CHAPTER 2
Planning and Design Task Team Best Practices

2.1 CHAPTER SUMMARY

2.1.1 Critical Areas of Study

Inadequate legislation or limited one-call system practices can hamper the planning and design process. Information about existing facilities should be obtained early in the design process to facilitate a design, which minimizes conflicts between facilities.

As a project proceeds, continued design interface is essential to minimize the impact of inaccurate location markings of facilities and the impact that discovery of unknown facilities may have on the project's safety, schedule and cost.

2.1.2 Major Conclusions Reached

- Planning and design must be recognized as an integral part of damage prevention and the one-call process.
- Interfaces between the project owner, designer, and the contractor should be maintained through the bid process and all phases of construction.
- Damage prevention legislation and one-call system practices should provide designers with opportunities to obtain information about facility owners/operators located in or near the proposed excavation area.

2.2 BACKGROUND AND MOTIVATION

2.2.1 Motivation for the Entire Work Effort – Continuing Excavation Damage

Underground facilities have become increasingly complex and congested. Power and communication lines have joined water, sewer and gas distribution lines underground. Petroleum product and natural gas transmission lines have become more numerous and slurry product lines and cable television lines were added to the mix. A deregulation of telecommunication services added dozens of new underground lines for long distance carriers.

Many new facilities were directly buried and fragile lines could be easily damaged by excavation or even by locating methods intended to prevent damage. Television cables of foam filled aluminum tubes could be easily dented with a resulting loss of use. Fibre optic telecommunication lines as small as a pencil may carry thousands of channels and could be cut with a shovel; usually these lines could not be readily detected with ordinary locating instruments. Often little consideration is given to designing new installations to prevent future excavation damage. This made apparent the need for improved planning and design to minimize the potential for damage to facilities. As the number of installations increased, excavations increased and excavation damage to existing facilities began to soar.

One-call systems were developed to reduce the number of telephone calls an excavator was required to make and to further encourage calling before digging. By 1970 the first one-call system began operating in Rochester, New York. Excavators were encouraged to contact facility owners/operators before excavating so that the locations of existing lines could be marked on the ground surface. Some states had adopted laws requiring various levels of excavation care. The emphasis was and still is to "Call Before You Dig!"

The concept of designing excavations and facilities to avoid damage has developed slowly. Only a few states have included planning and design in their damage prevention laws. In many areas the use of the one-call center for planning and design is discouraged or even prohibited as a one-call system service. However, planning and design must be recognized as an integral part of damage prevention and the one-call process. Efforts must be made to encourage efficient damage prevention. Consideration must be given to the development of underground facility installation practices and construction standards that will minimize damage during subsequent excavation for installation or maintenance.

2.2.2 Scope for the Planning and Design Task Team

The scope of the Planning and Design Task Team was to identify and describe planning and design practices used to prevent damage to buried facilities prior to breaking ground. The Team also attempted to identify and describe the design practices used during and after excavation activities to avoid existing subsurface facilities. Through this process the Team has identified the best planning and design practices in support of underground damage prevention.

2.2.3 Chapter Contents

This chapter contains the following major sections:

- Chapter Summary
- Background, Motivation, Scope, and Chapter contents
- Team Members and their organization
- Data Collection and Evaluation Process
- Issues Identified
- Findings
- Measuring Improvements
- Path Forward
- Emerging Technologies Report

2.3 TEAM MEMBERS

The Planning and Design Task Team members are listed below. A brief biographical sketch of each Team member, that serves to validate their participation in the Study effort, is included in Appendix F, "Common Ground Study Team Member Biographies."

Team Member	Representing[7]	Employer
Larry S. Abraham	INGAA	BP Oil Company
Robert C (Bobby) Arnold	INGAA	Duke Energy
Matt Bacon	NTDPC	Sprint
Johnny Becker	NUCA	Pipelayers, Inc.
Rocco Deprimo	State OPS	Florida Department of Transportation
James Farrell	AAR	Union Pacific Railroad
Don Gordon, Co-Chairperson	Electric Power Transmission and Distribution Industry	Wisconsin Electric (Ret)
Anne-Marie Joseph	OPS	Office of Pipeline Safety HQ
Gary Mentjes	AAR	Canadian Pacific Railroad
Patrick Murphy	A.G.A.	Consolidated Edison of New York
Paul Norgren	API/AOPL	Lakehead Pipe Line
John Robertson, Co-Chairperson	NULCA	The Spectra Group, Inc.

Others that participated in the Task Team's discussions but did not participate in the consensus decision process include:

Team Participant	Representing	Employer
Ziyad Doany, Emerging Technology Liaison	Industry, Research and Development	3M, Telecom Systems Division
Paul Scott, Linking Team Liaison	FHWA	U.S. DOT Federal Highway Administration

[7] See Appendix D for a detailed list of acronyms.

2.4 DATA COLLECTION AND EVALUATION PROCESS

2.4.1 Information Sources

- Company Procedures
- Industry Standards
- Operating Practices
- Expert Opinions
- Governmental Laws and Regulations

2.4.2 Process for Collecting Information

The Task Team members represent pipeline owners/operators, long distance communication carriers, railroads, gas and electric power public utility transmission and distribution companies, states' departments of transportation, the Office of Pipeline Safety, one-call systems, excavators, and subsurface utility engineering providers. Task Team members familiar with each issue were assigned the task of researching that issue and providing objective information about that issue for team discussion. To protect proprietary information, company names were stripped from examples when requested.

2.4.3 Process for Selecting Issues

The Task Team utilized an outline developed during an early meeting of the Linking Team to develop issues. The Team discussed the planning and design issues in the categories of planning, design, pre-bid/bid, construction and post-construction. The Team agreed at its first meeting that the planning and design process should not end when construction begins. Rather, interface meetings between the project owner/operator, designer and contractor(s) should continue through a final review meeting.

2.4.4 Process for Evaluating Practices

The following criteria was used to determine which existing practices were best practices:

- Benefit to Damage Prevention
- Within the Team Scope
- Consensus

2.5 ISSUES IDENTIFIED

The following issues were identified by the Planning and Design Task Team in five categories:

2.5.1 Planning

- Sharing information
- Plat designation of existing lines/easements
- Design requirements

- Relocation Design Rule
- Underground Facilities Survey
- Subsurface Utility Engineering
- Marking existing facilities on drawings
- Utility Coordinating Committee

2.5.2 Design

- Effective above ground markings
- Clearances required by code
- Utility Conferences (minimize conflicts and investigate potential conflicts)
- Send plans to facility owners/operators for information to identify conflicts
- Pot holing
- Color coding

2.5.3 Pre-Bid/Bid

- Continued interface with designer
- Pre-qualification of contractors
- Mandatory pre-bid conferences (identify lines and any special provisions)

2.5.4 Construction

- Continuous interface (owner/designer/contractor)
- As-built drawings
- Tracer wires on non-metallic lines
- Abandoned facilities
- Discovered unknown facilities

2.5.5 Post-Construction

- Cathodic protection test
- As-built drawings

2.5.6 Standards Under Development

- The American Railway Engineering and Maintenance of Way Association (AREMA), "Specifications for Fiber Optic Route Construction on Railroad Right of Way"
- American Society of Civil Engineers (ASCE) “Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data”

2.6 FINDINGS

The following were determined by consensus as best practices by the Planning and Design Task Team:

Planning

1. Plat Designation of Existing Underground Facility Easements
2. Gathering Information for Design Purposes
3. Identifying Existing Facilities in Planning and Design

Design

4. Utility Coordination
5. Markers for Underground Facilities
6. Follow All Applicable Codes, Statutes and Facility Owner/Operator Standards

Pre-Bid/Bid

7. Use of Qualified Contractors
8. Mandatory Pre-Bid Conferences
9. Continuous Interface between the Designer and Potential Contractors during the Pre-Bid/Bid Phase

Construction/Post-Construction

10. Continuous Interface between the Designer and the Contractor during the Construction Phase
11. As-Built Drawings

2.6.1 Planning

1. <u>Plat Designation of Existing Underground Facility Easements</u>

Practice Statement: Plats involving development of real property include the designation of underground facility easements.

Practice Description: Various items are required on the plats filed prior to the development of lands. Where plats are required to be filed, the items required include the identification of the easements of underground facilities traversing the land described on the plat. Identification of easements of underground facilities on the plat increases notice to developers and the public about the existence of the underground facilities. Notification to the owners of underground facilities that a plat has been filed alerts underground facility owners/operators to establish communication between the developers and the operators to facilitate a plan and design for the use of the land which complements the underground facility.

Example of practice: St. Louis County surveyors in Minnesota require that plats show easements of underground facilities. Conditional use permits are required to develop gravel pits in St. Louis County, Minnesota, and a prerequisite to the permit being issued is the notification to the owners of underground facilities that a permit to develop the gravel pit in the vicinity of their facilities has been sought.

Benefits: Often underground facility owners/operators do not receive notice of developments impacting their facilities until excavation activity has commenced. This compromises the optimal use of the land and potentially compromises the integrity of the underground facility.

Reference:
St Louis County, Minnesota zoning ordinances.

2. Gathering Information for Design Purposes

Practice Statement: The designer uses all reasonable means of obtaining information about underground facilities in the area of the planned excavation.

Practice Description: During the planning phase of the project, all available information is gathered from facility owners/operators. This includes maps of existing, abandoned and out-of-service facilities, cathodic protection and grounding systems, as-builts of facilities in the area if the maps are not current, proposed project designs, and schedules of other work in the area. This information is gathered for the purpose of route selection and preliminary neighborhood impacts, and as part of the process of impact analysis when evaluating different design possibilities.

Methods of gathering information may include contacting a one-call center, facility owners/operators, coordinating committees/councils, other designers, engineering societies, and governmental agencies as a means of identifying underground facility owners/operators in an excavation area. Gathering information may also include a review of the site for above ground indications of underground facilities (i.e. permanent signs or markers, manhole covers, vent pipes, pad mounted devices, riser poles, power and communication pedestals and valve covers). The one-call center provides a listing of operators directly to the designer, or to the designer's subsurface utility engineer. This information is available in formats that are accessible to all users such as voice, fax, E-mail or web-site. Once identified, the designer contacts the operators directly or uses the one-call system. The facility owner/operator may locate their underground facilities or provide locations of their underground facilities to the designer by other means, such as by marking up design drawings or providing facility records to the designer.

Examples of Practice:

- As a minimum, the designer responsible for the preparation of plans and specifications for an excavation obtains information on underground facilities within and near the project area. Some states, such as Wisconsin, Pennsylvania and Minnesota have statutes requiring such designers to contact one-call centers within a set time frame to obtain facility information. Where the information obtained suggests facilities may conflict with the excavation, an underground facility survey or subsurface utility engineering is used.

- Designers often utilize an underground facility survey process to minimize conflicts with existing underground facilities. The underground facility survey process employed in New York, NY, by Consolidated Edison and other utilities has several distinct steps. Each of the steps is performed in order, but any higher step may be omitted, depending on the proposed construction and the locations of existing underground facilities discovered in the next lower step.

  Underground Facility Survey Steps Include:

  < Use company records and contact other facility owners/operstors to obtain information about locations of existing underground facilities. This step includes the entire construction/excavation area.

  < Using the information obtained in the first step, visit the job site to correlate the information gathered about existing underground facilities with above ground features. This step may be limited to those portions of the construction area where existing facilities are present and where excavation is to occur.

  < Use appropriate instruments or other methods to determine the approximate horizontal locations of the underground facilities identified in the second step. This step may be limited to specific areas where existing facilities are expected to conflict with excavation.

  < Use test holes to positively determine the exact location of existing underground facilities. At this point, horizontal and vertical control measurements may be taken of the underground facility. This step is usually limited to those specific areas where conflicts are anticipated between existing facilities and proposed construction activities or proposed facilities, or where elevation information is essential to design the proposed facility.

Test holes are used to positively locate and identify an underground facility by exposing the facility by a non-destructive means of excavation. Such non-destructive means can be by hand, vacuum truck, air knife, etc.

Test holes may be requested under the following conditions:

(the design calls for a grade change,
(facility records indicate that proposed underground facilities or excavation may be in close proximity of existing underground facilities,
(elevations of proposed sewers or drains may interfere with existing underground facilities where required to determine potential geometry changes for water main installations,
(to locate points where proposed underground facilities may be tied into existing underground facilities, and
(to determine environmental conditions in an excavation area.

Test hole data includes at a minimum:

(date performed and purpose;
(type of existing surface and base of roadway or sidewalk and depth of each;
(general soil conditions found;
(any indication of oil or waste materials found in the pit; and
(facility cover, size, configuration, elevations (if applicable), and distance from curbs or other horizontal control.

- Subsurface Utility Engineering (SUE) is performed by, or under the direction of a registered professional engineer. SUE includes up to four quality levels for gathering underground facility information, to be specified by the project owner to be part of the project planning and design process. The Federal Highway Administration (FHWA) advocates its use and many state DOT's, such as but not limited to, Virginia, North Carolina, Maryland, Texas, Ohio, Florida, Washington, and Delaware, use this process.

Subsurface Utility Engineering Quality Levels are:

< Quality Level D information comes solely from existing utility records. It may provide an overall "feel" of the congestion of utilities, but it is often highly limited in terms of comprehensiveness and accuracy. Its usefulness should be confined to project planning and route selection activities.

< Quality Level C involves surveying visible above ground facilities such as manholes, valve boxes, poles, pedestals, pad-mounted devices, etc., and correlating this information with facility records obtained in Level D. When using this information, it is not unusual to find that many facilities have been omitted from

records or erroneously plotted. Its usefulness should be confined to locations where facilities are not prevalent or are not expensive to repair or relocate.

< Quality Level B involves the use of surface geophysical techniques to determine the existence and horizontal position of facilities, including those identified in Level C. This activity is called designating. Two-dimensional mapping information is obtained. This information is usually sufficient for excavation planning. Decisions can be made on where to place structures or new facilities to avoid conflicts with existing facilities. Slight adjustments in the design can produce substantial cost savings by eliminating facility relocations.

< Quality Level A involves the use of nondestructive excavation devices at critical locations to determine the precise horizontal and vertical position of existing facilities, as well as the type, size, condition, material, and other characteristics. This activity is called "locating." When surveyed and mapped, precise plan and profile information is available for use in making final design decisions. Additional information such as facility material, condition, size, soil contamination and paving thickness also assists the designer and facility owner/operator in their decisions.

Caution: Both the underground facility survey process and Subsurface Utility Engineering (SUE), as described above, may include marking the ground surface to indicate the approximate location of existing underground facilities. Both processes are tools to be used in project design. They should not be confused with underground facility locating (and marking) that is performed in response to a request, usually by an excavator, to a one-call center, immediately prior to beginning excavation work, as described elsewhere in this Report.

Some one-call centers accept calls for design purposes but the locating usually provided in response to such calls should be enhanced as described in this Chapter to be adequate for project design purposes. Such locating, however, may be adequate when planning smaller excavations and less extensive work where excavations can easily be adjusted to avoid marked facilities with appropriate clearances. Such less extensive work might include utility pole replacements, electric power or communication buried service installations, highway sign replacements, roadside ditch cleaning, smaller homeowner excavations or residential fence posts.

Benefits: Gathering underground facility information and including this information in the planning phase minimizes the hazards, cost and work to produce the final project.

- Safety is enhanced.
- Unexpected conflicts with facilities are eliminated.
- Facility relocations are minimized.

References:

- Wisconsin Sec. 186.0175 Stats.
- Minnesota Statute 216D.

- Pennsylvania Act 287 of 1974, as amended by Act 187 of 1996.
- See related Finding Number 3, "Identifying Existing Facilities in Planning and Design."
- "Construction Management Interference Control Manual," Consolidated Edison, New York, New York, June 9, 1997.
- Subsurface Utility Engineering, Federal Highway Administration (FHWA), February 1999, Office of Program Administration (HIPA).
- Florida Department of Transportation Utility Accommodation Manual, Document No.: 710-020-001-d, Section 11.4, January 1999.

3. Identifying Existing Facilities in Planning and Design

Practice Statement: Designers indicate existing underground facilities on drawings during planning and design.

Practice Description: During the planning phase of the project, existing facilities are shown on preliminary design plans. The planning documents include possible routes for the project together with known underground facility information. The various facility owners/operators are then given the opportunity to provide appropriate feedback.

During the design phase of the project, underground facility information from the planning phase is shown on the plans. If information was gathered from field located facilities, from underground facility surveys or from subsurface utility engineering, this is noted on the plans. The designer and the contractor both know the quality of the information included on the plans. If an elevation was determined during the information gathering, it is shown on the plan. The facilities shown include active, abandoned, out-of-service, and proposed facilities. The design plans include a summary drawing showing the proposed facility route or excavation including streets and a locally accepted coordinate system. The plans are then distributed to the various facility owners/operators to provide the opportunity to furnish additional information, clarify information, or identify conflicts.

Examples of Practice: The City of San Antonio, Texas, Public Works Department requires three main phases of design in engineering contracts. The 30% design submittal includes existing utilities in plan and profile views, taken from existing records. During this phase the designers have coordinated with the local facility owners/operators and coordinating council to learn what facilities are in the project area. The plans are obtained where available and shown and used in the design. Potential facility conflicts are noted in this phase. A summary drawing is included to orient the project and show the streets and major facilities.

The 60% design submittal updates the 30% submittal. This phase includes the balance of the field work, geotechnical information, and relative elevations on all facilities in potential conflict. It includes preliminary traffic control plans and Office of Safety and Health Administration (OSHA) requirement considerations. During this phase, the designers visit the site after the facilities have been located.

The 90% submittal includes final identification and resolution of conflicts with facilities, final facility designs, project schedule, and description of management of potential hazards.

Benefits: Providing complete underground facility information and including this information on design drawings reduces the hazards, simplifies coordination and minimizes the cost to produce the final project.

4. Utility Coordination

Practice Statement: Project owners and facility owners/operators regularly communicate and coordinate with each other concerning future and current projects.

Practice Description: Utility coordination fosters an open exchange of information among private and public facilities, governmental agencies and construction related organizations. Utility coordination also promotes cooperation among said groups in the planning, design and construction of projects affecting the overall good of participating parties, their organizations and customers or constituents, and the general public.

Utility Coordinating Committees (or Councils) include private utilities, public agency utilities, engineering firms, contractor associations, and others with facilities or business interests in public rights-of-way. Coordinating Committees function in multiple communities, counties and states to promote excavation project coordination. Typical items of discussion include facility excavations in existing and recently paved roadways, disruption of essential facility services, location of utility facilities, environmental impact of damages to utilities, permit procedures, right-of-way access controls and underground facility damage prevention. Plans of future roadway improvement and of future facility installations are reviewed regularly.

Examples of Practice:

- The Los Angeles, CA, Substructure Committee meets monthly to share information on specific projects and to review facility and roadway issues. The meeting agenda includes minutes of previous meeting, project status report, reports of interest from each agency, and a one-call center report. Substructure reports are issued which list upcoming projects and projects in progress.

- The San Antonio, TX, area Utility Coordinating Council meets monthly and coordinates lists of planned projects two years in advance. The streets and drainage improvement projects drive most of the utility adjustments. All utilities have the opportunity to move, replace or maintain their plant prior to or as part of the project.

- Arizona Utility Coordinating Committee

- Albuquerque, NM, Utility Council

- Dane County, WI, Coordinating Committee
- Georgia Utility Coordinating Committee
- Florida Utility Coordinating Committee
- Legislated Coordination in Wisconsin – Sec. 84.063 Wis. Stats. and Wis. Administrative Rule Trans., 220.

References:

- Wisconsin Administrative Rule Chapter Trans 220 "Utility Facilities Relocations."
- Arizona Utility Coordinating Committee (AUCC) Public Improvement/Project Guide, December 1996.
- Highway/Utility Guide (FHWA), Publication No. FHWA-SA-93-049; June 1993.

2.6.2 Design

5. <u>Markers for Underground Facilities</u>

Practice Statement: The presence and type of underground facilities are indicated by permanent above and below ground markers and material.

Practice Description: A combination of above ground and below ground markers is used to identify and locate underground facilities. The purpose of above ground markers is to identify underground facilities, not to locate for excavation or circumvent the one-call process. However, designing underground facilities for future location reduces the risk of an incorrectly marked underground facility during an excavation project. Above ground markers are developed during the design process and include the company name, type of facility, emergency contact, and the one-call number. The locations and types of markers are specified in the construction plans. The design provides a marker system to include, but not limited to, stream crossings, public road crossings, other facilities' right-of-ways, railroad crossings, heavy construction areas, and any other location where it is necessary to identify the underground facility location. If non-detectable facilities are being installed, the design includes a means to accurately locate the underground facility from the surface. The facility is color-coded in accordance with the APWA guidelines to assist in identifying the particular facility. Road decals, stencils, tracer tapes, electronic markers or other appropriate systems may mark areas where traditional markers are considered impractical.

Example of Practice:

- A developer is planning a subdivision. The designer obtains a list of affected facilities and contacts the facility owners/operators for design and encroachment information. The design includes, as specified by the affected facility owner/operator, marker locations identified for each encroachment during construction and post-construction.

- A company is installing additional underground facilities. The designer obtains a list of affected underground facilities and proceeds as above. In addition, the designer includes a detailed marker system to effectively mark the underground facilities to aid in the prevention of third party damages and future locates. Examples of a detailed marker system are:

  < Tracer wires on non-metallic facilities, or
  < Electronic markers or surface markers for facilities at excessive depth.

Benefits: Provisions to aid in future locating requests are included in the design. In addition, an effective marker system is beneficial to the underground facility owner/operator and first responders to an area involving more than one underground facility or an incident near underground facilities.

References:
- 49 Code of Federal Regulations (CFR) Part 192 & 195.
- Industry Standards.
- APWA, "Guidelines for Uniform Temporary Marking of Underground Facilities."

6. Follow All Applicable Codes, Statutes and Facility Owner/Operator Standards

Practice Statement: When planning and designing the installation of new or replacements of existing underground facilities, the designer follows all federal, state and local guidelines, codes, statutes and other facility owner/operator standards.

Practice Description: The designer of a facility project typically considers only national industry codes, regulations and practices applicable to that particular facility, and not of adjacent facilities. Regulations, codes, standards and other design documents generally specify depth of cover, and horizontal and vertical clearances between adjacent facilities. However, they are not always prescriptive and can be subject to interpretation by the designer. In addition, certain codes allow exceptions to the prescribed minimum clearances, contingent upon approval between the affected facility owners/operators.

The designer also has to consider the protection and temporary support of adjacent facilities, and any interference to existing cathodic protection and grounding systems. Consequently, the designer has to provide specifications on safety measures to be taken and procedures for emergency notification and repairs in the case of any damage to an adjacent facility.

Designers are aware of proposed and revised standards and codes that may affect the project.

Example of Practice: The Michigan Electrolysis Committee encourages cooperative efforts for the abatement of destructive corrosive conditions. The membership is open to any organization in Michigan which has property in Michigan and is involved in creating conditions which may cause or be damaged by electrolysis.

The Committee is interested in protecting the electrolytic condition of all members' systems. This includes notifying members of any damage or potential damage to electrolytic systems caused by nonmembers or members.

When changes in important bondings of underground structures or changes in drainage systems which would tend to affect electrolysis conditions on any underground structures are to be made, notice of this work is given to the Secretary-Treasurer so that all members of the Committee may be advised. Urgent cases of dangerous conditions needing immediate relief may be cared for temporarily by any member.

Examples and Sources of Standards and Codes:

- 49 Code of Federal Regulations (CFR) Parts 192 and 195.
- 23 Code of Federal Regulations CFR Part 645.
- National Fuel Gas Code.
- National Electrical Safety Code.
- National Electrical Code.
- American Association of State Highway and Transportation Officials (AASHTO) Standards.
- American Society of Mechanical Engineers (ASME) B31.8.
- National Association of Corrosion Engineers (NACE).
- American Society of Testing and Materials (ASTM).
- Occupational Safety and Health Administration (OSHA).
- American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual Chapter 1, Part 5 - Pipelines.
- Michigan Electrolysis Committee Standards.
- Wisconsin Corrosion Control Coordinating Committee Standards.
- Chicago Region Committee on Underground Corrosion Standards.

Examples and Sources of Proposed Standards and Codes

- Depiction of Existing Subsurface Utility Data
- The American Railway Engineering and Maintenance of Way Association (AREMA), "Specifications for Fiber Optic Route Construction on Railroad Right of Way"
- American Society of Civil Engineers (ASCE) “Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data”

Benefits: The designer reviewing codes pertaining to adjacent facilities minimizes any potential conflict of code clearance requirements, and facilitates future locating efforts.

2.6.3 Pre-Bid/Bid

7. Use of Qualified Contractors

Practice Statement: Qualified contractors are used to excavate on and near underground facilities.

Practice Description: Contractors that excavate on and near underground facilities possess the qualifications necessary to conduct such activities in a manner that is skillful, safe and reliable. The requisite qualification of the contractor serves to protect the public and integrity of underground facilities in the vicinity of the excavation. Using qualified contractors ensures that all contractors who bid and work on a project employ safe work habits and are capable of performing the requested work.

When working with contractors, the project owner is familiar with the contractors' work experiences and financial abilities and should not ask the contractors to bid beyond their capabilities. Allowing a competitive bidding process from qualified and competent contractors will assure the best quality and pricing available, while reducing damages to underground facilities.

Example of Practice:

- Duke Energy and other transmission companies have procedures in place to identify qualification requirements for contractors based on work history, insurance, financial statement, and safety records.

- The Florida Department of Transportation (FDOT) requires contractors to be qualified to perform transportation projects above $250K. FDOT reviews the financial history, employees construction experience, equipment list, work performance, and work history in determining the contractor's qualifications.

Benefits:
- Enhances safety,
- The quality of work increases, and
- Damage to facilities decreases.

References:
- Florida Law (Chapter 337.14 FS.) And Rules of the State of Florida, Department of Transportation, Chapter 14-22.
- Duke Energy of Houston, TX, procedures.

8. Mandatory Pre-Bid Conferences

Practice Statement: A mandatory pre-bid conference is held and bids are only accepted from attending contractors.

Practice Description: Depending on the level of impact of proposed construction upon facilities in the excavation area, the project owner or project designer requires potential contractors to attend a mandatory pre-bid conference including underground facility owners/operators. This pre-bid conference is exercised to discuss, among other things, the particular facilities in the area and the requirements to properly protect, support, and safely maintain the facilities during excavation. Official minutes are taken and disseminated as written to all attendees.

Example of Practice: Pre-bid conferences on larger projects normally include a senior contracts negotiator, real estate representative, the designer and staff, the general contractor and prime subcontractors. The conference may also include the local end-user and management personnel. The pre-bid conference can be used to issue the formal bid packages or scheduled within a brief period after the bidding contractors receive their formal bid packages.

During the pre-bid conference, the bidding contractors will be notified of what certifications will be required from the contractor. These certifications may include Shoring Competent Person certificates, railroad safety training certificates, resumes, commercial references and/or personal references.

Caution: This conference is not a substitute for notification of intent to excavate to underground facility owners/operators.

Benefits: Pre-bid conferences provide a forum for the contractor, owner and other interested parties to discuss a project and record binding changes or clarifications to the scope of the project. The pre-bid conference also provides an opportunity for all parties to review contract documents, regulatory requirements, schedules and submittal formats. Most large projects involve multiple levels of subcontracting activity, as well as multi-layered regulatory oversight. The pre-bid conferences traditionally address these issues in an open forum so that all bidders are equally aware of the ground rules. The ground rules would be both commercial and technical in nature, covering the spectrum from performance bonds to safety practices.

References:
Industry and governmental practices
- Florida Department of Transportation.
- Duke Energy of Houston, TX, procedures.

9. Continuous Interface between the Designer and Potential Contractors during the Pre-Bid/Bid Phase

Practice Statement: Once a project design is completed, the designer participates in the pre-bid/bid process.

Practice Description: The designer's continuing involvement during the pre-bid/bid phase with the potential contractor(s) allows for more effective communications between all parties. The designer can assess whether the interested bidders have the expertise needed and the correct understanding of the intended design.

Benefits:
- By providing quality assurance, this practice minimizes potential safety concerns and delays to project completion.

- The designer would have the opportunity to relay information not readily shown on the plans, such as accommodations of facility adjustments required to construct the project.

References:
- Industry Practice.
- Expert Opinion.

2.6.4 Construction/Post-Construction

10. Continuous Interface between the Designer and the Contractor during the Construction Phase

Practice Statement: The designer continues to interface with the selected contractor throughout the construction phase.

Practice Description: This practice allows the designer to be available for pre-construction conferences, unforeseen conditions and design changes and post-construction conferences.

Example of Practice: When an undesignated or otherwise unknown underground facility is discovered within a work area, the excavator reports such discovery to the one-call center and the designer. If the discovery is made during the locating phase of the work, the designer is made aware to determine if there is an impact on the design. Discovery of unknown facilities can impact the project by requiring additional work, increased hazards from the underground facility or its trench, or actually conflict with the installation of the new underground facility. Discovered facilities may contain hazardous substances, or may present other hazards which require notification of authorities. These facilities at a minimum are shown on the as-built drawings for consideration in future work.

Benefits:

- Potential safety concerns are resolved more quickly, thereby minimizing subsequent modifications to the project design, costs and completion.

- The designer's inspections of the project during different stages are also facilitated.

Reference:
Industry and government practice.

11. <u>As-Built Drawings</u>

Practice Statement: As-built drawings are prepared and the information recorded to aid future excavations and locates.

Practice Description: Installation should be made in accordance with the approved construction plans; any deviation to the plans is documented and such changes indicated on the as-built drawings. As-built information is recorded, retained and made available for subsequent excavation.

Example and Source of Practice: Figure/drawing (not included in this Report), "Union Pacific Railroad Methodology for Equating Fiber Optic and Cable Locations to Railroad Tracks and Right-of-Way Maps."

Benefits: As-built drawings serve as an information source for future projects to minimize damage to existing facilities.

References:

- Union Pacific Railroad procedures.
- Expert opinion.
- Industry and governmental practices.

2.7 MEASURING IMPROVEMENTS

Due to the disposition of planning and design practices, improvements as direct results from their implementation are difficult to measure and require years of application to develop an evaluation basis. These best practices offer greater qualitative than quantitative measures due to the diversity of end users and differences in application. Since the outcome objectives are greater public safety along with a reduction in underground facility damages, the following are potential indicators of successful implementation of the suggested best practices.

Increases of:

- location requests by designers to the one-call centers,
- states that allow design phase locates,
- utility coordination councils/committees,
- accurate locates,
- underground utility markers, and
- projects utilizing an underground survey process or SUE.

Reductions in:

- incidents related to inadequate clearance between underground utilities,
- delays to the project caused by waiting for utility work to be completed so highway construction can begin, and
- number of third party damage occurrences attributed to any planning and design practice.

2.8 PATH FORWARD

A periodic review and update process for this Report should be put in place.

2.9 PLANNING AND DESIGN EMERGING TECHNOLOGIES SUMMARY

- Enhance locating through GPS/GIS technology,
- Improved Ground Penetrating Radar (GPR), and
- Detectable plastic.