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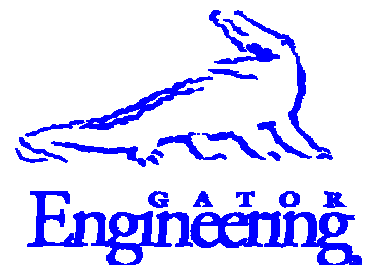
**Development of Improved Strategies for Avoiding Utility Related
Delays During
FDOT Highway Construction Projects**

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16. Abstract Utility delays remain a frequent cause of transportation construction project delays. This study investigates the root causes of those delays. The technical and contractual work processes were reviewed and analyzed. A review of industry practices was performed and best practices were identified. Strategies to avoid utility related delays were developed and implementation steps were suggested.			
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**The opinions, findings and conclusions
expressed in this publication are those of
the authors and not necessarily those of the
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CHAPTER ONE: INTRODUCTION AND PROBLEM STATEMENT

Introduction

As transportation, communication and utility networks continue to grow in complexity and size, the likelihood of two or more networks occupying a common right-of-way or intersecting each other also continues to increase. Conflicts arise when one network or another decides to perform construction or maintenance on their facility. Every year, Department of Transportations (DOTs) and the various County Road Departments in the United States spend millions of dollars on problems that arise due to utility conflicts. Historically, the problems that arise are varied and numerous. Each DOT and County has devised its own approach to mitigating the effects of utility conflicts, but it is still a leading cause of construction delays and cost overrun.

Problem Statement

On a substantial portion of Florida Department of Transportation construction projects many disputes and problems evolve concerning utilities. Often, delays occur due to utility relocation and conflicts arise from confusion with location of utilities and responsibility between the contractor and the utility company.

There have been numerous research projects that have made extensive efforts to solve these problems, however, the majority of these solutions have been vague and impractical. This research project, using a unique approach, sought to develop solutions that are practical and can be integrated into real construction projects.

CHAPTER TWO: LITERATURE REVIEW

Literature Review and Current Practice Assessment

Overview

The literature review for this project includes the examination of periodicals, technical reports, published and unpublished articles and studies. The review focused on: impacts of utility conflicts, the reasons most commonly identified by state DOTs for utility delays, the utility view, the methods being used to avoid/mitigate utility delays, an examination of the various technological tools being used to ameliorate the problem and AASHTO guidelines and best practices for handling utilities. In addition, the input of each State DOT was solicited with regards to their approach to solve the common utility problem.

Impacts of Utility Conflicts

In spite of past efforts, utility conflicts remain a leading cause of construction delays and cost growth. This is true both for the FDOT and nationally within other State DOTs. A recent survey of DOTs conducted by Dr. Ralph Ellis and Dr. Randolph Thomas as a part of NCHRP 2-24(12), an AASHTO sponsored national study, found that the top five causes of construction delays were:

1. Utility Relocation Delays
2. Utility (Differing Site Conditions) Delays
3. Permitting Issues
4. Weather Delays
5. Errors in Plans and Specifications

The Florida Department of Transportation also experiences similar problems with regard to utilities. Utility problems account for a significant number of FDOT's supplemental agreements, which add additional cost and time to projects. Even when project personnel are able to resolve the utility conflicts at the project level, much key management and supervisory time is consumed in the process. The resolution of utility issues consumes a great deal of the time of contractor, utility and FDOT personnel. This is time that could be better spent on improving project quality and on delivering the project on time and on budget.

Ellis and Thomas found that utility problems on construction projects generally fall within three broad categories:

1. Actual locations or type of utilities that do not agree with the information contained in plans and specification.
2. Required relocations of utilities are not completed when required by the project schedule.
3. Conflicts concerning contractor and utility company personnel and shared responsibilities for utility location, protection, and relocation.

According to the NCHRP 2-24(12) study, what is needed is a comprehensive strategy for managing utility issues beginning with design and continuing throughout the construction process. This strategy must address the responsibilities and contributions of all project participants.

Reasons Most Commonly Identified by DOTs for Utility Delays

Many design and construction projects are located on sites that have an abundance of underground utilities. These sites include metropolitan areas, airports, process plants highways and bridges. These existing utilities create problems for the project owner, designer, contractor and utility companies, because it is their responsibility to work through the conflict without causing undue delays, service interruptions or escalated costs. Many reasons have been identified for the utility delay problem, however, one of the fundamental problems is that there is

usually no accurate data on the exact location, or sometimes even the existence of these buried features.

In a report published by the General Accounting Office (GAO) – Impacts of Utility Relocation on Highway and Bridge Projects, June 1999 – state DOTs identified several reasons for delays caused by utility relocations, but these reasons were more or less interrelated. For example, one of the most popular reasons cited by the various state DOTs for project delay, was the short time frame for them to plan and design projects. This short time frame can potentially affect all subsequent aspects of the project, including dealing with utility conflicts. Specifically, it affects the relocation effort by reducing the amount of time available to utility companies to acquire needed right of way for the relocation. If utilities cannot relocate their facilities because they do not have the right of way for the new location, delays in obtaining these rights of ways, can in turn, impede the relocation process. **Table 1** shows the reasons most frequently identified by state DOTs for utility delays, and lists them according to the number of states that considered them to be a moderate or major reason for delays.

TABLE 1: Reasons Identified by States for Delays in Relocating Utilities

Reason for Delay	Number of States
Utility lacked resources (financial and personnel)	34
Short time frame for states to plan and design project	33
Utilities gave low priority to relocations	28
Increased workload on utility relocation crews, because highway/bridge construction has increased	28
Delays in starting utility relocation work: some utilities would not start until construction contract was advertised or let	28
Phasing of construction and utility relocation work out of sequence	26
Inaccurate locating and marking of existing utility facilities	23
Delays in obtaining rights of way for utility	23
Shortages of labor and equipment for contractor	19
Project design changes required changes to utility relocation	19

Utilities were slow in responding to contractor's requests to locate and mark underground utilities	16
Inadequate coordination or sequencing among utilities using common poles/ducts	13

Source: States responses to GAO's questionnaire

Utility relocations can be very complicated because in addition to the DOT personnel, the contractor, and the designer, more than one utility company might be involved on the same project. An ideal case for the contractor would be that all utility relocation be completed before the beginning of the construction phase.

The Utilities View

At the Eighth National Highway/Utility Conference, held April 2000, Arlene Brown, Utility Coordinator for Tampa Electric Company, attempted to answer the question: "Why does it take a utility company so long to relocate its structures?"

Brown identified several factors that influence the utility relocation effort, and then categorized these factors into internal and external influences. She stated that utility companies more often than not deal with internal issues that impact the area immediately surrounding the relocation activity. These issues include: new customer demands, maintenance issues, service upgrades and system improvements, all of which could potentially extend the relocation time.

In addition to the internal factors mentioned above, a utility company that is required to relocate its structure may have to coordinate with other utility agencies within the same proximity and governmental entities. A combination of any number of these factors can significantly stretch a company's resources thin, thereby increasing their reaction time to relocation requests.

In a subsequent interview on January 15th, 2002, Brown added that utility companies usually adhere to established codes regarding depth coverage and clearance requirements whenever they relocate a utility structure. However, when construction of the project is executed after the

relocation activity, the contractor must meet his own cut-and-fill requirements at the same site, which often conflicts with that of the utility company. This leads to either changes in sub-surface structures coverage or clearances (as in the case of utility poles). Therefore companies sometimes delay their relocation effort until they have coordinated with the contractor and established a consensus of what exactly is to be done.

Methods Used to Avoid/Mitigate Utility Delays

A recent GAO survey indicated that several methods are currently being used by the various state DOTs to mitigate the delays caused by relocating utilities. These methods include monetary incentives, monetary penalties, the courts, special contracting methods and early planning and coordination. A summary of these methods is included below.

Monetary Incentives

The survey indicated that three states have attempted to use monetary incentives to encourage utility companies to complete utility relocations on federal-aid highway and bridge projects. However, these incentives were not contingent on the timely completion of the relocation work.

Monetary Penalties

Seven states responded that they had assessed monetary penalties against utilities that failed to complete utility relocations on federal-aid highway and bridge projects in a timely manner. These states either charged the utilities for the costs that the states incurred or for contractor claims paid as a result of delays in relocating utilities.

Use of the Courts

The courts are seldom used to discipline utility companies for untimely utility relocations. Only two states reported using the courts over the past 2 years. Kentucky responded that it had used the courts very infrequently, and Texas responded that it had used the courts on only one occasion.

Special Contracting Methods

One way of reducing conflicts between construction work and relocation work is to include the relocation work in the construction contracts; thus, giving the construction contractor more control over all the work. Fifteen states - Alabama, Alaska, Colorado, Delaware, Georgia, Kentucky, Louisiana, Maine, Maryland, Missouri, Montana, New Hampshire, North Carolina, Ohio, and South Carolina - have included utility relocation work, such as that for water and sewer lines, directly in construction contracts for certain projects.

Another contracting method used by nine states - Louisiana, Maine, Maryland, Mississippi, Missouri, North Carolina, Ohio, Oregon, and Rhode Island - is to separately contract the site clearing and preparation work and allow utility companies the time to relocate their lines and facilities before the state advertises the highway construction project. However, such a phased approach generally tends to extend the length of the project. In addition, some utility companies are usually reluctant to relocate utilities too soon (e.g., before a construction project starts) because of the possibility of subsequent project redesigns and the need for them to come back and redo what they have already done.

Partnering is yet another mitigation method used by 11 states - Alaska, Connecticut, Delaware, Indiana, Kansas, Kentucky, Maine, Massachusetts, Michigan, Nebraska, and Texas. This method, which is advocated by at least one national contractor association, seeks to remove the adversarial relationships that sometimes exist between states, contractors, and utility companies and replace them with business relationships that are based on common goals and a desire to

work productively together. According to the Contractor's Association, partnering does not change nor release any of the contractual requirements but helps all parties recognize that a basic tenet of contract law is to act in good faith. A Massachusetts highway official explained that partnering has been used on large projects. State, contractor, and utility company officials involved in the project meet weekly or biweekly to discuss all issues and resolve problems. This official said that partnering helps improve communications and reduce delays but that it does not resolve all delay problems. He explained that when conflicting demands for a utility company's resources arise, relocating utilities might receive a lower priority by the utility company because it entails expending resources as opposed to doing something that generates income.

Early Planning and Coordination

Forty-one states responded that they used early planning and coordination methods to help avoid or reduce delays in relocating utilities and their impacts on highway and bridge projects. For example, various states were:

1. Providing much earlier notices of upcoming projects (in some instances 5-years);
2. Inviting utility companies to meetings early in the design phase of a project;
3. Holding monthly, quarterly, or other periodic planning/ coordination meetings;
4. Providing advanced right of ways and utility relocation funding before the highway and/or bridge construction work was funded; and
5. Improving coordination efforts and working relationships.

Illustrative of some of the actions being taken by states to deal with utility relocation concerns, the Texas Department of Transportation recently developed and adopted what it calls its Utility Cooperative Management Process. This process was put together as a means of discovering and incorporating utilities' concerns into the planning, design, acquisition, and construction phases of project development. Texas recognized, as have many other states, that early coordination provides a more efficient highway design, economical utility relocation, and reduced construction costs. Texas's goal is to (1) accommodate utilities during the planning and design

phase and (2) when utility adjustments are necessary, implement an adjustment plan that is compatible with the state's established contract award scheduling and construction sequencing.

Use of Available Technology

The various states have identified and used preferred technologies to locate and map utilities during the design process in order to expedite utility relocation. Some of these methods include: computer-aided design and drafting (CADD), vacuum extraction, geographic information/global positioning systems and subsurface utility engineering (SUE).

Computer-Aided Design and Drafting (CADD) Systems

CADD systems use computer graphics technologies to design and map construction projects and presents an expedient way to consolidate many different design aspects, such as right of way maps, into a common database, or base map. About eighty-four percent (84%) of the respondents to a GAO questionnaire said that they had used CADD on more than half of their projects.

Vacuum Extraction

This is a nondestructive method of removing dirt and debris at critical points along a subsurface utility's path in order to determine the exact horizontal and vertical position of buried utilities. Generally, soil and other debris are sucked out of the pothole using a truck mounted vacuum unit. It involves physically uncovering the utility using a small hole (measuring about 20 x 20 cm at the top), thus allowing the utility to be accurately surveyed and providing information on its type, size, material, and condition. Seven states reported using this procedure on more than half of their projects.

Geographic Information/Global Positioning Systems

Geographic information systems (GIS) use software and hardware to develop an information

database using coordinates of various land features and mapping techniques. GIS represent a newer method of providing ground control points for mapping purposes by monitoring satellite signals. Receivers on the ground pick up the satellite information, which is then transferred to an attached computer. Using the GIS tools and network analysis, the application is capable of determining overlapping projects and finding optimal paths for routing utilities. Fifteen states reported they had used these systems on more than half of their projects.

Subsurface Utility Engineering (SUE)

SUE can be defined as the integration of new site characterization and data processing technologies that allows for the cost-effective collection, depiction and management of existing utility information during the early development of a construction project. The technologies used encompass surface geophysics, surveying and mapping techniques, vacuum extraction, CADD and GIS systems.

Information gathered in the use of SUE is generally grouped into four quality levels:

1. Quality Level A (QL A) – three-dimensional information
2. Quality Level B (QL B) – two-dimensional information
3. Quality Level C (QL C) – topographic information
4. Quality Level D (QL D) – basic data derived from record drawings

The practice of Subsurface Utility Engineering then manages the risks associated with subsurface utilities by giving project designers the opportunity to redesign the project to avoid conflicts, using proper utility coordination techniques, performing utility relocation design, communicating the utility information to concerned parties and providing utility relocation cost estimates.

This is the method of choice for the Federal Highway Administration (FHWA). So-Deep Inc. and the Virginia Department of Transportation developed this method of identifying and avoiding buried utilities in the early 1980's. SUE has been marketed and popularized by the

FHWA since then, and federal financial aid is currently available for reimbursement to state DOTs for using it. The following are case studies that have been identified by the FHWA with regards to the benefits of using SUE.

1. On a major highway project in Richmond, the Virginia DOT's consultant dug 156 test holes at locations where it was thought highway utility conflicts were possible. Using the data obtained, VDOT's roadway and hydraulics designers determined that conflicts would occur at 75 of the sites. As a result, design changes were made and 61 of the potential conflicts were eliminated. By making these changes, \$731,425 worth of utility adjustments were avoided; whereas, the cost of digging the test holes was only \$93,553, resulting in a savings of \$637,872.
2. The Virginia DOT credits SUE with helping to reduce the time needed to design highways from 5 years to 4 years, a 20% reduction in time.
3. On a utility project in Columbus, Ohio, the Columbus Southern Power Company designed and installed almost 2 km of underground 138 kV electric line through the downtown area at lower cost, reduced risk, and ahead of schedule by including SUE in its design. The increased quality of the utility information presented at the pre-bid meeting increased the bidder's confidence in the construction plans, resulting in a bid, which was \$400,000 less than anticipated. The cost of SUE was less than \$100,000. Additionally, there were no change orders as a result of utilities not correctly depicted on the plans, no utility relocations, no utility damages on the project, and no contractor claims.
4. On a highway project in Maryland involving realignment and widening from 2 to 6 lanes, the use of SUE enabled the Maryland State Highway Administration (MSHA) to redesign the hydraulics system to minimize conflicts with utilities. Instead of impacting about 5,000 feet of each utility (gas, water, and sanitary), conflicts were reduced to about 400 feet of each. The cost for SUE was \$56,000. Cost savings to MSHA and the utilities amounted to \$1,340,000.

5. On another project in Maryland, involving widening an interstate highway from 4 to 6 lanes with full shoulders, retaining walls, and barriers, the use of SUE enabled MSHA to redesign the barriers and change the grading and ditches to minimize conflicts with utilities (gas, water, and telephone). The cost for SUE was \$5,000. Cost savings to MSHA and the utilities amounted to \$300,000, and the relocation time was reduced by 4-6 months.
6. SUE was used on a highway project in North Carolina to locate a PVC water line along 18 miles of NC 168 in Currituck County. Location of the line was critical to determine conflicts with proposed pavement widening and shoulder excavation work. Using vacuum excavation, 40 holes were dug at a cost of less than \$10,000. Using the resulting Quality Level "A" information, it was determined that approximately 21,280 feet of the water line could remain in place. This saved NCDOT an estimated \$500,000.
7. On another project in North Carolina, SUE was used early in the development of a project on the Southwest Loop Extension in Lenoir to identify utilities that needed to be relocated. Its use resulted in 16 storm drain boxes being changed to eliminate utility conflicts and in the assurance that 9 other storm drain boxes would not conflict with existing utilities. It was also used to accurately locate underground storage tanks.
8. Florida DOT analyzed the use of SUE on major projects in Tallahassee and Miami and found that it saved \$3 in contractor construction delay claims for every \$1 spent for subsurface utility engineering.
9. Fairfax County in Virginia started using SUE in 1980 in an effort to reduce construction expenses caused by unexpected utility hits, redesign costs, and contractor claims. Utilizing SUE during the design of projects has dramatically reduced the extent of the problems.

In a report conducted by Purdue University entitled Cost Savings on Highway Projects Utilizing Subsurface Utility Engineering, December 1999, a study of seventy-one (71) projects with a

combined construction value in excess of \$1 billion indicated a total of \$4.62 in savings for every \$1.00 spent on SUE. Qualitative savings were not measured, but it is clear that those savings were significant and may be many times more valuable than the quantifiable savings.

The figure of \$4.62 in savings for every \$1.00 spent on SUE found by Purdue University is somewhat less than the \$7.00 to \$1.00 (previous Virginia DOT study), \$18.00 to \$1.00 (previous Maryland SHA study), and \$10.00 to \$1.00 (Society of American Value Engineers) returns on investment that were previously reported. However, the number of projects that were focused on in this study was a lot more than any previous study, and more over, they were randomly selected.

At the 2001 National Highway/Utility Conference held in Cleveland Ohio, Nick Zimbillas of the Tampa Bay Engineering Group, Inc. reported that much of the SUE data collected is effectively “lost” in project files after its intended initial use. He advocates archiving and transferring the information into a common database as the next logical step, in order to facilitate future design efforts.

AASHTO’S Guidelines and Best Practices for Handling Utilities

The AASHTO subcommittee on Right of Way and Utilities prepared a report – Utilities Guidelines and Best Practices, January 2000 - that outlines their four guidelines and best practices for handling utilities. The report was prepared for the US Department of Transportation and the Federal Highway Administration. Below is a summary of their recommendations.

1. Use current available technology to the greatest extent possible.
 - A. Use Subsurface Utility Engineering (SUE) for projects where underground utilities are present and high quality levels of information are needed for design purposes.

- B. Require utility company certification of record drawings and encourage development of a CADD database system and electronic transfer system.
- 2. Encourage frequent coordination and communication with local government agencies to reduce delivery time, reduce costs, and improve quality in the utilities process.
 - A. Work with local governmental jurisdictions to establish pavement cutting criteria and backfill requirements.
- 3. Encourage frequent coordination and communication with utility companies to reduce delivery time, reduce costs, and improve quality in the utilities process.
 - A. Provide utility companies with long-range highway construction schedules.
 - B. Host meetings with utility companies to discuss future highway projects.
 - C. Recognize the importance of long-range highway/utility coordination.
 - D. Organize periodic (monthly, quarterly, annual) meetings with utility owners within municipality, county, or geographic or highway planning region.
 - E. Solicit similar information on utility owners' capital construction programs, particularly where a utility's planned expansion or reconstruction may encroach on or coincide with a planned highway project.
 - F. Consider using the long range-planning meeting as a convenient forum to discuss other highway/utility issues, such as accommodation policies, reimbursement, etc.
 - G. Provide utility companies with a notice of proposed highway improvements and preliminary plans as early in the development of highway projects as possible.
 - H. Involve utility companies in the design phase of highway projects where major relocations are anticipated.
 - I. Conduct on-site utility meetings or utility plan-in-hands with utility companies to determine utility conflicts and resolution.
 - J. Participate in local one-call notification programs to the maximum extent practicable per state law.

- K. Invite utility companies to pre-construction meetings and encourage or require utility companies, contractors, and project staff to hold regular meetings, as deemed appropriate, during the construction phase of a project.
4. Improve contract, internal project development and training processes to expedite utility relocation.
- A. Use standardized utility agreements.
 - B. Initiate separate contracts for advance roadway work on selected projects prior to utility relocation.
 - C. Set forth responsibilities for appropriate action to reduce delays to contractors.
 - D. Provide utility special provision language in the construction contract
 - E. Avoid late plan changes.
 - F. Have highway contractors relocate utility and municipal facilities, when possible.
 - G. Acquire sufficient right-of-way for utilities purposes.
 - H. Provide training to Department of Transportation utility staff and utility companies staff.

ASCE's Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data

ASCE's National Consensus Standard entitled "*Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data*" was made available to the public in 2002. The standard was developed to provide a system of classifying the quality of existing subsurface utility data. The standard closely follows the concepts already used by SUE professionals and basically contain provisions such that:

1. The project owner will be responsible for taking appropriate actions to consider and deal with utility risks. On many small projects, where few subsurface utilities are present, and/or where information about subsurface utilities is believed to be generally accurate and comprehensive, this will only involve making a conscious decision to proceed with

the project using readily available information. On larger projects, where information about subsurface utilities is not believed to be generally accurate and comprehensive, this may involve employing the services of an engineer to provide expert advice and to use available technologies to provide better information.

2. The engineer will advise the project owner of utility risks and recommend an appropriate quality level of utility data for a given project area at the appropriate time within the project planning and design process. Such advice will take into account such items as type of project, expected utilities, available rights-of-way, project timetables, and so forth.
3. The project owner will specify to the engineer the desired quality level of utility data.
4. The engineer will furnish the desired utility quality level to the owner in accordance with the standard of care.
5. The engineer would be responsible for negligent errors and/or omissions in the utility data for the certified utility quality level.

Many nationally recognized organizations such as the National Transportation Safety Board, the National Research Council and the FHWA are supporting the implementation of these standard guidelines, and it is not expected that there will be substantial opposition to them.

CHAPTER THREE: RESEARCH APPROACH

Objectives of This Research Study

This report provides improved strategies for avoiding utility related-delays during Florida Department of Transportation (FDOT) highway construction projects. It is part of a larger study being conducted by the University of Florida Civil Engineering Department, regarding the management of utilities during FDOT construction projects.

This report takes an in-depth look at how the FDOT, other Departments of Transportation around the United States and the sixty-seven (67) Counties in Florida handle the problem of utility conflicts. It also examines the various technological tools being used to help offset the problem and Federal Highway Administration's (FHWA) recommendations for dealing with it. As well, a section is included that explains the processes of the Design-Build delivery system and how it has been regarded by contractors, utility companies and the FDOT.

Research Approach

General Considerations

This is a complicated issue involving many different project participants such as:

- FDOT Utility Engineers
- FDOT Project Engineers
- Design Consultants
- Sub-surface Engineering Consultants
- Construction Contractor
- Utility Companies

Past efforts in developing solutions have been only partially successful. Good practical solutions are only possible with input from all the major project participants and must consider all aspects of the project delivery process including design, relocation activities and construction. Therefore, the implemented format for this research involved establishing an Advisory Committee with at least one member from each of the above different participants. The Advisory Committee is a working group, which provides experienced input into the research process. The Advisory Committee assisted in identification of the sources of problems and development of solutions. Additionally, the research team worked closely with the Florida Utility Coordinating Committee and sought input from the committee during each step of the research. The organization of the research team is given in the following figure.

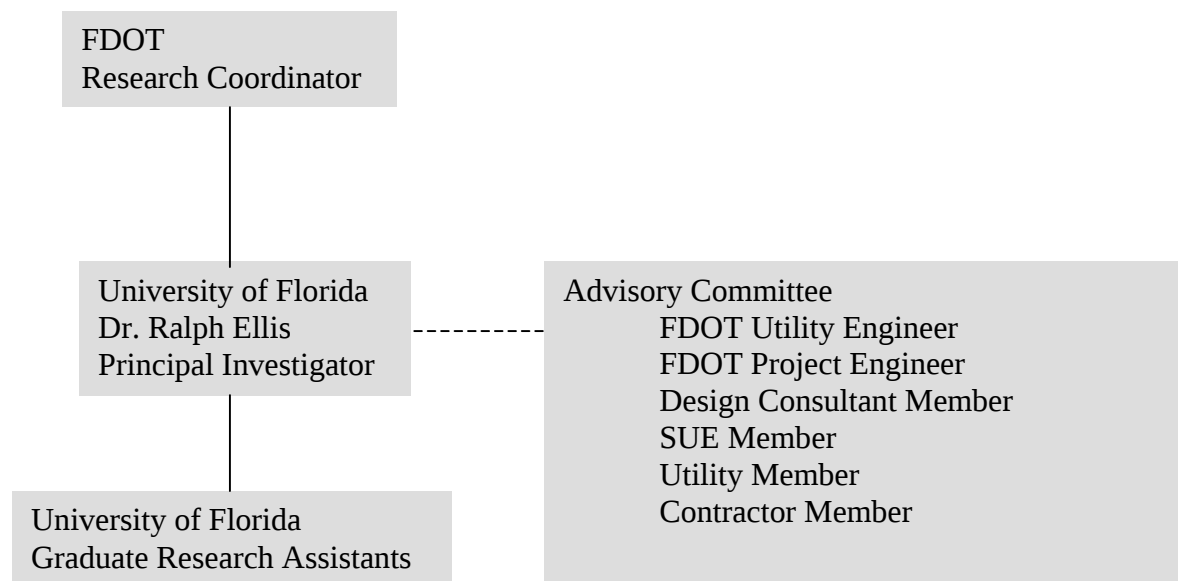


FIGURE 1: Research Team Organization

Research Activities

Work on this research project included the following tasks:

Task One: Establish Advisory Group

The industry advisory Group was formed. Individual members were recruited from the various project participant groups. The research team coordinated member selection with the FDOT research coordinator and with the Florida Utility Coordinating Committee.

Task Two: Literature Review and Industry Information

A narrowly focused literature search was conducted to seek recent reported experiences and research results with the subject of avoiding utility delays. In particular, input was solicited from each State Highway Agency with regard to innovative solutions to common utility problems.

Task Three: Assessment of the Current Situation

The research team visited FDOT projects in several districts. Through observation and discussions with experienced FDOT project personnel, FDOT Utility Engineers and contractor personnel, the research team developed an understanding of current procedures and the most common utility problems. The results of this task were documented. A clear definition of the current process for managing utility location and relocations was prepared. A categorical listing of current utility problems effecting construction was developed.

Task Four: Determining the Root Causes of the Problems Identified in Task Three

Past attempts to solve utility problems have not been totally successful largely because the solutions have focused on the apparent cause of the problem and not on the true root cause of the problem. This research first sought to identify the root causes of utility related problems, which occur during construction. Using the information obtained from investigations conducted in task three, the research team identified the root causes. This process utilized the input received from FDOT project participants and the experience of the Advisory Group.

Task Five: Development of Candidate Strategies

Candidate strategies were developed by the research team for dealing with the root causes of the utility problems. The FDOT's overall mission and project delivery goals were considered when developing strategies for specific utility problems. The Advisory Group served to provide industry input into the solution development process. Practical strategies, which can be implemented, were also sought.

Task Six: Development of an Implementation Plan

The research team, working with the FDOT and the Advisory Group, developed an implementation plan addressing all of the strategies from Task Five. The implementation plan was developed in sufficient detail to allow FDOT managers to make appropriate adjustments to operating procedures and processes. Recommendations for changes to specifications, procedures and contracting practices have been presented. Additionally training and information transfer considerations will be taken into account.

Task Seven: Preparation and Submission of a Final Report

A Final Report will be submitted providing comprehensive documentation of the research activities and findings, and present a plan for implementation.

CHAPTER FOUR: ANALYSIS OF HOW FDOT HANDLES UTILITY CONFLICTS

Introduction

Each highway agency has adopted its own approach to handling the utility conflict problem. Here, we take an in depth look at the FDOT project organizational structure, its limitations and the methods adopted by the Department to handle utility issues. The survey results - of how the other State DOTs and the sixty-seven (67) Counties within Florida – are discussed as well as some of the most common utility problems encountered by the FDOT. As a fairly new concept within the FDOT, the Design-Build delivery method will be introduced in this chapter. Specifically, the section will focus on how the Design-Build method has worked thus far for the FDOT, and how the method can be improved with respect to utility relocation and delays.

FDOT Project Organizational Structure

In order to fully understand the problems faced by the FDOT with respect to utility delays, one needs to first understand its typical project organizational structure. Under Florida Statutes 337.401 – see Appendix A - utility companies that require the use of public rights of way are required to obtain a permit from the department and local governmental agencies that have jurisdiction and control of public roads in that area. This is usually the County Road Department or the FDOT. This agency has also been given authority by Florida Statutes 337.401 to maintain the highway right of way corridors under its jurisdiction and to preserve the operational safety, integrity and function of the highway.

The problem arises when the FDOT or a County Road Department hires a construction contractor to do work on one of its roads. Often these road improvements require the use of the

right of way occupied by utility companies. In this situation, neither the FDOT nor construction contractor has a contract with the utility company, therefore none of them has any leverage that can be used to expedite the utility relocation.

Florida Statutes 337.403 – see Appendix B - states that a utility company should obey a written request from the authorized state agency to relocate its facilities within the right of way of a public road no later than thirty days of receiving the notice. If the utility company fails to relocate its facility within the stipulated time, the agency has the authority to perform the relocation work and then recover the costs from the utility company. Within these thirty days, the utility company has the opportunity to appeal the request to relocate. This appeal can delay the roadway contractor and extend the original contract duration. **Figure 2** below shows the typical FDOT design-bid-build project organizational structure.

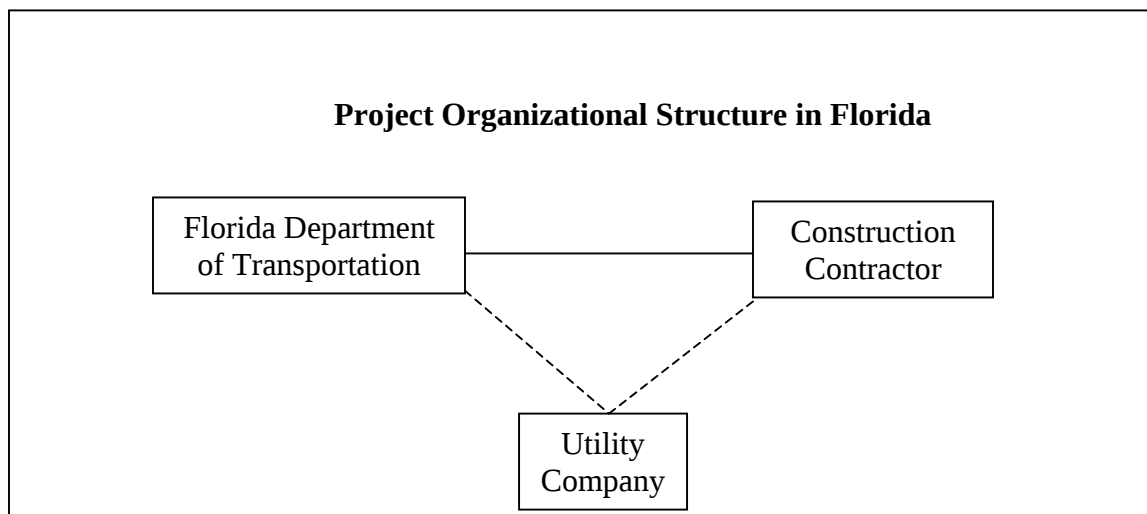


FIGURE 2: Typical FDOT Design-Bid-Build Project Organizational Structure

The solid line represents the contractual relationship between the FDOT and the construction contractor, while the dashed line shows the utility company that has been granted permission to use the right of way, but has no contractual obligation with either party to move when asked.

One issue that should not be ignored is that it requires scarce resources to relocate utility facilities, and since there is no contractual obligation that forces the utility company to move their facilities on time to fit the project schedule, they often prefer to utilize these scarce resources elsewhere to retain existing clients, attract new clients and earn profits.

This complicated situation has lead the FDOT and some County Road Departments to believe that it is in their best interest to take the responsibility of coordinating the utility relocation. The FDOT has implemented a Utility Engineering department that is responsible for smoothing out the relocation process. Typically, the FDOT uses three methods to coordinate utility relocations, and they are:

1. Direct Coordination – involves FDOT personnel scheduling and coordinating the relocation process with the utility companies and the construction contractor.
2. Utility Work by Highway Contractor Agreement – involves the inclusion of utility relocation work within an FDOT roadway construction contract. The utility company agrees to pay a negotiated sum for the highway construction contractor to construct and relocate their facilities.
3. Separating the project into three contracts:
 - a. Letting a clearing and grubbing contract
 - b. Instructing the utility company to relocate their facilities either by themselves or through another contractor
 - c. Issuing a “Notice to Proceed” to the roadway contractor of choice after “a” and “b” above are completed.

Utility Relocations Survey Results

The University of Florida has recently (Spring, 2002) conducted a survey as part of a study being performed for the FDOT regarding the management of utilities during construction. This survey sought to find out how the fifty state DOTs and Puerto Rico's DOT handle utility relocations during construction. An authoritative representative from each DOT was contacted and asked the following question: "Does your Department of Transportation require the construction contractor to be responsible for coordinating utility relocations during construction?"

Of the thirty-three (33) responses received, ten (10) DOTs responded "yes", twenty-four (25) DOTs responded "no", while eighteen (18) DOTs did not respond to the question. **Figure 3** below shows a chart of the DOTs' responses to the survey question.

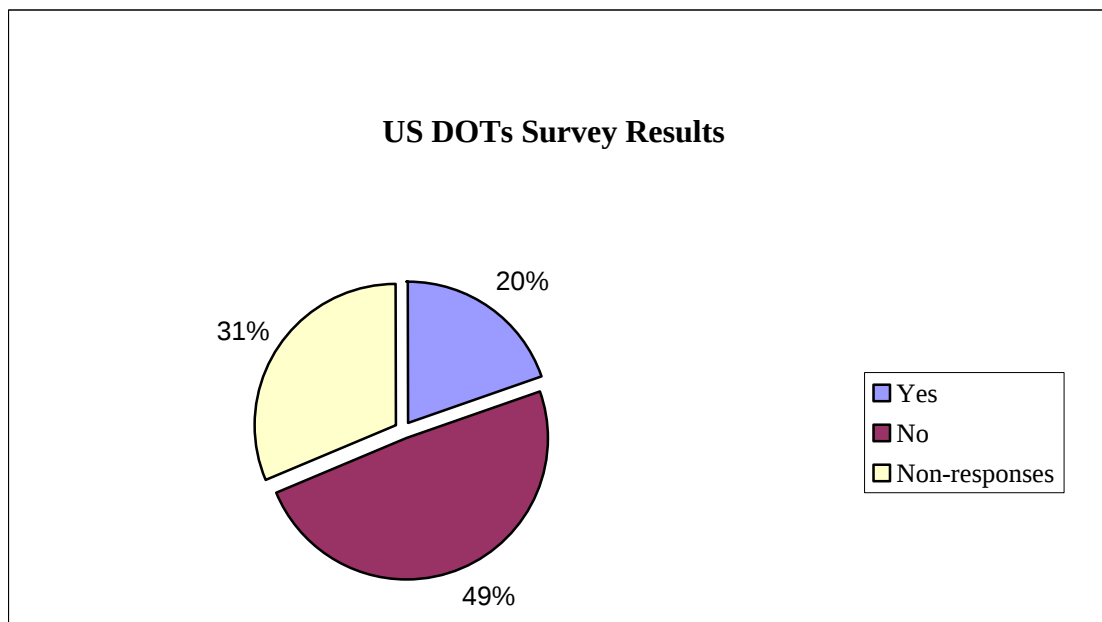


FIGURE 3: Survey Question: Does your DOT Require the Contractor to be Responsible for Coordinating Utility Relocations During Construction?

The results indicate that a minority number of state DOTs require the construction contractor to be responsible for coordinating utility relocations during construction, while most handle the situation similarly to the FDOT. The states that require the contractor to coordinate utility relocations during construction encounter one primary problem: the contractor has no authority to make the utility company relocate their facilities on time when asked. This sometimes causes significant utility-related delays that adversely affect project durations, which the DOTs address by granting excusable delays to the contractor. Examples of the specification language used by states that require the contractor to be responsible for coordinating utility relocations during construction is included in Appendices C and D.

A similar survey was done of the sixty-seven (67) counties in Florida to find out how they handle the issue of utility relocation during roadway construction. Of the fifty-eight (58) responses received, it was found that twenty-seven (27) counties require the contractor to be responsible for coordinating utility relocations during construction, while thirty (30) counties does not. A summary of this information is shown in **Figure 4** below.

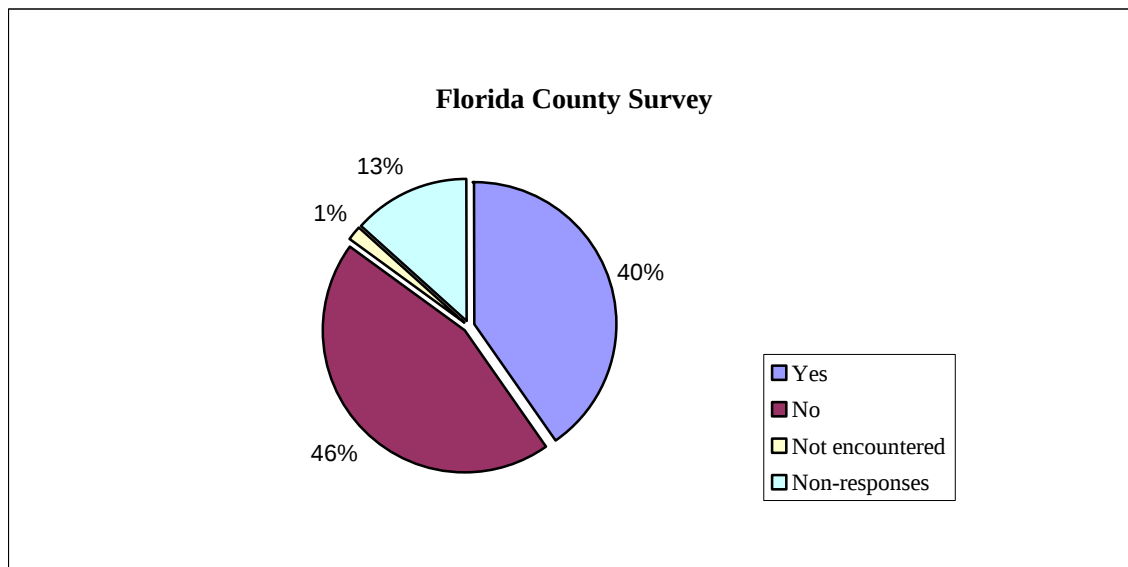


FIGURE 4: Survey Question: Does your County Require the Contractor to be Responsible for Coordinating Utility Relocations During Construction?

One county reported that they have not yet encountered utility conflicts in their right of way, while nine (9) counties were non-responsive to the survey. The counties that do not require the contractor to be responsible for coordinating utility relocations during construction reported that they used methods similar to those employed by FDOT - direct coordination, joint project agreements and separate contracts - to manage utility relocations. Examples of the specification language used by counties that require the contractor to be responsible for coordinating utility relocation during construction is included in Appendices E and F.

As part of its study on the management of utility relocation for the FDOT, the University of Florida's research team has analyzed cut-damage reports and supplemental agreements, generated between January 2000 and June 2002 for District II, in order to accurately determine the root causes of the utility problem faced by the state's DOT. A cut-damage report is a report that is generated after a utility facility is accidentally damaged during construction, while a supplemental agreement is a report that is generated as a result of "extra work" ordered by the state DOT, due to inaccurate information on the plans. This analysis revealed that in District II, the construction contractor was responsible for causing the accident seventy-seven percent (77%) of the time that a utility was damaged, the construction plans were inaccurate fifteen percent (15%) of the time and the utility company was at fault eight percent (8%) of the time. The reader should be reminded that the data used in the above analysis was collected by FDOT personnel, instead of an independent third party. The analysis also revealed that the contractor was delayed three out of every ten times (or 30% of the time) that an accident occurred.

General Utility Problems Encountered by FDOT

The nature of utility problems encountered by FDOT generally fall within three broad categories: the quality of location information, the availability of resources for relocation and coordinating and scheduling relocations between contractors and utility companies.

The Quality of Location Information

The quality of location information found on FDOT plans is often inaccurate with respect to the exact location, or sometimes even the existence of buried utility features. This inaccuracy can be attributed to the fact that the information is usually retrieved from out-dated record drawings and limited site surveys. This has led to roadway contractors being very skeptical of the utility information shown on FDOT construction plans. Before a contractor begins work in a particular area, it is their responsibility to contact Florida One Call utility locators. This is a service provided by the utility companies in Florida, that uses record drawings and surveying techniques to locate buried utility facilities within four feet. From this point on, the specifications require the contractor to use the information provided by Florida One Call and the construction plans to find the exact location of the buried facility. If that is still not possible, a “soft dig” is recommended. These requirements are frequently ignored, and the result is often broken utility facilities.

The Availability of Resources

There are insufficient resources available to utility companies that can be used for facility relocations. In addition to relocating their facilities, utilities have to also deal with other issues that might be affected as a result of the move. Some of these issues are: new customer demands, maintenance issues, service upgrades, system improvements, and coordinating with other utility agencies and governmental entities within the same proximity. A combination of any number of these factors can significantly stretch a company’s resources thin, thereby increasing their reaction time to relocation requests.

Coordinating and Scheduling

When FDOT assumes the responsibility of coordinating the utility relocations on its roadway projects, it constantly faces two main problems:

1. Unfamiliarity with the contractor's schedule, which changes weekly and is often not properly updated to show changes, and
2. Unfamiliarity with the technology involved in relocating utilities facilities.

This leaves them straddled between the contractor and the utility company, trying to coordinate two entities that they do not completely understand. **Figure 5** below shows a graphic representation of the situation.

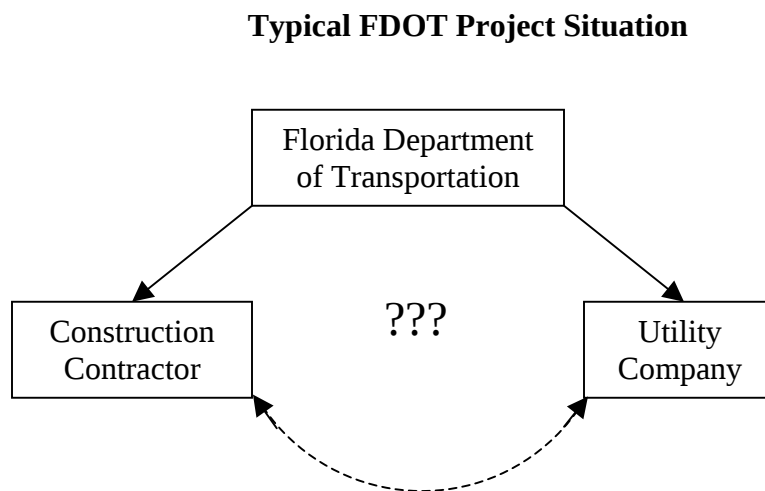


FIGURE 5: Attempts by the FDOT to coordinate utility relocation between contractor and utility

The above situation often results in a chain of events that starts with frustration of the three organizations with each other, which leads to mistrust, adversarial relationships, and eventually utility-related construction delays.

The Process of Utility Relocation in Design-Build Contracts

Introduction

This section will give the reader an insight into how the FDOT is using Design-Build contracting to reduce delays caused by utility relocation by improving coordination and communication between all parties involved in the construction project. Three important questions concerning the FDOT and Design-Build contracting will be answered; what is design-build contracting, how has the FDOT implemented the method, and how has it worked thus far with respect to utility relocation. To answer the last question, three interviews were conducted with specific contractors and FDOT personnel who have worked or are currently working on FDOT design-build projects. These interviews will be summarized in this section and included as Appendices G, H and I.

Design-Build Defined

Although it has been around for centuries, the Design-Build project delivery process (DB) is steadily becoming the preferred project delivery method for many owners due to its great advantages. DB is defined as the combination of design and construction into a single contract with one party taking full responsibility for the delivery of the project. Advantages of using DB over more traditional methods include reduced costs, reduced project duration, increased quality, focused responsibility, reduced number of change orders, lower incidence of claims and improved risk management. With this single source responsibility comes many supplemental advantages such as increased communication between the designer and constructor, enhanced constructability due to early constructor involvement and promoted innovation. Owners are attracted to DB because it removes their responsibility of maintaining the proper communication and coordination lines between the contractor and designer. Instead, the DB firm takes full responsibility and resolves disputes amongst themselves without owner involvement. With a broad application, DB can be utilized in all facets of industrial, commercial and residential construction and can be negotiated or competitively bid.

The FDOT and Design-Build

The Florida Department of Transportation (FDOT) adopted and implemented DB as an experimental program in 1989 for the purpose of combining the design, construction and Construction Engineering and Inspection Services (CEI) into one contract. Although the

program was dropped due to difficulty with the way it was setup, DB was reinstated in 1995 with new parameters and limitations. The new program was limited to projects such as major bridges, buildings and rail corridors, but was expanded to all projects under FDOT's innovative contracting package in 1996. The program has now defined two major categories for DB, major and minor. Major projects include bridges over \$10 million, buildings and rail corridors with no statutory funding cap, while minor projects include any project not classified as a major project and have a \$120 million funding cap.

The FDOT defines DB as follows: "Design-Build combines into a single contract the design, construction, and in certain cases, construction engineering and inspection (on Federally-funded projects the Department must have specific authorization from Federal Highway Administration (FHWA) if the Request for Proposal (RFP) includes CEI), and acceptance requirements for a project, all in accordance with standard Florida Department of Transportation (FDOT) Design Standards and criteria, specifications, and contract administration practices". There are two design-build selection methods that the FDOT typically uses, adjusted score design-build and low bid design-build. In the adjusted score design-build selection method a technical review committee determines a score between 0 and 100 based on criteria in the technical proposal. The bid price is then divided by the technical score too determine the lowest adjusted score. The low bid design-build selection method is typically only used when the project design and construction criteria are concise and clearly defined. In this method, the technical review committee evaluates the technical proposal for acceptability and the selection committee awards the project to the lowest bid price with a responsive technical proposal.

Utility Relocation on Design-Build Projects

Utility relocation has long been a hassle for the FDOT to handle. However, DB transfers that responsibility away from the department and into the Design-Builder's hands. DB is still a new concept to the FDOT and is only used on projects with minimal utility relocation. Nevertheless, as the FDOT becomes more familiar with DB, this contracting method will be used extensively due to its great advantages over traditional delivery methods. With DB being new to the FDOT, there will be problems that will need to be worked out. This section is written using real field

experiences on FDOT Design-Build projects to help identify the major problems and to recognize possible solutions.

Section 5.6 of the FDOT Design-Build Guidelines (Appendix I) states that “The Design-Build Firm shall be responsible for identifying the existence, features and locations of any and all utilities within the limits of construction; for coordinating any required utility relocations or adjustments necessary for satisfactory completion of the Contract work; and for any and all work necessary to otherwise accommodate any and all utilities within limits of construction during construction and upon satisfactory completion of the work”. The Design-Build firm is responsible for coordination of activities, meetings, schedules, locating utilities, and for any delays caused by utility relocations.

The FDOT has enjoyed using DB thus far since it transfers the responsibility of dealing with utility relocation to the Design-Build firm (DB firm). This increase in responsibility for the DB firm gives them motivation to do a thorough and high quality job on the project. Some DB firms like this method because it gives them the latitude to design and schedule to the benefit of both the contractor and the utility company without FDOT intervention. As well, the DB firm has far superior insight to constructability and facilities at particular locations and benefit from reviews made by consultant inspection staff. With little focal point in the FDOT for coordination of utilities, coordination is increased in DB due to improved communication between the DB firm and the utility companies.

One of the major problems with utility relocation for the DB firm is finding the power to force the utility company to perform their duties on schedule. Conversely, the FDOT has the upper hand on utility companies since the utility facility is in their right-of-way. Also, the FDOT can perform utility relocation before actual construction begins. As stated in section 5.6 of the FDOT Design-Build guidelines (Appendix I), “the utility company will be responsible for all relocation costs except when prior compensable interests exist”. Since the utility company has no contractual obligation to the DB firm, they will often commit their personnel to jobs that make money rather than those that cost them money like utility relocation. As one contractor complained, the utility company may agree to a certain time frame, but they perform the work on

their own schedules regardless of delay issues. As well, most utility contracts state that their final price can overrun the original cost estimate by as much as 10%. This was reported as an actual occurrence in at least one of the interviews conducted.

One issue brought up in the interviews was whether there was a need for a staff member within the DB firm to handle utility relocation coordination. The response was unanimous, for major highway and interstate construction, a staff member is not required specifically for this task, but in municipal areas or other areas where utility relocation is very complex, a staff member should be required along with a field coordinator.

CHAPTER FIVE: PROPOSED SOLUTIONS TO UTILITY CONFLICTS

Introduction

Utility issues are complex involving a wide range of technologies and a variety of project participants. Given the degree of complexity, it should be clear that there is no one single solution for solving the utility conflict and delay problem. A comprehensive effort is required including many strategies. A fundamental principal expressed by Kenneth Weldon, FDOT State Utility Engineer, is implementation of the use of the three “S”s, Safer, Simpler, and Smarter. Mr. Weldon’s report titled “State of the Utilities 2003” provides a clear and concise presentation of current utility issues for the FDOT. A copy of the report is included as Appendix M. Additionally, a copy of a white paper prepared by Nathanael Winthrop, titled “Life Cycle Facility Management”, is enclosed as Appendix N. Mr. Winthrop is an FDOT consultant and has offered some very thoughtful observations concerning the management of the utility infrastructure. The following recommendations are based upon the results of the research effort and with consideration of the above-mentioned references.

Binding the Contractor into Dealing Directly with the Utility Companies

One proposed solution is to bind the contractor into dealing directly with the utility company during the construction process. Currently, the Contractor is required by specification to “cooperate with the owners of all underground or overhead utilities”. The applicable section from the FDOT 2000 Standard Specifications for Roads and Bridges reads as follows:

7-11.6.2 Cooperation with Utility Owners: Cooperate with the owners of all underground or overhead utility lines in their removal and rearrangement operations in order that these operations may progress in a reasonable manner, that duplication or rearrangement work may be reduced to a minimum, and that services rendered by the utility owners will not be unnecessarily interrupted. In the event of interruption of water or other utility services as a result of accidental breakage, exposure, or lack of support, promptly notify the proper authority and cooperate with the authority in the prompt restoration of service. If water service is interrupted and the Contractor is performing the repair work, the Contractor shall work

continuously until the service is restored. Do not begin work around fire hydrants until the local fire authority has approved provisions for continued service.

7-11.6.3 Utility Adjustments: Certain utility adjustments and reconstruction work may be underway during the progress of the Contract. Cooperate with the various utility construction crews who are maintaining utility service. Exercise due caution when working adjacent to relocated utilities. The Contractor shall repair all damage to the relocated utilities resulting from his operations at no expense to the Department. The requirements of 7-11.1 and 7-11.6.2 outline the Contractor's responsibility for protecting utility facilities. The Department will include in the Contract the utility authorities who are scheduled to perform utility work on the project.

The above specification sections clearly require cooperation, but do not require active coordination and management of the utility adjustments and reconstruction. Coordination is mentioned in the next specification section on Weekly Meetings, which reads as follows:

7-11.6.4 Weekly Meetings: Conduct weekly meetings on the job site with all the affected utility companies and the Engineer in attendance to coordinate project construction and utility relocation. Submit a list of all attendees one week in advance to the Engineer for approval. Provide the approved Work Progress Schedule and Work Plan for the project, as specified in 8-3.2, to document the schedule and plan for road construction and utility adjustments. When utility relocations no longer affect construction activities, the Contractor may discontinue the meetings with the Engineer's approval.

The research team believes that under the current specification utility coordination remains primarily an FDOT responsibility at the project level. Contractor participation in coordination activities may vary depending upon the contractor's preference. The suggestion here is to place the contractor in an active role with regard to managing the utility relocation work occurring during the contractor's construction project. In this case, the contractor would be bound into dealing directly with the utility companies by way of the contract documents. This would remove the DOT's responsibility of trying to coordinate two entities from which it may not have complete information. **Figure 6** below shows a graphical representation of the proposed project organizational structure for FDOT.

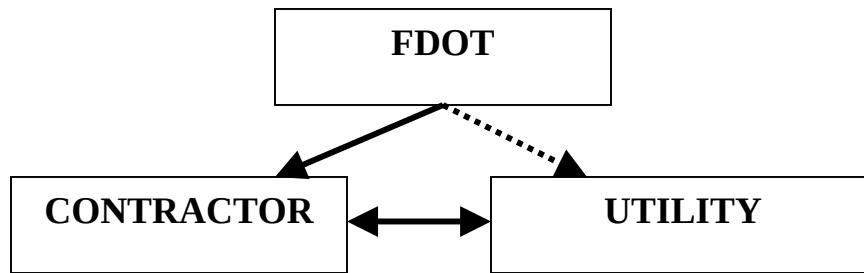


FIGURE 6: Proposed project organizational structure relieves the FDOT of coordinating between the contractor and utility companies

A draft specification requiring contractor utility coordination is enclosed as Appendix K. The language of the revised specification reads in part as follows:

7-11.6 .1 Coordination: The Contractor shall be responsible for coordinating any required utility relocations or adjustments necessary for satisfactory completion of the Contract work; and for any and all work necessary to otherwise accommodate any and all utilities within limits of construction during construction and upon satisfactory completion of the work. The Contractor shall coordinate the utility relocation work in accordance with any utility adjustment schedules included in the Contract Documents unless the utility company and the Department mutually agree to changes to the utility schedules shown in the Contract.

A change in the Florida Statutes might also be necessary in order for this method to be completely effective. This change would need to:

1. Recognize the contractor as an agent of FDOT who is authorized to make decisions regarding utility issues, while performing work
2. Require the utility company to deal with the contractor directly, and
3. Appoint FDOT to act as an agent of appeals or mediator of conflicts between the contractor and utility companies

This proposed solution enables the contractor who is most familiar with his own schedule to coordinate relocations directly with the utility company who is most familiar with their own technology.

A survey of Florida counties and other DOTs was conducted to determine if other organizations were requiring contractor utility coordination. The results indicated that 27 Florida counties and 15 DOTs currently require contractor utility coordination. The complete results of the surveys is provided in Appendix L.

Additionally, recognizing that performing utility coordination is additional work for the contractor, a new Lump Sum pay item should be added to provide compensation to the contractor for this effort. A draft specification providing for contractor utility coordination is included in Appendix K.

Incorporate ASCE Guidelines as Standard Practice for the FDOT

Many utility problems faced during construction are due to the quality of information depicted on the construction plans. Another proposed solution to this problem is to incorporate ASCE's Standard Guidelines into everyday FDOT practice. These guidelines use subsurface utility engineering (SUE) to formulate a system of classifying the quality of existing subsurface utility information. This will improve the quality of information shown on the construction plans, and allow the contractor to focus on delivering the project as specified within the contract time. Such classifications allow the project owner, engineer, and contractor to develop strategies to reduce risk, or at minimum, to allocate risk due to existing subsurface utilities in a defined manner.

The ASCE's Standard Guidelines can be used as a handout or as part of a specification, and may assist engineers, owners, and contractors in understanding utility quality level classifications and their allocations of risk. This reduced risk for contractors might eventually result in lower bid prices.

Incorporate FHWA's Guidelines for Reducing Utility-Related Construction Delays

Yet another proposed solution is to incorporate the FHWA's Guidelines for Reducing Utility-Related Construction Delays. These FHWA recommendations were derived from a study done by Penn State University for the AASHTO Highway Subcommittee on Construction. This study, "Avoiding Delays During the Construction Phase of Highway Projects," found that lack of coordination, cooperation and communication between transportation agencies and utility companies form the root of the utility problem. The research team produced and developed a video entitled "CCC: Making the Effort Works!" which was based on their findings and the recommendations contained in the AASHTO Utilities Guidelines and Best Practices. The video was designed to inform transportation agencies and utility companies of actions they can take toward avoiding construction delays and reducing or eliminating unnecessary project costs, and to motivate them to work in partnership with each other toward this common goal. The video puts the responsibility on State and County project personnel to initiate Coordination, Cooperation and Communication (CCC) between State and County transportation agencies, utility companies, contractors and consultants. Below is a summary of FHWA's recommendations for state and county project participants.

1. State and county personnel can help the utility relocation process by adapting the following measures:
 - a. Practicing CCC early and often throughout the project
 - b. Providing long-range construction schedules to utility companies
 - c. Formalizing communication and coordination efforts
 - d. Avoiding conflicts by designing around known utilities
 - e. Encouraging and facilitating cooperative working relationships
 - f. Holding regular meetings with utility companies in the planning and design phases
 - g. Encouraging utility companies to make and keep commitments on work plans
 - h. Sharing Best Practices

2. Use current available technology to the greatest extent possible. Examples include:

- a. Subsurface Utility Engineering (SUE)
- b. World Wide Web and the Internet
- c. Electronic transfer of plans
- d. Trenchless technology
- e. Information sharing through various training and outreach programs

3. Improve contract, internal project development and training processes by:

- a. Staking and acquiring sufficient right-of-way
- b. Paying the costs of engineering the utility relocations
- c. Informing bidders of concurrent utility relocation work in special provisions
- d. Accepting responsibility for costs and delays due to late plan changes
- e. Letting separate contracts for selective advance work when feasible
- f. Making contractors responsible for selective relocation work
- g. Supporting and encouraging joint use programs
- h. Sponsoring and conducting on-going training programs for all DOT divisions and managers, consultants and utility personnel
- i. Proactively market Best Practices

The items above contain suggestions to alleviate the common utility problem. The FHWA recommendations emphasize the fact that proper use of information obtained from using SUE, new technologies, early and frequent coordination, communication and cooperation (CCC) can result in a timelier and more efficient relocation process.

Continue Use of “Utility Work by Highway Contractor Agreement” Whenever Possible

An arrangement that allow much of the utility relocation work to be included in the scope of the construction contract have proven to be a successful strategy to minimize utility delays. Having one organization responsible for both the roadway construction and the utility work can be the most efficient way to accomplish both tasks. The FDOT should continue to promote Utility Work by Highway Contractor Agreements with utilities that have not yet participated in such an agreement.

Continue to Perform as Much Utility Relocation in Advance of Construction as Possible

Right of way clearing has in the past been an obstacle to allowing the utility to perform relocations in advance of construction. Several FDOT Districts have been successful in contracting with the utility to have needed clearing performed so that utility work can precede construction.

Suggestions for Improvement on Design-Build Projects

At the end of the interviews, the DB firms were asked to comment on possible suggestions for improvement regarding utility relocation on Design-Build projects. The following suggestions were made:

1. Make a line item in the estimate specifically for utility relocation
 - a. Gives a better means to adjust the price
 - b. Gives the contractor proof by what measure and when variances occur
2. Subcontract utility relocation coordination to obtain more control and authority over the utility
3. Offer the utility incentives for finishing according to or ahead of schedule
4. Make deals to let the utility leave the facility in place with an “out of service” status
5. Redesign facilities to accommodate the utility

6. Since the FDOT clearly has some control over the utility, the right-of-way lease agreement can be rewritten to include delay issues and price increases related to utility relocation
7. Discuss and deal with Utility issues during the design phase
8. Assign a staff member to handle the coordination of utility relocation

Some of the suggestions in this section can be matched with recommendations from the other sections in this chapter. This in itself is strong evidence that these solutions, if implemented, can help to improve problems associated with utility relocation. If the contractors and FDOT personnel are making the same suggestions, then they are definitely motivated to implement them.

CHAPTER SIX: CONCLUSIONS

Conclusions

There is no single approach to solving the problems caused by utility delays, because each project is different and should be handled according to the circumstances involved therein.

However, it is clear that greater investment must be made in locating utility information during the planning and design phase. This will make it easier during construction, because the plans will reflect more accurate utility information. It should also be noted that good practical solutions are possible with input from all the major project participants. These solutions must consider all aspects of the project delivery process including design, relocation activities and construction.

For this reason, a Pilot Project should be implemented in order to continue to find new solutions and to refine those practical solutions presented in this report. Project Participants should bear in mind that coordination, cooperation and communication among themselves throughout the project is the synthesis for smooth completion.

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APPENDIX A: FLORIDA STATUTES 337.401 - USE OF RIGHT-OF-WAY FOR UTILITIES SUBJECT TO REGULATION; PERMIT; FEES

(1) The department and local governmental entities, referred to in ss. [337.401](#)-337.404 as the "authority," that have jurisdiction and control of public roads or publicly owned rail corridors are authorized to prescribe and enforce reasonable rules or regulations with reference to the placing and maintaining along, across, or on any road or publicly owned rail corridors under their respective jurisdictions any electric transmission, telephone, telegraph, or other communications services lines; pole lines; poles; railways; ditches; sewers; water, heat, or gas mains; pipelines; fences; gasoline tanks and pumps; or other structures hereinafter referred to as the "utility."

(2) The authority may grant to any person who is a resident of this state, or to any corporation which is organized under the laws of this state or licensed to do business within this state, the use of a right-of-way for the utility in accordance with such rules or regulations as the authority may adopt. No utility shall be installed, located, or relocated unless authorized by a written permit issued by the authority. The permit shall require the permit holder to be responsible for any damage resulting from the issuance of such permit. The authority may initiate injunctive proceedings as provided in s. [120.69](#) to enforce provisions of this subsection or any rule or order issued or entered into pursuant thereto.

(3)(a)1. Because of the unique circumstances applicable to providers of communications services, including, but not limited to, the circumstances described in paragraph (e) and the fact that federal and state law require the nondiscriminatory treatment of providers of telecommunications services, and because of the desire to promote competition among providers of communications services, it is the intent of the Legislature that municipalities and counties treat providers of communications services in a nondiscriminatory and competitively neutral manner when imposing rules or regulations governing the placement or maintenance of communications facilities in the public roads or rights-of-way. Rules or regulations imposed by a municipality or county relating to providers of communications services placing or maintaining communications facilities in its roads or rights-of-way must be generally applicable to all providers of communications services and, notwithstanding any other law, may not require a provider of communications services, except as otherwise provided in subparagraph 2., to apply for or enter into an individual license, franchise, or other agreement with the municipality or county as a condition of placing or maintaining communications facilities in its roads or rights-of-way. In addition to other reasonable rules or regulations that a municipality or county may adopt relating to the placement or maintenance of communications facilities in its roads or rights-of-way under this subsection, a municipality or county may require a provider of communications services that places or seeks to place facilities in its roads or rights-of-way to register with the municipality or county and to provide the name of the registrant; the name, address, and telephone number of a contact person for the registrant; the number of the registrant's current certificate of authorization issued by the Florida Public Service Commission or the Federal Communications Commission; and proof of insurance or self-insuring status adequate to defend and cover claims. Nothing in this subparagraph is intended to limit or expand

any existing zoning or land use authority of a municipality or county; however, no such zoning or land use authority may require an individual license, franchise, or other agreement as prohibited by this subparagraph.

2. Notwithstanding the provisions of subparagraph 1., a municipality or county may, as provided by 47 U.S.C. s. 541, award one or more franchises within its jurisdiction for the provision of cable service, and a provider of cable service shall not provide cable service without such franchise. Each municipality and county retains authority to negotiate all terms and conditions of a cable service franchise allowed by federal law and s. [166.046](#), except those terms and conditions related to franchise fees and the definition of gross revenues or other definitions or methodologies related to the payment or assessment of franchise fees and permit fees as provided in paragraph (c) on providers of cable services. A municipality or county may exercise its right to require from providers of cable service in-kind requirements, including, but not limited to, institutional networks, and contributions for, or in support of, the use or construction of public, educational, or governmental access facilities to the extent permitted by federal law. A provider of cable service may exercise its right to recover any such expenses associated with such in-kind requirements, to the extent permitted by federal law.

(b) Registration described in subparagraph (a)1. does not establish a right to place or maintain, or priority for the placement or maintenance of, a communications facility in roads or rights-of-way of a municipality or county. Each municipality and county retains the authority to regulate and manage municipal and county roads or rights-of-way in exercising its police power. Any rules or regulations adopted by a municipality or county which govern the occupation of its roads or rights-of-way by providers of communications services must be related to the placement or maintenance of facilities in such roads or rights-of-way, must be reasonable and nondiscriminatory, and may include only those matters necessary to manage the roads or rights-of-way of the municipality or county.

(c)1. It is the intention of the state to treat all providers of communications services that use or occupy municipal or charter county roads or rights-of-way for the provision of communications services in a nondiscriminatory and competitively neutral manner with respect to the payment of permit fees. Certain providers of communications services have been granted by general law the authority to offset permit fees against franchise or other fees while other providers of communications services have not been granted this authority. In order to treat all providers of communications services in a nondiscriminatory and competitively neutral manner with respect to the payment of permit fees, each municipality and charter county shall make an election under either sub-subparagraph a. or sub-subparagraph b. and must inform the Department of Revenue of the election by certified mail by July 16, 2001. Such election shall take effect October 1, 2001.

a.(I) The municipality or charter county may require and collect permit fees from any providers of communications services that use or occupy municipal or county roads or rights-of-way. All fees permitted under this sub-subparagraph must be reasonable and commensurate with the direct and actual cost of the regulatory activity, including issuing and processing permits, plan reviews, physical inspection, and direct administrative costs; must be demonstrable; and must be equitable among users of the roads or rights-of-way. A fee permitted under this sub-subparagraph may not: be offset against the tax imposed under chapter 202; include the costs of roads or rights-of-way acquisition or roads or rights-of-way rental; include any general administrative, management, or maintenance costs of the roads or rights-of-way; or be based on a percentage of the value or costs associated with the work to be performed on the roads or rights-of-way. In an action to recover amounts due for a fee not permitted under this sub-subparagraph, the prevailing party may

recover court costs and attorney's fees at trial and on appeal. In addition to the limitations set forth in this section, a fee levied by a municipality or charter county under this sub-subparagraph may not exceed \$100. However, permit fees may not be imposed with respect to permits that may be required for service drop lines not required to be noticed under s. [556.108\(5\)\(b\)](#) or for any activity that does not require the physical disturbance of the roads or rights-of-way or does not impair access to or full use of the roads or rights-of-way.

(II) To ensure competitive neutrality among providers of communications services, for any municipality or charter county that elects to exercise its authority to require and collect permit fees under this sub-subparagraph, the rate of the local communications services tax imposed by such jurisdiction, as computed under s. [202.20](#), shall automatically be reduced by a rate of 0.12 percent.

b. Alternatively, the municipality or charter county may elect not to require and collect permit fees from any provider of communications services that uses or occupies municipal or charter county roads or rights-of-way for the provision of communications services; however, each municipality or charter county that elects to operate under this sub-subparagraph retains all authority to establish rules and regulations for providers of communications services to use or occupy roads or rights-of-way as provided in this section. If a municipality or charter county elects to operate under this sub-subparagraph, the total rate for the local communications services tax as computed under s. [202.20](#) for that municipality or charter county may be increased by ordinance or resolution by an amount not to exceed a rate of 0.12 percent. If a municipality or charter county elects to increase its rate effective October 1, 2001, the municipality or charter county shall inform the department of such increased rate by certified mail postmarked on or before July 16, 2001.

c. A municipality or charter county that does not make an election as provided for in this subparagraph shall be presumed to have elected to operate under the provisions of sub-subparagraph b.

2. Each noncharter county shall make an election under either sub-subparagraph a. or sub-subparagraph b. and shall inform the Department of Revenue of the election by certified mail by July 16, 2001. Such election shall take effect October 1, 2001.

a. The noncharter county may elect to require and collect permit fees from any providers of communications services that use or occupy noncharter county roads or rights-of-way. All fees permitted under this sub-subparagraph must be reasonable and commensurate with the direct and actual cost of the regulatory activity, including issuing and processing permits, plan reviews, physical inspection, and direct administrative costs; must be demonstrable; and must be equitable among users of the roads or rights-of-way. A fee permitted under this sub-subparagraph may not: be offset against the tax imposed under chapter 202; include the costs of roads or rights-of-way acquisition or roads or rights-of-way rental; include any general administrative, management, or maintenance costs of the roads or rights-of-way; or be based on a percentage of the value or costs associated with the work to be performed on the roads or rights-of-way. In an action to recover amounts due for a fee not permitted under this sub-subparagraph, the prevailing party may recover court costs and attorney's fees at trial and on appeal. In addition to the limitations set forth in this section, a fee levied by a noncharter county under this sub-subparagraph may not exceed \$100. However, permit fees may not be imposed with respect to permits that may be required for service drop lines not required to be noticed under s. [556.108\(5\)\(b\)](#) or for any activity that does not require the physical disturbance of the roads or rights-of-way or does not impair access to or full use of the roads or rights-of-way.

b. Alternatively, the noncharter county may elect not to require and collect permit fees from any provider of communications services that uses or occupies noncharter county roads or rights-of-way for the provision of communications services; however, each noncharter county that elects to operate under this sub-subparagraph shall retain all authority to establish rules and regulations for providers of communications services to use or occupy roads or rights-of-way as provided in this section. If a noncharter county elects to operate under this sub-subparagraph, the total rate for the local communications services tax as computed under s. [202.20](#) for that noncharter county may be increased by ordinance or resolution by an amount not to exceed a rate of 0.24 percent, to replace the revenue the noncharter county would otherwise have received from permit fees for providers of communications services. If a noncharter county elects to increase its rate effective October 1, 2001, the noncharter county shall inform the department of such increased rate by certified mail postmarked on or before July 16, 2001.

c. A noncharter county that does not make an election as provided for in this subparagraph shall be presumed to have elected to operate under the provisions of sub-subparagraph b.

3. Except as provided in this paragraph, municipalities and counties retain all existing authority to require and collect permit fees from users or occupants of municipal or county roads or rights-of-way and to set appropriate permit fee amounts.

(d) After January 1, 2001, in addition to any other notice requirements, a municipality must provide to the Secretary of State, at least 10 days prior to consideration on first reading, notice of a proposed ordinance governing a telecommunications company placing or maintaining telecommunications facilities in its roads or rights-of-way. After January 1, 2001, in addition to any other notice requirements, a county must provide to the Secretary of State, at least 15 days prior to consideration at a public hearing, notice of a proposed ordinance governing a telecommunications company placing or maintaining telecommunications facilities in its roads or rights-of-way. The notice required by this paragraph must be published by the Secretary of State on a designated Internet website. The failure of a municipality or county to provide such notice does not render the ordinance invalid.

(e) The authority of municipalities and counties to require franchise fees from providers of communications services, with respect to the provision of communications services, is specifically preempted by the state, except as otherwise provided in subparagraph (a)2., because of unique circumstances applicable to providers of communications services when compared to other utilities occupying municipal or county roads or rights-of-way. Providers of communications services may provide similar services in a manner that requires the placement of facilities in municipal or county roads or rights-of-way or in a manner that does not require the placement of facilities in such roads or rights-of-way. Although similar communications services may be provided by different means, the state desires to treat providers of communications services in a nondiscriminatory manner and to have the taxes, franchise fees, and other fees paid by providers of communications services be competitively neutral. Municipalities and counties retain all existing authority, if any, to collect franchise fees from users or occupants of municipal or county roads or rights-of-way other than providers of communications services, and the provisions of this subsection shall have no effect upon this authority. The provisions of this subsection do not restrict the authority, if any, of municipalities or counties or other governmental entities to receive reasonable rental fees based on fair market value for the use of public lands and buildings on property outside the public roads or rights-of-way for the placement of communications antennas and towers.

(f) Except as expressly allowed or authorized by general law and except for the rights-of-way permit fees subject to paragraph (c), a municipality or county may not levy on a provider of communications services a tax, fee, or other charge or imposition for operating as a provider of communications services within the jurisdiction of the municipality or county which is in any way related to using its roads or rights-of-way. A municipality or county may not require or solicit in-kind compensation, except as otherwise provided in subparagraph (a)2. Nothing in this paragraph shall impair any ordinance or agreement in effect on May 22, 1998, or any voluntary agreement entered into subsequent to that date, which provides for or allows in-kind compensation by a telecommunications company.

(g) A municipality or county may not use its authority over the placement of facilities in its roads and rights-of-way as a basis for asserting or exercising regulatory control over a provider of communications services regarding matters within the exclusive jurisdiction of the Florida Public Service Commission or the Federal Communications Commission, including, but not limited to, the operations, systems, qualifications, services, service quality, service territory, and prices of a provider of communications services.

(h) A provider of communications services that has obtained permission to occupy the roads or rights-of-way of an incorporated municipality pursuant to s. [362.01](#) or that is otherwise lawfully occupying the roads or rights-of-way of a municipality shall not be required to obtain consent to continue such lawful occupation of those roads or rights-of-way; however, nothing in this paragraph shall be interpreted to limit the power of a municipality to adopt or enforce reasonable rules or regulations as provided in this section.

(i) Except as expressly provided in this section, this section does not modify the authority of municipalities and counties to levy the tax authorized in chapter 202 or the duties of providers of communications services under ss. [337.402](#)-337.404. This section does not apply to building permits, pole attachments, or private roads, private easements, and private rights-of-way.

(j) Pursuant to this paragraph, any county or municipality may by ordinance change either its election made on or before July 16, 2001, under paragraph (c) or an election made under this paragraph.

1.a. If a municipality or charter county changes its election under this paragraph in order to exercise its authority to require and collect permit fees in accordance with this subsection, the rate of the local communications services tax imposed by such jurisdiction pursuant to ss. [202.19](#) and [202.20](#) shall automatically be reduced by the sum of 0.12 percent plus the percentage, if any, by which such rate was increased pursuant to sub-subparagraph (c)1.b.

b. If a municipality or charter county changes its election under this paragraph in order to discontinue requiring and collecting permit fees, the rate of the local communications services tax imposed by such jurisdiction pursuant to ss. [202.19](#) and [202.20](#) may be increased by ordinance or resolution by an amount not to exceed 0.24 percent.

2.a. If a noncharter county changes its election under this paragraph in order to exercise its authority to require and collect permit fees in accordance with this subsection, the rate of the local communications services tax imposed by such jurisdiction pursuant to ss. [202.19](#) and [202.20](#) shall automatically be reduced by the percentage, if any, by which such rate was increased pursuant to sub-subparagraph (c)2.b.

b. If a noncharter county changes its election under this paragraph in order to discontinue requiring and collecting permit fees, the rate of the local communications services tax imposed by such jurisdiction pursuant to ss. [202.19](#) and [202.20](#) may be increased by ordinance or resolution by an amount not to exceed 0.24 percent.

3.a. Any change of election pursuant to this paragraph and any tax rate change resulting from such change of election shall be subject to the notice requirements of s. [202.21](#); however, no such change of election shall become effective prior to January 1, 2003.

b. Any county or municipality changing its election under this paragraph in order to exercise its authority to require and collect permit fees shall, in addition to complying with the notice requirements under s. [202.21](#), provide to all dealers providing communications services in such jurisdiction written notice of such change of election by July 1 immediately preceding the January 1 on which such change of election becomes effective. For purposes of this sub-subparagraph, dealers providing communications services in such jurisdiction shall include every dealer reporting tax to such jurisdiction pursuant to s. [202.37](#) on the return required under s. [202.27](#) to be filed on or before the 20th day of May immediately preceding the January 1 on which such change of election becomes effective.

(k) Notwithstanding the provisions of s. [202.19](#), when a local communications services tax rate is changed as a result of an election made or changed under this subsection, such rate shall not be rounded to tenths.

(4) As used in this section, "communications services" has the same meaning ascribed in chapter 202, and "cable service" has the same meaning ascribed in 47 U.S.C. s. 522, as amended.

(5) This section, except subsections (1) and (2) and paragraph (3)(g), does not apply to the provision of pay telephone service on public, municipal, or county roads or rights-of-way.

(6) If a municipality or county imposes any amount on a person or entity other than a provider of communications services in connection with the placement or maintenance by such person or entity of a communication facility in municipal or county roads or rights-of-way, such amounts, if any, shall not exceed the highest amount, if any, the municipality or county is imposing in such context as of the date this act becomes a law. If a municipality or county is not imposing any amount in such context as of the date this act becomes a law, any amount, if any, imposed thereafter, shall not be less than \$500 per linear mile, payable annually, of any cable, fiber optic, or other pathway that makes physical use of the municipal or county right-of-way. Any excess of \$500 shall be applied in a nondiscriminatory manner and shall not exceed the sum of:

(a) Costs directly related to the inconvenience or impairment solely caused by the disturbance to the municipal or county right-of-way;

(b) The reasonable cost of the regulatory activity of the municipality or county; and

(c) The proportionate share of cost of land for such street, alley, or other public way attributable to utilization of the right-of-way by a person or entity other than a provider of communications services.

For purposes of this subsection, the term communications facility shall not include communications facilities owned, operated, or used by electric utilities or regional transmission organizations exclusively for internal communications purposes. Except as specifically provided herein, municipalities and counties retain all existing authority, if any, to collect fees relating to public roads and rights-of-way from electric utilities or regional transmission organizations, and nothing in this subsection shall alter this authority.

APPENDIX B: FLORIDA STATUTES 337.403 - RELOCATION OF UTILITY; EXPENSES

(1) Any utility heretofore or hereafter placed upon, under, over, or along any public road or publicly owned rail corridor that is found by the authority to be unreasonably interfering in any way with the convenient, safe, or continuous use, or the maintenance, improvement, extension, or expansion, of such public road or publicly owned rail corridor shall, upon 30 days' written notice to the utility or its agent by the authority, be removed or relocated by such utility at its own expense except as provided in paragraphs (a), (b), and (c).

(a) If the relocation of utility facilities, as referred to in s. 111 of the Federal-Aid Highway Act of 1956, Pub. L. No. 627 of the 84th Congress, is necessitated by the construction of a project on the federal-aid interstate system, including extensions thereof within urban areas, and the cost of such project is eligible and approved for reimbursement by the Federal Government to the extent of 90 percent or more under the Federal Aid Highway Act, or any amendment thereof, then in that event the utility owning or operating such facilities shall relocate such facilities upon order of the department, and the state shall pay the entire expense properly attributable to such relocation after deducting therefrom any increase in the value of the new facility and any salvage value derived from the old facility.

(b) When a joint agreement between the department and the utility is executed for utility improvement, relocation, or removal work to be accomplished as part of a contract for construction of a transportation facility, the department may participate in those utility improvement, relocation, or removal costs that exceed the department's official estimate of the cost of such work by more than 10 percent. The amount of such participation shall be limited to the difference between the official estimate of all the work in the joint agreement plus 10 percent and the amount awarded for this work in the construction contract for such work. The department may not participate in any utility improvement, relocation, or removal costs that occur as a result of changes or additions during the course of the contract.

(c) When an agreement between the department and utility is executed for utility improvement, relocation, or removal work to be accomplished in advance of a contract for construction of a transportation facility, the department may participate in the cost of clearing and grubbing necessary to perform such work.

(2) If such removal or relocation is incidental to work to be done on such road or publicly owned rail corridor, the notice shall be given at the same time the contract for the work is advertised for bids, or 30 days prior to the commencement of such work by the authority.

(3) Whenever an order of the authority requires such removal or change in the location of any utility from the right-of-way of a public road or publicly owned rail corridor, and the owner thereof fails to remove or change the same at his or her own expense to conform to the order within the time stated in the notice, the authority shall proceed to cause the utility to be removed. The expense thereby incurred shall be paid out of any money available therefore, and such expense shall, except as provided in subsection (1), be charged against the owner and levied and collected and paid into the fund from which the expense of such relocation was paid.

APPENDIX C: EXCERPT FROM PENNSYLVANIA DEPARTMENT OF TRANSPORTATION SPECIFICATIONS

105.06 PUBLIC OR PRIVATE FACILITIES AND STRUCTURES ON THE PROJECT—

(a) Facilities and Structures Interfering with Contract Operations. Investigate the location of public and private facilities and structures on, under, or over the project site and all waste and borrow areas not on the project site to determine whether such facilities and structures might or might not require placement, replacement, relocation, adjustment, or reconstruction and whether they might interfere with operations performed under this contract. The Department has indicated on the drawings such facilities and structures as have been brought to its attention, but such indications will not relieve the Contractor of any responsibility under this section. The Department is not responsible for the omission or failure to give notice of any other facility or structure on, under, or over the project or waste and borrow areas not on the project. It will be presumed that the bid was prepared and the contract signed by the Contractor with complete awareness of the conditions to be encountered and with acceptance of responsibility and risk relating to the effect that such facilities and structures might have on the performance of operations on this contract.

Upon execution of the contract, inform all public service companies, individuals, and others owning or controlling any facilities or structures within the limits of the project, which may have to be relocated, adjusted, or reconstructed, of the plan of construction operations. Give due notice to the responsible party in sufficient time for that party to organize and perform such work in conjunction with or in advance of construction operations.

Make all necessary arrangements with the owners of facilities and structures on, under, or over the project site and all waste and borrow areas not on the project site for any placement, replacement, relocation, adjustment, or reconstruction of such facilities and structures that might be needed to perform work on this contract. Cooperate with the owners of facilities and structures. Arrange and perform contract work in and around such facilities and structures in order to assist the owners in their placement, replacement, relocation, adjustment, or reconstruction operations. Arrange and perform the work in accordance with recognized and accepted engineering and construction practices. As provided in Section 105.06(b), the Engineer may assist in resolving any construction problems that arise. However, the Department does not assume responsibility for the work as a consequence of such cooperation.

Refer to the provisions of Act 287-1974, as amended by Act 172-1986, and Act 187-1996, which specifies project responsibilities in regard to public health and safety during excavation and demolition operations in areas of underground utilities.

(b) Delays in the Performance of Work. Expect delays in the performance of work under contract in order to permit public and private facilities and structures to be placed, replaced, relocated, adjusted, or reconstructed. In the event of such delays, the work under contract may be

required to proceed for the convenience, facility and safety of the public. Do not hold the Department liable for charges or claims for additional compensation for any delays, hindrances, or interferences regardless of duration or extent, resulting from the failure of owners to place, replace, relocate, adjust, or reconstruct their facilities and structures within the time estimated by the Department.

Resolve all disputes or disagreements concerning placement, replacement, relocation, adjustment, or reconstruction of facilities and structures directly with the owners. Upon written request, the Department may, at its discretion, render assistance in resolving such disputes or disagreements. However, under no circumstances will such assistance be construed to relieve the Contractor of his responsibility to resolve conflicts with the owners. Do not hold the Department liable for charges or claims for additional compensation for any delays, hindrances, or interferences that arise from the dispute and its resolution. However, upon written request, the Department may grant an extension of contract time.

(c) Facilities and Structures Reset by Others. When required, owners or lessees are to bring railway tracks to the established line and grade. Facilities or structures owned by others are to be reset or set by their owners, unless otherwise indicated. Check the line and grade before base or pavement is placed adjacent to or around such facilities or structures.

(d) Damage to Facilities and Structures. Compensate the owner for all cost of repairing, replacing, or resetting any facility or structure damaged or disturbed by contract construction as provided in [Section 107.12](#).

Coordinate with the railroad company to provide accepted measures for protection of railroad tracks and ballast from debris, silt, or other foreign matter.

Provide required means of protection, maintenance, cleaning, repair, and replacement of ballast. This work will be subject to the approval of the Railroad's Chief Engineer or authorized representative.

APPENDIX D: EXCERPT FROM TENNESSEE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS

105.07-Cooperation with Utilities. The Department will notify concerning the planned construction, all utility companies, all pipe line companies, and all other parties who have property, other than land, in the construction area. It will make every reasonable effort to cause such parties to make the adjustments in elevation or location which may be necessary to avoid conflict with the construction and with the completed project, and to protect their property from damage during construction. In general, the Contract will indicate the various utility items known to exist, will indicate items to be adjusted or capital improvements proposed by the owners and will designate any items that are to be adjusted by the Contractor. Information contained in the contract documents regarding utility locations is advisory only and shall not be construed as being a representation of completeness or accuracy. The Contractor shall contact the owners of the various utilities to determine the exact location of the utilities and the owner's schedule of work. Unless otherwise noted, all utility adjustments will be performed by the Utility or its representative. The Contractor shall cooperate with the owners of any utilities in their adjustment operations. The Contractor will provide all necessary protective measures to safeguard existing utilities from damage during construction of the Work. In the event that special equipment is required to work over and around the utilities, the Contractor will be required to furnish such equipment. Cost of protecting utilities from damage and furnishing special equipment will be included in the price bid for other items of construction. The Contractor shall notify each individual Utility owner of his plan of operation in the area of the utilities. Prior to commencing work, the Contractor shall contact the Utility owners and request them to properly locate their respective utility on the ground. This notification shall be given at least three business days prior to commencement of operations around the utility. It is understood and agreed that the Contractor has considered in his bid all of the permanent and temporary utility appurtenances in their present and relocated positions, any proposed utility capital improvements, and the Contractor has contacted the utility owner in regard to their proposed schedule of work and that no additional compensation will be allowed for any delays, inconvenience or damage sustained due to utilities or utility adjustment. However, interference caused by utilities on working day contracts will be considered in charging working time in accordance with Subsection 101.60.

APPENDIX E: EXCERPT FROM ESCAMBIA COUNTY, FLORIDA STANDARD SPECIFICATIONS

1.4 EXISTING UTILITIES AND OTHER SERVICES

- A. General: Indicated locations are approximate; determine exact locations before commencing Work.
- B. Coordinate relocation of existing utilities required on new construction. Relocation costs shall be at expense of utility.
- C. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

1.6 PROJECT CONDITIONS

A. Site Information: Data in the subsurface investigation report was used for the basis of the design and are available to the contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Engineer/Owner will not be responsible for interpretations or conclusions drawn from this data by the contractor.

B. Existing Utilities: Contractor is responsible for contacting all utility companies to obtain locations of all existing utilities or obstructions, which he may encounter during construction. After location of utilities by the appropriate utility company, it is the Contractor's liability to protect all such utility lines, including service lines and appurtenances, and to replace at his own expense any which may be damaged by the Contractor's equipment or forces during construction of the Project.

1. Provide a minimum 48-hours' notice to the Engineer and receive written notice to proceed before interrupting any utility.
2. The contractor is responsible for contacting all utility companies to verify locations of all existing utilities, utility-related obstructions, or utility relocations, which he may encounter during construction.
3. Adequate provision shall be made for the flow of existing sewers, drains, and water courses encountered during construction, and structures, which may be disturbed, shall be satisfactorily restored by the Contractor.

C. Should uncharted, or incorrectly charted, piping or other utilities be encountered during the course of the work, consult Engineer immediately for directions. Cooperate with owner and utility companies in keeping respective services and facilities in operation.

APPENDIX F: EXCERPT FROM BROWARD COUNTY, FLORIDA STANDARD SPECIFICATION

33. Location and Damage to Existing Facilities, Equipment or Utilities:

33.1. As far as possible, all existing utility lines in the Project area have been shown on the plans. However, COUNTY does not guarantee that all lines are shown, or that the ones indicated are in their true location. It shall be the CONTRACTORS responsibility to identify and locate all underground and overhead utility lines or equipment affecting or affected by the Project. No additional payment will be made to the CONTRACTOR because of discrepancies in actual and plan location of utilities, and additional costs suffered as a result thereof.

33.2. The CONTRACTOR shall notify each utility company involved at least thirty (30) days prior to the start of construction to arrange for positive underground location, relocation or support of its utility where that utility may be in conflict with or endangered by the proposed construction. Relocation of water mains or other utilities for the convenience of the CONTRACTOR shall be paid by the CONTRACTOR. All charges by utility companies for temporary support of its utilities shall be paid for by the CONTRACTOR. All costs of permanent utility relocation to avoid conflict shall be the responsibility of the utility company involved. No additional payment will be made to the CONTRACTOR for utility relocations, whether or not said relocation is necessary to avoid conflict with other lines.

33.3. The CONTRACTOR shall schedule the work in such a manner that the work is not delayed by the utility providers relocating or supporting their utilities. The CONTRACTOR shall coordinate its activities with any and all public and private utility providers occupying the right-of-way. No compensation will be paid to the CONTRACTOR for any loss of time or delay.

33.4. All overhead, surface or underground structures and utilities encountered are to be carefully protected from injury or displacement. All damage to such structures is to be completely repaired within a reasonable time; needless delay will not be tolerated. The COUNTY reserves the right to remedy such damage by ordering outside parties to make such repairs at the expense of the CONTRACTOR. All such repair, made by the CONTRACTOR is to be made to the satisfaction of the utility owner. All damaged utilities, must be replaced or fully repaired. All repairs are to be inspected by the utility owner prior to backfilling.

APPENDIX G: DESIGN-BUILD INTERVIEW #1 SUMMARY (VIA SITE VISIT)

Subject: Design-Build Utility Relocation – Contractor provides utility relocation coordination
Project: Replacement of I-4 Bridge and Road widening, FM# 242702-1-52-01
Interviewer: Glen Harris
Interviewees: Richard Large/ Metric Engineering, J.C. Miseroy/ Granite Paving
Date: October 9, 2002

POINTS OF DISCUSSION:

- 1.) Process of Utility Relocation with Contractor Coordination:
 - Contractor works with the utility company to schedule utility relocation
 - Contractor takes on all risks associated with utility relocation rather than the FDOT
 - Contractor is responsible for delays caused by utility relocation
- 2.) Better or Worse than when FDOT performs coordination:
 - Contractor feels that it is worse because they lack the authority to push the utility companies
 - FDOT likes it because they do not have to bother with the issue
- 3.) Authority to push Utility Companies to reduce delays and added costs:
 - Contractor has little authority over utility companies
 - Utility company may agree to a certain time frame but they perform the work on their own schedule regardless of delay issues
 - Contractor has no control over price increases
 - Example: Granite was given an estimate by a utility company, which they used in their bid, but just before performance of the work the utility company increased their price. Granite had no choice but to pay on the utility company's terms.
 - Typically, the utility company's contract states that the price can overrun by 10%
 - FDOT seems to have slight control due to the permitting process
 - FDOT can also do relocation before the project begins
- 4.) Utility Delays specific to this project:
 - They could think of only one: A delay with Florida Power and Light over transmission and distribution
- 5.) Staff member requirements for utility coordination:
 - For major highway and interstate construction, a staff member is not required specifically for this task
 - However, in municipal areas where utility relocation is very complex, a staff member would be required along with a field coordinator

6.) Suggestions for improvement:

- Make a line item in the estimate specifically for utility relocation
 - Gives a better means to adjust the price
 - Gives the contractor proof by what measure and when variances occur
- Subcontract utility relocation coordination to obtain more control and authority
- Find other means and methods to obtain more authority over utility companies

7.) Project completion to date:

- 50 – 60 % complete
- A year and a half remaining to 100% completion
- No utility relocation expected for the remainder of the project

APPENDIX H: DESIGN-BUILD INTERVIEW #2 (VIA EMAIL)

QUESTIONARE (*Italicized Information is Response*)

SUBJECT: Contractor Provides Utility Relocation Coordination

PROJECT: I-75 over Peace River in Charlotte County

ANSWERED BY: *Sean Rodeheffer*

COMPANY: *FDOT*

POSITION: *Project Manager*

QUESTIONS:

- 1) What is the process of utility coordination when the contractor provides relocation coordination?

The contractor and utility are required to work together among themselves without input from the FDOT. Issues should be discussed and solved between utilities and contractors with the prime contractor handling all coordination. Much of this work should take place at the design stage.

- 2) Does this process work better or worse than when the FDOT handles the coordination? Why?

This would vary greatly and be job specific. It should and is intended to work better with the contractors and utilities working and designing to the benefit of both parties. They have the latitude to design and schedule to the benefit of both without DOT intervention.

- 3) Have you had any utility delays on this project or on a similar project? If so, what happened?

The Peace River Project had very few utilities, and those conflicts that were encountered were easily solved. On typical projects, conflicts which are difficult to solve and not foreseen in the design process generally result in costly delays and claims.

- 4) Does the contractor find it hard to push utility companies to follow the schedule? Why?

We have not had a great amount of experience in this area with D/B, but I believe that most contractors could convince utilities to work with them in the design phase to help reduce conflicts. As utilities become familiar with the Design/Build process, they should realize that this is a concept that could be of great benefit to them in that they will have input in the original design and can help locate and design around conflicts. Although utilities may always need to be relocated to some extent, their input and direction at the design stage should help reduce their relocation quantities and costs.

- 5) What methods have you used to persuade utility companies to relocate utilities on time?

If they have identified and not relocated their utilities as per the approved relocation schedules between the DOT and them, then they become responsible for all delay costs associated with conflicts. If they have failed to identify and locate correctly all of their utilities that come into conflict with construction, they become responsible for associated costs.

- 6) Who has more authority over utilities, FDOT or the contractor? Why?

The FDOT has standard agreements with most utilities within the R/W. When the DOT assigns a project to a D/B contractor, the utilities would still have to follow the terms of the original agreement.

- 7) Does the contractor need a staff member to handle the coordination activity?

If the project were large and complicated, a specific person to handle these issues would be helpful. If issues were discussed and dealt with properly in design, then construction would not be much different than normal Design/Bid/Build projects.

- 8) Have you had any problems with price increases after a utility company gave an estimate? Please explain.

They would not normally give estimates. Utilities would either contract out the relocation work themselves by entering into an agreement with a separate contractor to do their work, or enter into an agreement with the department, where the department's contractor does their work at bid prices.

- 9) Have you been involved in a dispute with a utility company concerning utility delays on a design-build project? Please explain.

No. This is my first experience with a large D/B project.

- 10) Can you give me suggestions on ways to improve the coordination process to reduce delays or price increases due to utility relocation?

Design/Build!!!! I really believe that this process will work well and force the utilities to become involved early in the process to locate correctly and solve or reduce their relocation problems. This process will actually help reduce utility issues, and get the

problems addressed up front and early in the design process. Utilities which do not get involved with this process will only be hurting and putting themselves at a great disadvantage.

- 11) If there are any other questions, concerns or comments concerning this issue, please list them below. Thank You for your time.

APPENDIX I: DESIGN-BUILD INTERVIEW #3 (VIA EMAIL)

QUESTIONARE

SUBJECT: Contractor Provides Utility Relocation Coordination

PROJECT: Ringling Bridge in Sarasota

ANSWERED BY: Albert Rosenstein

COMPANY: FDOT Sarasota

POSITION: Project Administrator

QUESTIONS:

- 1) What is the process of utility coordination when the contractor provides relocation coordination?

On Design/Build projects, the Contractor is the focal point for relocation. The DB firm is responsible to coordinate the activities, meetings, schedules and locations for the utilities. The DB firm does this in a manner that they choose; however, they submit their plans to the Consultant Inspection Staff, and other related departments for review and acceptance before construction.

- 2) Does this process work better or worse than when the FDOT handles the coordination? Why?

Not enough data to answer accurately. However, it would appear that the process should work better than the FDOT process for a few reasons. 1. The DB firm has more at stake if they don't do a thorough job. 2. The DB firm benefits from reviews by Consultant Inspection staff and others. 3. The DB firm has far superior insight to the constructability of structures and facilities at particular locations. 4. The DB firm coordinates the work phases better because they 'talk' to one another. The FDOT process (as related to my experience in this office) is broke. It doesn't appear that there is a focal point to coordinate all utilities at once. The Department 'clears' utilities; however, I am not sure what that means because of the following. For example, a telephone utility is 'cleared' on a project, then after a period of time passes, a county utility is 'cleared' on the same project... but when they're incorporated on the same plan sheet, conflicts appear. Utilities are given relocation schedules that do not coincide with construction time. For example, the contractor had milestones to reach for bonus money. In order to reach the milestone, Utility work had to be preformed in order for the contractor to do his milestone work. However, the Utility relocation schedule not only allowed more time than the bonus days to do the work, but the work is scheduled in different phases. Utility work, MOT, drainage work, work phases, allowable contract days don't appear to be coordinated.

- 3) Have you had any utility delays on this project or on a similar project? If so, what happened?
No delays... see above. The projects aren't similar because they are design-bid-build.
- 4) Does the contractor find it hard to push utility companies to follow the schedule? Why?
Not on the Ringling project, but in general, yes they do. In my opinion, Utility companies don't want to spend the money to relocate.
- 5) What methods have you used to persuade utility companies to relocate utilities on time?
Verbally asking them to complete their work. Making deals to let them leave facilities in place with an 'out of service' status. Redesigning our facilities to accommodate the Utility. Bringing the issue up the chain of command.
- 6) Who has more authority over utilities, FDOT or the contractor? Why?
FDOT. They are in our ROW.
- 7) Does the contractor need a staff member to handle the coordination activity?
Yes. Utilities are a full time concern.
- 8) Have you had any problems with price increases after a utility company gave an estimate? Please explain.
No. Usually, estimates, JPA's and relocations are resolved before it reaches our scope of work.
- 9) Have you been involved in a dispute with a utility company concerning utility delays on a design-build project? Please explain.
No.
- 10) Can you give me suggestions on ways to improve the coordination process to reduce delays or price increases due to utility relocation?
Someone needs to understand and head the process for utilities, and coordinate the effort between MOT, drainage, work Phase, utility relocation.
- 11) If there are any other questions, concerns or comments concerning this issue, please list them below. Thank You for your time.

APPENDIX J: EXCERPT FROM FDOT DESIGN-BUILD GUIDELINES

5.6 Utilities: The Design-Build Firm shall be responsible for identifying the existence, features and locations of any and all utilities within the limits of construction; for coordinating any required utility relocations or adjustments necessary for satisfactory completion of the Contract work; and for any and all work necessary to otherwise accommodate any and all utilities within limits of construction during construction and upon satisfactory completion of the work.

The Department will make available to the Design-Build Firm for inspection all utility permits and utility relocation information upon written request; however, the Department makes no representation as to the completeness or accuracy of such information and the Design-Build Firm relies on the completeness or accuracy of such information at it's own risk.

To the extent that there is found, within the limits of construction, one or more utilities that after reasonable pre-construction coordination and investigation by the Design-Build Firm is found to be either materially mislocated vertically or horizontally, materially different in features, or existing when previously undisclosed, the Design-Build Firm may pursue recovery of actual damages against the utility involved, up to and including the compensation formulas provided for in 4-3.2 and 5-12 of the Specifications, and the Department will grant the Design-Build Firm an assignment of rights the Department may have by permit or as a property right as to the utility, expressly limited however to only those rights necessary for the Design-Build Firm to pursue recovery of actual damages directly against the utility, and as limited above.

The utility company will be responsible for all relocation costs except when prior compensable interests exist.

APPENDIX K DRAFT SPECIFICATION FOR CONTRACTOR

UTILITY COORDINATION

7-11.6 Utilities:

7-11.6 .1 Coordination: The Contractor shall be responsible for coordinating any required utility relocations or adjustments necessary for satisfactory completion of the Contract work; and for any and all work necessary to otherwise accommodate any and all utilities within limits of construction during construction and upon satisfactory completion of the work. The Contractor shall coordinate the utility relocation work in accordance with any utility adjustment schedules included in the Contract Documents unless the utility company and the Department mutually agree to changes to the utility schedules shown in the Contract.

The Department will make available to the Contractor for inspection all utility permits and utility relocation information upon written request; however, the Department makes no representation as to the completeness or accuracy of such information and the Contractor relies on the completeness or accuracy of such information at its own risk.

To the extent that there is found, within the limits of construction, one or more utilities that after reasonable pre-construction coordination and investigation by the Contractor is found to be either materially mislocated vertically or horizontally, materially different in features, or existing when previously undisclosed, the Contractor may pursue recovery of actual damages against the utility involved, up to and including the compensation formulas provided for in 4-3.2 and 5-12, and the Department will grant the Contractor an assignment of rights the Department may have by permit or as a property right as to the utility, expressly limited however to only those rights necessary for the Contractor to pursue recovery of actual damages directly against the utility, and as limited above.

The utility company will be responsible for all relocation costs except when prior compensable interests exist.

7-11.6.2 Method of Measurement: When an item for this work is included in the proposal, the quantity to be paid for will be at the Contract lump sum price for Utility Coordination.

APPENDIX L RESULTS OF SURVEY ON CONTRACTOR UTILITY COORDINATION

Utility Relocation Coordination Responsibility
A Florida County and US State Survey

Prepared by

Dr. Ralph D. Ellis, Jr.

For
Florida Department of Transportation

April 2003

Florida Countywide Survey:

Does your DOT require the construction contractor to be responsible for the coordination of utility relocations during construction?

According to a survey conducted by the University of Florida, the following tables give the results to the question.

Table 1: Counties responding “Yes”

Alachua	Baker	Bradford
Broward	Charlotte	Citrus
Columbia	Desoto	Escambia
Hamilton	Hendry	Hernando
Hillsborough	Indian River	Jefferson
Liberty	Manatee	Marion
Orange	Palm Beach	Pasco
Polk	Putnam	Sumter
Suwannee	Taylor	Washington

Table 2: Counties responding “No”

Bay	Brevard	Calhoun
Clay	Collier	Duval
Flagler	Franklin	Gadsden
Gilchrist	Glades	Hardee
Highlands	Holmes	Jackson
Lake	Lee	Leon
Levy	Madison	Miami-Dade
Monroe	Okeechobee	Osceola
Pinellas	St. Johns	St. Lucie
Santa Rosa	Volusia	Walton

Table 3: Counties not responding to survey

Dixie	Gulf	Lafayette
Martin	Nassau	Okaloosa
Sarasota	Seminole	Union
Wakulla		

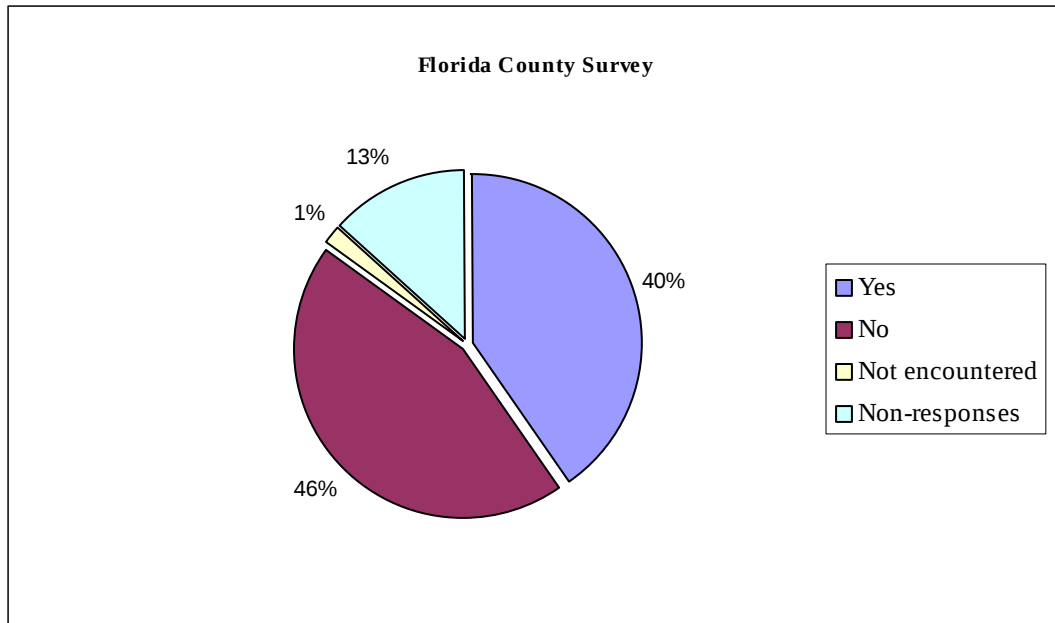


Figure 1: Florida County Survey Results

US Statewide Survey:

Does your DOT require the construction contractor to be responsible for the coordination of utility relocations during construction?

According to a study found in the June, 1999 issue of the GAO, "Transportation Infrastructure: Impacts of Utility Relocations on Highway and Bridge Projects", the following states were found to have included utility relocation work directly in construction contracts for certain projects.

Table 4: States having Relocation in Contract according to GAO Survey

Alabama	Alaska	Colorado
Delaware	Georgia	Kentucky
Louisiana	Maine	Maryland
Missouri	Montana	New Hampshire
North Carolina	Ohio	South Carolina

According to a survey conducted by the University of Florida, the following tables give the results to the question.

Table 5: States responding "Yes"

Idaho	Indiana	Massachusetts
Minnesota	Pennsylvania	Tennessee
Virginia	Washington	West Virginia
Wyoming		

Table 6: States responding “No”

Alaska	Colorado	Connecticut
Delaware	Florida	Hawaii
Illinois	Kentucky	Louisiana
Maine	Michigan	Mississippi
Missouri	Nebraska	Nevada
New Hampshire	New Jersey	North Carolina
North Dakota	Ohio	Oklahoma
South Carolina	South Dakota	Texas
Utah		

Table 7: States not responding to survey

Alabama	Arizona	Arkansas
California	District of Columbia	Georgia
Iowa	Kansas	Maryland
Montana	New Mexico	New York
Oregon	Puerto Rico	Rhode Island
Vermont	Wisconsin	

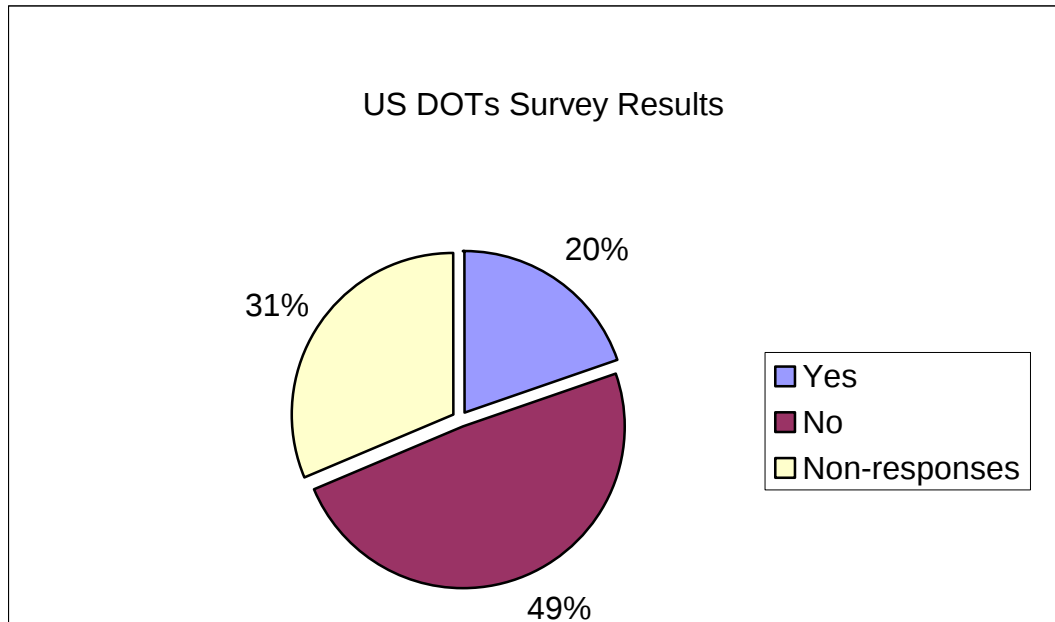


Figure 2: US DOT Survey Results

**APPENDIX M STATE OF THE UTILITIES 2003 (REPORT BY
KENNETH WELDON)**

STATE OF THE UTILITIES
2003

Kenneth E. Weldon
Florida Department Of Transportation

The objective of this document is to update management on current and future Utility issues being applied Nationwide and make a subjective comparison with the Florida Department Of Transportation's (FDOT) practices where appropriate. Issues to be addressed include, but are not limited to: construction delays, relocation practices and incentives, reimbursement practices, new standards of practice, new technology & research, and cooperation. Ancillary topics will be described in one of the most appropriate of the six previously stated issue topics. This material is derived primarily from knowledge gained over the last two years attending conferences and participating in or on National and Statewide Department Of Transportation surveys or task teams, and on Utility and Contractor task teams within Florida.

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INTRODUCTION

CONSTRUCTION DELAYS

Subsurface Utility Engineering

AS-BUILT INFORMATION

Utility Work Schedules & Bidding Practices

RELOCATION PRACTICES AND INCENTIVES

REIMBURSEMENT PRACTICES

NEW STANDARDS OF PRACTICE

NEW TECHNOLOGY & RESEARCH

Global Positioning Systems

Geographic Information Systems

Computer Aided Ground Penetrating Radar (GPR)

Computer Model For Determining Optimum Use Of The R/W

COOPERATION

CONCLUSIONS AND RECOMMENDATIONS

1. INTRODUCTION

The Department has continually sought ways to speed up the design and construction process. One element common to both processes is Utility problems. Florida is not alone in dealing with this problem. Virtually every state has tried different methods to either eliminate or minimize Utility issues. Many differences exist such as different state, county and city laws, environmental issues, soil conditions, and even public opinion as to the solution. Some States have improved procedures, others have processes or specific legislation, and still others manage through Utility incentives. With all the differences that exist, and schemes that have been tried, you would think someone would have found the right answer by now.

There is no single right answer! The one thing that has shown itself to work better than changed laws, procedures or incentives can be found in application of a simple cliché. It's as simple as the three "C"s, Communication, Coordination, and Cooperation. Virtually every Utility Engineer or Administrator, as well as Right Of Way Administrator or Agent, has repeatedly said this is what it takes to get the job done with minimal problems. Once an adversarial posture is assumed, the way gets rougher and schedules suffer regardless of incentives provided. A partnership must be established to be effective.

I would propose introducing a new cliché called the three "S"s. It is: Safer, Simpler, and Smarter! Working to these common ends provides the rhyme and reason to ensure Utility buy-in occurs. We need to convey to the Utilities that "Safer" means our Statutory mandate is to develop and maintain a safe highway system and our procedures are a means to achieve that end. "Simpler" means the Utility and the FDOT can simplify processes to reduce the paper work and maximize the return for the time. Lastly, we should both work "Smarter," not harder, by taking advantage of newer technology and reducing redundancy. This may involve ditching or limiting the use of relatively ineffective processes and replacing them with processes used by the Utility industry or other States.

Each of the above concepts will be demonstrated through the individual issues that are presented. The order of presentation will first be those things the FDOT can do independently and lastly, those that the Utility must do on their own or the FDOT must instigate.

2. CONSTRUCTION DELAYS

Every state experiences problems with Utilities causing construction delays. There are many reasons but only two root causes. They are: poor planning, and unforeseen conditions. It is arguable that proper planning could eliminate unforeseen conditions. For example you could do more data gathering in soils, locates and surveying. Every job is unique but to do what would be necessary to guarantee every bad soil and utility is located accurately would require an inordinate amount of time and would not be a cost effective approach.

We can't do anything about true unforeseen conditions. Therefore we will address construction delays that can be prevented in the design process where the track record can be improved.

Most problems arise from a lack of good information. This occurs when: 1. information is not communicated and coordinated adequately, or 2. when no one knows where the Utilities are located to a reasonable degree of accuracy. The only utilities you can guarantee to be at a specific point are exposed manholes and poles. You can't assume lines run between exposed valves and even manholes in some cases. If it isn't above ground you can not be sure of the alignment vertically or horizontally, that the facility is the same size and material throughout, or whether the condition of the facility may require special construction handling. All of these may result in an unforeseen condition.

Subsurface Utility Engineering (SUE) is being touted today as the answer to everything. It is not, yet it is one of the most cost effective tools available, when properly employed. Unfortunately, the FDOT does not to any significant extent, use SUE as is purported by CI/ASCE 38-02. We do a lot of utility potholing, not SUE!

Various studies say for every dollar spent on SUE from \$4.62 to \$5.83 in dividends are returned. Few FDOT District staff know what is intended to be included in the scope of service for SUE. A SUE contractor will give you what you ask for. If you ask for potholes that is what you get, but you are not getting SUE. If you are asking for potholes from a SUE contractor who expects to provide engineering related services, you may be paying too much. It might be more cost effective to use a surveyor.

The FDOT Utility Locates Contracts usually dictate obtaining locates data without allowing the process to work properly and place the liability where it should be, with the SUE contractor. This practice can result in inadequate information being conveyed. It may increase not only final construction cost but up front cost, because what we ask for is sometimes not necessary. The SUE involves making those decisions for you, and where possible saving you time and money.

No attempt will be made here to address in detail the levels of locates or services employed by SUE. This will be addressed more fully in Item Number 5. Suffice it to say if you are doing the highest level of SUE, the liability becomes the SUE Contractor's, and the firm is performing engineering by making evaluations and recommendations in the design and locate process rather than just potholing and providing survey information.

As-Built information is a must if future delays are to be minimized. When SUE is performed the data obtained should be saved in a useful and recoverable format to facilitate future designs and permitting activities. "If you are not recycling you are throwing it all away!" This is an environmental cliché that could apply to Utility locate data. It is estimated during the life of a transportation corridor of twenty years, information is obtained on the same utility on the average of five times. Somebody is paying for this information through roadway dollars or utility rates. The FDOT could save immensely by collecting and maintaining that data. Several months could be saved in the design process because advance

knowledge would allow for better planning and up front coordination as well as shorten the survey process.

Utility Work Schedules & Bidding Practices are often not complied with. In most cases this is the result of either poor communication in the design process or the Contractor changes either the phasing of construction or maintenance of traffic plan. The first is easily resolved. However, in the second case when a contractor makes a change in the bid documents (plans), the Utility may have to redesign or acquire different materials in support of the change. This may require the Utility to contract out utility design services that has inherent delays of advertisement and finding the right expertise, or be required to order materials that may take six months or longer to arrive.

If a Contractor change requires a Utility change at the last minute, it matters not that the Utility is legally obligated and the FDOT can take over the work. The issue is can it be done within the schedule. There is no benefit to posturing over authority. If the FDOT allows the Contractor to make indiscriminate changes that affect the FDOT schedule, then the FDOT and not the Utility is responsible. Seldom is the Utility made a party to the proposed change to seek cost effective and time saving alternatives.

There are no standards for how long it takes to conduct various utility functions as with other construction technologies. A Utility typically submits lengthy time schedules and the FDOT cuts them back subjectively. The Utility usually accommodates the FDOT schedule. The Utility Industry should be required to develop industry standards to facilitate better time estimates for work on FDOT projects. In the interim, each Utility should be required as a condition of getting a permit, to furnish the FDOT a basis of estimate of time needed to accomplish common tasks. If necessary it should be updated annually.

The Utility must be made a part of the project. Our work is nothing more than a relay race once a schedule is set. Every runner represents a different function carrying a baton. The baton can be dropped anywhere along the course affecting the results, but all are still teammates. Until we promote team work we will not be effective.

The FDOT should give consideration to establishing some pilot projects where the Contractor must bid based on the FDOT's Phasing and MOT plan with no significant changes that would affect Utilities. This is necessary to determine if projects can be more cost effective by shorter construction time, and with less utility problems. Another alternative could include the requirement that the Contractor submit with the bid any proposed change to the Phasing or MOT. The award would then be delayed a sufficient time to accommodate any required Utility design change, or may be based on the cost of that change to the public.

3. RELOCATION PRACTICES AND INCENTIVES

Most States, like Florida, do not pay for relocation or adjustment of utilities unless property rights are involved. Less than a dozen States have implemented over the last ten years

various incentives to encourage Utilities to relocate or adjust, and minimize if not eliminate, Utility related delays and construction supplemental agreements.

The various schemes employed vary with the State paying for all Utility relocation and engineering expenses to some percentage, of one or both of the expense items. Eighty or sixty percent State participation is the norm. Also tried has been the State requiring the letting of Utility work as part of the roadway construction contract with the exception of some specialized services. These may include high pressure gas and electric transmission facilities. Only one state has contracted electrical work.

Through consensus at the May 2003 AASHTO Utility Meeting the States that paid for Utility relocation and adjustment regardless of whether property rights were involved or not felt there was no long term benefit. Initially Utility participation was good and they were responsive to schedules. As time progressed and they realized they would get paid anyway, they became less responsive and the number of delays and supplemental agreements due to Utilities were no less than before State participation.

Virtually all states willing to share numbers were paying a higher or insignificantly smaller percentage in Utility delay claims and supplemental agreement costs than Florida. The obvious conclusion might be that incentives have many shortcomings and the best results are achieved through employing superior management and engineering practices.

4. REIMBURSEMENT PRACTICES

The FDOT reimburses expenses incurred based on property rights. Reimbursement occurs after completion of the work. Many States have found that the reverse philosophy works better in facilitating meeting the schedules.

Some States advance funds to Utilities to accomplish the required work. This allows the Utility to immediately contract design services that they can't do in-house or for which they can't immediately develop an immediate budget. When there are property rights and you know you are going to have to pay anyway, this philosophy is easily justified. But a few states advance funds when no property rights are involved and as appropriate seek reimbursement through lump sum or installments. Interest may be charged or not depending on the situation. Many States pay for all Utility work if it is a small un-incorporated city. The population factors in and is usually less than ten thousand even though the nature of the facility is also considered.

Some States advance funds as installments and not all at once. In contrast the FDOT requires a Utility to pay up front for one hundred and ten percent of all Utility cost in a Joint Participation Agreement. The above cited practices should be viewed differently from paying for the Utility work without recuperation of expenses. They are merely a means to facilitate the schedule being maintained. Many Florida Utilities have requested to be able to pay for work completed rather than having to advance funds up front. Our requirements impact the Utility budget unnecessarily and cause them to shift funds around to facilitate

work. This often shifts the budget deficit problem from one project to another or even multiple projects.

The FDOT should evaluate the benefit of advance funding at least where reimbursement is guaranteed and consider partial payment to reduce funding impacts on multiple projects. Instances when advance funding might be appropriate are the purchase of engineering services, rights of way, and materials.

5. NEW STANDARDS OF PRACTICE

The American Society Of Civil Engineers has adopted a standard for Subsurface Utility Engineering (SUE) best practices. It is entitled CI/ASCE 38-02, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data." The quality levels of service described in the guideline are generally in line with those found in the Utility Accommodation Manual with two exceptions. One, they are more explicit and encompassing; and two, it is made clear that each level incorporates the lower quality levels of service. This is a two edged sword.

By adoption of standard quality levels of service industry wide, the FDOT is also obligated to use these standards if liability is to be kept at a minimum. Historically the FDOT has specified what information it wanted from a SUE Contractor when obtaining Utility locates or potholing as described in Section 2 of this report. We typically dictate what we want without regard to the new ASCE Standard Quality Levels of Service. As such, if there are any damages in construction that can be tied to improper design based on misapplying the appropriate quality levels, the FDOT may be found liable. On the other hand the Utility has the same responsibility.

The ASCE Standard recommends technology in some cases technology that we in the FDOT would like to see but the Utility Industry has resisted. It is our position that we will reduce content in the UAM and reference the new Standard to facilitate proper use by everyone and eliminate any potential conflicts. This will require the FDOT to begin scooping its Utility locates based on desired Quality Levels rather than defining the number of potholes it will pay for. Only by adoption of this standard can we facilitate proper application of SUE.

6. NEW TECHNOLOGY & RESEARCH

Aside from improving on local design and construction meeting communication issues, there are two relatively new initiatives that are being adopted across the nation. Frankly the State of Florida lags well behind most states in years on these two initiatives. These are the use of Subsurface Utility Engineering (SUE) in concert with a Global Positioning System (GPS) and Geographic Information System (GIS). Some states are beginning to employ the newest Ground Penetrating Radar (GPR) techniques.

GIS and GPS standards for recording all topography on a project, whether above or below ground, have already been adopted by most states. ArcView software has become the standard but certainly not the only viable one. Most states are pursuing a significant GIS/GPS budget recognizing it is a cost effective aid in planning and design, with the ultimate benefit being received in the construction process. This process is used to develop base maps and as-built information as multi level plots that aide in numerous data base and other functions from reconstruction to evaluating damage and restoration of services in a calamity. While some Utilities argue they don't want such data to be recorded nor do they wish to fund it, it is incumbent upon the FDOT to know what is within the right of way to accomplish its statutory objective of managing its resources cost effectively.

Construction delays can be minimized through improved communication, coordination, and cooperation. But it is necessary to have something accurate to communicate. This is where SUE, GPS and GIS come into play.

GPR or Ground Penetrating Radar (not to be confused with GPR - Gradient Phase Readout) has been used for a number of years with limited success. This was largely due to the past need to have trained interpreters of the data and a limited environment in which it could be relied upon. With advances in microprocessors it is now possible to computerize the readout data to make interpretation understandable to most anyone with minimal training, and the environmental limitations have been reduced. It is now possible to develop more or less x-ray images of the features in the ground. It is analogous to an open field magnetic resonance imaging device (MRI) that is used to scan the human body in medical testing except this is for subsurface investigation of utilities. The proper application of this process costs less than what we are paying per square foot for so-called SUE or potholing while providing magnitudes of more valuable information.

Computer Aided GPR Tomography allows the designer to decide exactly where to make cuts in the pavement if necessary, and therefore minimizes disruption of traffic with much less public inconvenience. It is a vehicle mounted device that scans the area while driving down the roadway. It stores the data to produce images that can be looked at and analyzed in sections so accurately that depth is a product. This means you can literally plot images at any increment in inches or feet of depth, and determine where utility lines are that would not be found by potholing or where they converge. A pothole may be necessary to determine the type of facility and condition. This can eliminate the problem of Utilities not knowing if they have facilities in the roadway or not.

Many construction delays are caused by finding utilities in the field that were not picked up in the survey or identified by the Utility. This condition exists because most utilities didn't historically keep records of their facilities in detail. When a Utility is sold to another Utility, the latter seldom knew or acquired the location records and distinctions between active and inactive facilities. Consequently, the rights of way are loaded with undocumented facilities that are both active and inactive. It makes no difference to the contractor if it is active or inactive if he comes upon it and there is no clear distinction of what it is or who owns it. This is an automatic construction delay waiting to happen. Computer assisted GPR technology is pretty much limited

to a depth of seven feet if vertical accuracy is to be relied upon without digging and should not be used in a relatively high salts environment such as along the coast. Never the less it should prove beneficial in highly urbanized areas in most areas of the state. The FDOT should experiment with this technology in high traffic volume areas to get the biggest return.

Research funded by the FDOT Utility Section with the University Of South Florida is underway to develop a computer model that predicts the cost of making decisions relative to the placement of Utility facilities within the R/W. Historic and current Utility placement is based upon a first come first serve philosophy of where the Utility wants to be. This is “NO PLANNING” and has many impacts. It is my objective to enable development a cost effective scheme for any particular corridor. The intent is to establish a working tool that will allow the FDOT to tell the Utility where to place their facilities to minimize long and short term impacts to new construction, maintenance, and the public. A spreadsheet conceptual model has been completed and demonstrated. Further development of a compiled version is underway and will be available by the end of December.

The final model could conceivably be used not just by the FDOT but the Utility Company to select the optimum location prior to submitting a permit. The model can also allow the FDOT to determine the impacts of a new alignment shift to avoid utilities and assess a general public cost benefit.

7. COOPERATION

There are some issues that need to be addressed by Rule or Legislation. Utilities are in the process of downsizing or have downsized to the point many can no longer provide the required services mandated by the Statutes or Utility Accommodation Manual (UAM), or they are unwilling to do so. Often the Utility’s refusal to provide required services is explained away as our interpretation of the requirement is different from theirs and not legally required, unnecessary, or unreasonable due to the liability incurred in providing the service.

This situation is being experienced Nationwide by the various Departments of Transportation. This is largely in part due to severe reduction in Utility support staff and the Utilities are becoming a more litigious society that no longer takes the DOT’s threats as serious. The FDOT must be cooperative to foster the proper working environment. To this end, the Utilities Section over the last few years embarked on a major effort of training both FDOT and Utility staff in common interests. It has also increased the level of communication magnitudes over what it was six years ago and achieved open communication without everyday adversarial posturing.

Cooperation is also best accomplished when the roles are clearly defined. To this end, updating the Utility Accommodation Manual through the Rule Process is underway. Many of the issues

left to interpretation that have prevented the FDOT from effectively performing its task are being rectified through the new language with agreement by the majority of the Utilities.

Of late the Utility Industry has questioned our commitment of cooperation because we have not always followed the legal process of allowing them the ability to input on issues that affect them. This was done because some managers felt this was not necessary or incorrectly believed the actions of the FDOT did not affect the Utility Industry. It has been my position over the past six years to provide open communication and let them tell me when they were impacted and my not making that call for them. This is in line with Statutory direction and one I would like to continue to follow.

The FDOT and the Utility Industry need to spend more time learning each other's business in order to co-exist in the right of way with the least amount of friction and providing adequate service to our common customers. The Statutes do not require us to do as the Utility asks. It does require us to take into consideration any impacts our work has upon any industry. Since we do not know enough about the Utility's processes to know what impact we may have on their industry when we make changes, in the spirit of cooperation it behooves us to inform them of what we are doing and let them tell us if there is a problem. This is precisely why there was a separate Liaison Rule that was incorporated into the UAM in 1999 and why we are obligated to make a reasonable effort in communicating with the Utility Industry.

The FDOT needs to recognize Utilities as partners in the use of the right of way as guaranteed by the Statutes and act accordingly. That partnership should extend into the design arena and not operate solely on the basis of avoidance. Cooperation is beneficial to both parties.

8. CONCLUSIONS AND RECOMMENDATIONS

It is the consensus of the State Utility Engineers attending the last AASHTO Utility Meeting that paying for Utility relocation and adjustment beyond what is afforded by property rights is not cost effective nor does it guarantee less Utility delays or that construction supplemental agreements will result. It has been determined that a consistent application of good balanced policies and procedures along with much repetitive training and communication is the sole key to keeping Utilities on schedule. This substantiates the need to implement the use of the three "S"s, safer, simpler, and smarter.

The following is a summary list of recommendations that would improve our ability to work with Utilities and better insure cost effective designs will result with minimal cost associated Utility delays and supplemental agreements. I have prioritized the following list in the order of believed diminishing return with research implementation falling last due to the inability to immediately implement some of the options.

- Communicate to the Utility Industry the same as you do with other partners such as the Consultants and Contractors.

- Reinforce the position of the UAM by taking Legal action when non-compliance is more than incidental.

Develop and maintain Utility as-built information in a CADD or GIS database format.

Embrace new technology and standards by employing GIS/GPS/GPR.

Implement the proper use of Subsurface Engineering practices in accordance with the ASCE guidelines.

Implement procedural changes that allow timely partial utility payment, provide for advance reimbursement to expedite schedules, and limit Contractor changes to bid documents without Utility involvement.

Implement research on “Optimum Placement Of Utilities” when the final model is complete and make it available also to the utilities to use.

**APPENDIX N LIFE CYCLE INFRASTRUCTURE
MANAGEMENT (WHITE PAPER BY NATHANAEL
WINTHROP)**

Life Cycle Facility Management

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The Florida Department of Transportation is faced with several challenging trends of increasing difficulty in the 21st Century. Existing and projected population growth will require the expansion and improvement of existing transportation facilities. Costs and litigation to acquire additional right of way required for the expansion of the existing transportation infrastructure continue to escalate. The variety, density, and complexity of utilities located within FDOT right of way has increased drastically within the last twenty years. Current traffic demands on many roadway facilities require that the number of existing travel lanes be maintained throughout the proposed reconstruction which results in phased TCP, limited access and productive areas, increased construction costs, and increased contract time. Finally, public pressure to minimize impacts to the traveling public and adjacent retail facilities have limited lane closures, driveway closures, yet the public increasingly demands reduced reconstruction timeframes.

These trends are neither independent nor complimentary. In fact, all of these trends currently and will continue to affect each other adversely. Alternative contracting efforts to encourage the contractor to apply the additional resources will only potentially have a limited affect upon the reduction of construction contract time. If further contract time reductions of substance are desired by the Department, a vastly different approach to the long term management of these roadway facilities is necessary.

What is needed is a Life Cycle approach to the management of FDOT transportation facilities. There are four major elements to the life cycle of a roadway project:

- 1) Design
- 2) Utility Permitting & Relocation
- 3) Roadway Reconstruction
- 4) Occupancy and Maintenance

These elements may overlap and be somewhat concurrent for certain projects. However, the relationship, prioritization, and transition between these elements can be uncertain and problematic.

Short Term Strategies to Improve Utility Coordination

1. All utilities should be depicted and labeled on drainage structure x-sections. This includes:
 - a. Existing Utilities Both JPA & Non-JPA
 - b. Proposed Utilities (JPA & Non-JPA)
 - c. Aerial w/ pole line offsets and removal order on poles.
2. JPA plans and all utility permits should be standardized:
 - a. Should require construction layout using PLS and PLS signed as-builts.
 - b. Should reference same baseline as affected proposed drainage structures
 - c. Should be depicted on drainage x-sections
 - d. Should indicate what previous plans, permits, or as-builts were checked by permittee for conflicts when developing their permit.
 - e. Should provide offset, station, and elevation information specific to a defined point on their conduit, manhole, pipe, etc. i.e. top of pipe, center of pipe, corner of MH, etc.
 - f. Should as a general rule, have a preferred placement for proposed or relocated facilities, i.e. what ideally goes deepest to shallowest in order to stack utilities and maximize use of ROW. Some facilities require access from the top (water) some do not (phone conduit).

Long Term Development / Modernization

- 1) Use of Web based GIS ARCVIEW (or ARCInfo, both ESRI products) software to incorporate and record all project elements.
 - a. Roadway Drainage
 - b. Bridges including Foundations
 - c. Signalization and Sign Foundations
 - d. Overhead and Buried Utilities
 - e. Contaminated Areas
 - f. Soil Boring Information
 - g. Project Documentation
- 2) Use of mm Accurate GPS Base Station Survey Techniques by the CEI / inspection staff during actual construction to record electronic as-built information to be incorporated into the master GIS database for all project elements.
- 3) Use of completed GIS as-builts to assign and document future locations for utilities during the utility permitting relocation process.
- 4) Use of completed GIS as-builts to incorporate interim improvements during Occupancy and Maintenance.
- 5) Use of completed GIS as-builts to incorporate traffic count data during Occupancy and Maintenance.
- 6) Use of completed GIS as-builts to incorporate annual inspections and facility assessments (pavesmart or other automated assessment techniques) during Occupancy and Maintenance.
- 7) Use of GIS as-builts to acquire ROW, plan and incorporate design elements for reconstruction, improvements, or expansion of the facility towards the end of the life cycle or upon over capacity.
- 8) Allow access to designers, utility agencies, contractors, planners, city, and county officials to the updated existing and proposed project in a GIS database to aid in their development strategies. Return to Step 1.

Maximization of the Return

The amount of effort and resources allocated for this long term strategy should be considered an investment. A substantial return on such an investment would be realized in steps 7 and 8. The “return” would materialize in various direct and indirect forms.

- 1) Reduced conflicts and utility delay claims.
- 2) Maximized density and use of available ROW for all facilities.
- 3) Reduced Construction Timeframes.

Here is perhaps, potentially, the greatest return. The spectrum of projects from a construction aspect are bounded by these two extremes. The construction durations for roadway construction projects built in the middle of the virgin forest are completely prime contractor resource dependent (like the Suncoast Parkway). Conversely, the construction durations for roadway urban **Reconstruction** interchange projects are dependent upon many factors besides the application of prime contractor resources. These factors can be considered limiting factors to production:

- A. Reduction of access and storage areas
- B. Increased Complexity of TCP, and Reduction of construction areas.
- C. Increased Density of Utilities
- D. Lane Closure Restrictions and traffic demand.
- E. Business and Pedestrian Access (driveways and sidewalks).

That is, there is a more sudden and pronounced diminishing rate of return for the application of additional men, material, and equipment given any increase in the listed restrictions. These restrictions will also make it difficult to determine what initial elements of the project are driving the overall completion of the project. Is it JPA utility installation, non-JPA utility installation, storm drainage installation, or temporary asphalt installation?

Unfortunately, TCPs are seldom designed with subsurface or aerial utilities in mind. Inadvertently, the project TCP may trap the prime contractor and a utility agency into competing for the same space during construction. Instead, several TCP scenarios should be considered that account for roadway and utility (JPA and non-JPA) reconstruction efforts. A “systems” approach to research the installation, relocation, and removal of utility components should be used to complement and develop the TCP and certain permanent roadway features. Specifically, what side of the Road should Phase 1 construction be located, left, middle, or right roadway? How much temporary asphalt should be used, and where should it be located to maximize available construction areas and concurrent work in an effort to decrease contract time. Should MSE walls be utilized that may be cheaper but require greater access and construction areas that complicate the TCP **OR** should sheet pile walls be used that may be more expensive but increase production and reduce construction limit requirements? Which utilities should be JPAs? Should gravity sewer be used that is cheaper with less long term maintenance, or should force main be mandated that takes up far less space and is not grade dependent? Which utilities should be installed prior to construction, and which are dependent upon the roadway contractor? Traffic Control Phasing design should be modeled using P3 software in detail that matches FDOT CPM specifications. The modeling will determine critical elements given various phasing, and subsequent iterations will optimize the design of Traffic Control Phasing, utility coordination and design, permanent roadway features and contractor resources to minimize construction durations. Currently these elements are neither coordinated, complimentary, nor contemplated in their entirety by the FDOT prior to bid. In order to substantially reduce contract time all elements from the permanent design, TCP, utilities, and alternative contracting choices should be on the table at the same time. Use of a GIS ARCVIEW software to incorporate all of this information in a spatial representation to facilitate the development of a detailed decision matrix is paramount to this effort.

- 4) More efficient use of contractor’s resources.
- 5) Less economic impact to the public.