).
3. What utility relocation information is communicated to the contractor in the contract bidding documents?	Advertised bid package including addendums from the selected projects in objective #4	Contracts unit (for bid package submittal or prep) and Design Project Manager, Utility Project Manager or Consultant (for interview)	Review electronic, CD preferred, (3 copies or use FHWA large file transfer system) bid package prior to visit, if possible. Interview of Design Project Manager, Utility Project Manager or Consultant.

4. How does utility coordination, prior to opening of bids, impact construction cost and time?	Utility related change orders or claims from 3 FAHP state administered projects that are substantially complete in the district selected.	Construction Project Manager or others as appropriate	Review electronic CO prior to visit, if possible. Interview of construction staff.

Appendix 3: Phase 1 Division Office Survey

The Office of Infrastructure has established a national review team to conduct a review of state utility agreements and the impacts to construction cost and time. Please see the briefing document for additional background. The first step in this process is to review utility agreements from each state. In order to do this, we are asking each division to send one federally reimbursement utility agreement and one non-federally reimbursed utility agreement as defined in Section 1 and 2 below. Note: non-federally reimbursed utility agreements are defined as those that are paid by others, State DOT, LPA or utility company and not reimbursed with federal funds.

Additionally, the team is requesting some program input to assist in this review effort. Please fill out Section 3 below.

1. **Selection of Project:**

    a. From the list of projects provided in the excel spreadsheet, select the first project on the list for your state.
    b. Using the Utility Certification (Cert) as contained in the Plans, Specifications and Estimate (PS&E) package, determine if there is at least one federally reimbursed utility agreement.
    c. If there is not at least one federally reimbursed utility agreement for the first project on the list, use the back-up or second project on the list.
    d. If neither of the projects have a federally reimbursed utility agreement, please contact George Jones at George.Jones@dot.gov or by phone at 720-963-3032 to get another project.

2. **Selection of Utility Agreement:**

    a. Using the Utility Cert as contained in the PS&E package, select the first federally reimbursed utility agreement shown on the list of utility companies.

    b. Also using the Utility Cert, select the first non-federally reimbursed utility agreement.
    c. If the division needs assistance with this request, please contact George Jones (see #4 above for contact information)
    d. Once you have pulled one federally reimbursed utility agreement and one non-federally reimbursed utility agreement, send both along with a copy of the Utility Cert to Jeff Lewis at Jeff.Lewis@dot.gov .

3. Division Questions:
    a. Does your state have guidance to assist in the preparation of utility agreements? If yes, what is the name of the document?

b. Does your state have guidance to assist in the preparation of contract documents, communicating utility relocation requirements to prospective contractors? If yes, what is the name of the document?
c. Does your state capture utility related cost and time change orders during construction (i.e. utility reason codes)? Are they readily accessible?
d. Briefly describe how your state typically identifies the location of utilities (i.e. SUE, 'as-built' drawings, utility company input, etc)?
e. In a few sentences, briefly describe how your state coordinates utility relocation work prior to construction?
f. In a few sentences, briefly describe what utility requirements are communicated to the contractor in the contract documents prior to bid?
g. Does your state track utility related cost and time performance data? If yes, what are the results?

Thank you for your time in completing this survey and providing the very important Utility Agreement information.

Appendix 4: Code of Federal Regulations Entries Related to Utility Coordination

Laws dealing with utility relocation and accommodation are contained in the United DOTs Code, title 23, sections 123 and 109(l)(1), respectively. These laws are contained in the Appendix and will be cited in this guide as 23 U.S.C. 123 and 23 U.S.C. 109(l)(1).

Regulations dealing with utility relocation and accommodation matters are based upon laws contained in 23 U.S.C. and are found in the Code of Federal Regulations, title 23, chapter I, subchapter G, part 645, subparts A and B. These regulations are contained in the Appendix and will be cited in this guide as 23 CFR 645.

§645.113 Agreements and authorizations

(a) On Federal-aid and direct Federal projects involving utility relocations, the utility and the TD shall agree in writing on their separate responsibilities for financing and accomplishing the relocation work. When Federal participation is requested, the agreement shall incorporate this regulation by reference and designate the method to be used for performing the work (by contract or force account) and for developing relocation costs. The method proposed by the utility for developing relocation costs must be acceptable to both the TD and the FHWA. The preferred method for the development of relocation costs by a utility is on the basis of actual direct and related indirect costs accumulated in accordance with a work order accounting procedure prescribed by the applicable Federal or State regulatory body.

(c) The agreement shall be supported by plans, specifications when required, and itemized cost estimates of the work agreed upon, including appropriate credits to the project, and shall be sufficiently informative and complete to provide the TD and the FHWA with a clear description of the work required.

(g) (3) The FHWA has reviewed and approved the plans, estimates, and proposed or executed agreements for the utility work and is furnished a schedule for accomplishing the work.

Critical Components:

§635.301 Purpose.

To prescribe the policies and procedures under which a State transportation department may be authorized to advance a Federal-aid highway project to the physical construction stage.

§635.307(a) Coordination

(a) The right-of-way clearance, utility, and railroad work are to be so coordinated with the physical construction that no unnecessary delay or cost for the physical construction will occur.

§635.309 Authorization.

Authorization to advertise the physical construction for bids or to proceed with force account construction thereof shall normally be issued as soon as, but not until, all of the following conditions have been met:

(a) The plans, specifications, and estimates (PS&E) therefor have been approved.

(b) A statement is received from the State, either separately or combined with the information required by §635.309(c), that either all right-of-way clearance, utility, and railroad work has been completed or that all necessary arrangements have been made for it to be undertaken and completed as required for proper coordination with the physical construction schedules. Where it is determined that the completion of such work in advance of the highway construction is not feasible or practical due to economy, special operational problems and the like, there shall be appropriate notification provided in the bid proposals identifying the right-of-way clearance, utility, and railroad work which is to be underway concurrently with the highway construction.

Title 2 CFR 200 Subparts D and E.

Subpart E, §200.403 Factors affecting allowability of costs.

Except where otherwise authorized by statute, costs must meet the following general criteria in order to be allowable under Federal awards:

(a) Be necessary and reasonable for the performance of the Federal award and be allocable thereto under these principles.

(b) Conform to any limitations or exclusions set forth in these principles or in the Federal award as to types or amount of cost items.

(c) Be consistent with policies and procedures that apply uniformly to both federally-financed and other activities of the non-Federal entity.

(d) Be accorded consistent treatment. A cost may not be assigned to a Federal award as a direct cost if any other cost incurred for the same purpose in like circumstances has been allocated to the Federal award as an indirect cost.

(e) Be determined in accordance with generally accepted accounting principles (GAAP), except, for state and local governments and Indian tribes only, as otherwise provided for in this part.

(f) Not be included as a cost or used to meet cost sharing or matching requirements of any other federally-financed program in either the current or a prior period. See also §200.306 Cost sharing or matching paragraph (b).

(g) Be adequately documented. See also §200.300 Statutory and national policy requirements through 200.309 Period of performance of this part.

Appendix 5: Utility Agreement Review Checklist

Title: National Utility Program Review: Preconstruction Relocation Coordination Process

Purpose: To serve as a checklist and to capture review comments of each State DOT Utility Agreement review. It is intended that at the conclusion of this phase of the review, these reports will assist the team in identifying trends and best practices at a national level.

Process: Each division submitted at least one utility agreement from a specified random list of projects. The DOTs were divided amongst the review team members where each member had a representative list of DOTs to review (i.e. large, small, north, south, east and west).

Reviewer: _____Date: _____

State: _____
Federal-aid (FA)/Non Federal-aid (NFA): _____

Utility Relocation Plans

Are existing utilities shown on the plans?

_____
_____

Is the location of the proposed utilities clearly shown on the plans?

_____
_____

Are other existing utility lines in the vicinity shown on the plans?

_____
_____

In the reviewer's opinion do the relocations plans sufficiently communicate the required work to the contractor?

_____
_____
_____

Is there evidence that an agency representative reviewed the plans?

_____
_____

Estimate of Work (Note: an estimate of work is not required for NFA projects)

Is the labor, materials and equipment broken down in sufficient detail to allow a determination of the reasonableness of the estimate?

_____

_____

Would an inspector be able to measure the quantities in the field in accordance with the estimate?

_____

_____

Is there evidence that someone reviewed the estimate and determined that it was reasonable?

_____

_____

Schedule

Does the utility agreement provide reasonable notification requirements for the contractor? (Provide requirements)

_____

_____

_____

Does the utility agreement provide a reasonable duration of when the work will be accomplished?

_____

_____

If there are multiple phases or locations where work is to be accomplished, does the schedule provide separate durations for each phase or location?

_____

_____

With the information provided, could a contractor reasonable schedule their work around the utility work to be completed?

_____

_____

Reviewers Notes

Overall findings:

_____

_____

Best Practices:

_____

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