

**Alliance for Telecommunications Industry
Solutions**

Network Reliability Steering Committee

**Fixing Facility Outages: Building the
Tools to Make It Happen**

Facilities Solution Team Report

Results and Recommendations

November 1997

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Bellcore**

1. Executive Summary

Facility failures continue to be the leading contributor to outages in the Public Switched Network. Approximately 50% of the FCC-reportable¹ service outages and their impact have been caused by facility outages. The ATIS/NRSC² Facilities Solution Team was chartered to determine the causes of those facility outages and to recommend ways to reduce their number and impact.

The Facilities Solution Team is made up of representatives of telecommunications service providers (InterExchange Carriers and Local Exchange Carriers), several large utilities, the insurance industry, contractors' associations, and the Department of Transportation (DOT). One of the major changes implemented since February of 1996 has been the expansion of the membership to organizations outside the telecommunications industry. The major reason for the expansion was that accomplishing the goals of Facilities Solution Team could not occur without the cooperation of all the organizations involved with installing, maintaining, and using facilities. The team was broken into four subteams: the Data Analysis Subteam, the Damage Prevention Subteam, the Legislative Subteam, and the New Technology Subteam.

The Facilities Solution Team published a comprehensive report of their findings and recommendations in February 1996. The report entitled *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* provided 24 recommendations on ways to reduce the number and impact of facility outages. This is the second report aimed at reducing the number and the impact of facility outages.

Overall, the number of facility outages is down from the previous year. Of equal interest, the impact of facility outages is down:

	Report Year 3 7/1/95 - 6/30/96	Report Year 4 7/1/96 - 6/30/97
Number of Facility Outages	100	85
Facility Outage Impact (Outage Index ³)	882	635

Although these changes are not statistically significant, they indicate that progress has been made.

The Data Analysis Subteam has developed a new categorization for facility outages. The goal was to clarify the categories and to reduce the number of outages classified as "Other". The new categories are sub-terrestrial cable dig-ups, sub-terrestrial cable washout, sub-terrestrial cable damage other, aerial cable cuts, submarine cable cuts, cable placing/removing, splices/connectors, cable electronics, radio facility equipment, and other. With the new categorization, the Data Analysis Subteam determined that cable electronics outages are higher in the last two years than in

¹ Per Federal Communications Commission CC Docket 91-273.

² Alliance for Telecommunications Industry Solutions/Network Reliability Steering Committee.

³ Per Committee T1 Technical Report No. 42, *Enhanced Analysis of FCC-Reportable Service Outage Data*, August 1995.

the previous three years and recommended that the Cable Electronics Subteam be resurrected to look at these outages.

The goal of the Cable Damage Prevention Subteam was to develop comprehensive proactive guidelines which are non-legislative in nature and are aimed at preventing facility outages.

The Cable Damage Prevention Subteam completed the following four documents:

1. Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities
2. Minimum Performance Guidelines for One-Call Notification Systems
3. Facility Owners Minimum Guidelines for Location and Protection of Below Ground Fiber Optic Cable
4. Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout.

These guidelines define minimum standards for each of the parties with a role in damage prevention.

Over 50% of the facility outages are categorized as Fiber Cut Dig-Ups. Nearly 50% of the Fiber Cut Dig-Ups occurred because the excavator either failed to notify the facility owner or provided inadequate notification. One-Call legislation is aimed at reducing these outages. The Facilities Solution Team recommended federal One-Call legislation in its earlier report. In July, 1996, Casimir Skrzypczak, then President of NYNEX Science and Technology Inc., in his testimony in support of One-Call legislation before a House Subcommittee, outlined four recommended principles of One-Call legislation that the Facilities Solution Team continue to use today. These principles cover 1) notice and responsibility, 2) simplicity and flexibility, 3) broad applicability and 4) industry funding.

The Facilities Solution Team continues to champion One-Call legislation at the federal level and at the state level. The Facilities Solution Team endorses the passage of strong and effective federal One-Call legislation to set minimum standards for the states to achieve in administering One-Call systems. There are two One-Call bills before Congress which work to achieve the goal of protecting underground telecommunications facilities and meet the recommended principles of legislation as stated by Mr. Skrzypczak. The Facilities Solution Team supports both bills and is working to ensure that a One-Call bill is passed which applies to all excavators and facility providers⁴.

The only way to ensure that recommendations are acted on is by constant vigilance and continued, dedicated effort. Past work appears to be paying off. The Facilities Solution Team, as part of the ATIS/NRSC, stands ready to help ensure that its recommendations are acted upon, to periodically analyze the effectiveness of its recommendations, and to respond to any new reliability concerns that arise on telecommunications facilities.

⁴ Update: The One-Call bill S. 1115 (see Appendix G) was passed unanimously by the U.S. Senate on November 9, 1997.

2. Background

In 1991, the Federal Communications Commission (FCC) chartered the Network Reliability Council (NRC) to investigate causes of major outages in the telecommunications network. Its mission was to recommend practices aimed at reducing the number and impact of these outages. The NRC first considered seven areas critical to network reliability and created a corresponding focus group in each area. They concentrated initially on fire, power, switching, signaling, Digital Cross-connect Systems (DCSs), essential services and fiber cables. In their report, the Fiber Cable Focus Group stated, “During 1992, fiber cable failures were the single largest cause of network outages affecting more than 50,000 customers for more than 30 minutes and accounted for roughly as many outages as tandem and local switch equipment combined. As networks place ever increasing amounts of traffic over single fiber cables, the need to protect these vital facilities becomes ever more clear and crucial to the industry’s goal of raising system reliability.”

The Fiber Cable Focus Group developed a set of recommendations aimed at reducing cable dig-ups. In June 1993, the NRC first published *Network Reliability: A Report to the Nation* that contained a description of all the recommendations from the focus groups including those from the Fiber Cable Focus Group. In addition, as follow up to one of their recommendations, the Telecommunications Industry Benchmarking Consortium was formed and published their report *Network Protection Practices for Subsurface Facilities* through the Alliance for Telecommunications Industry Solutions (ATIS) in June 1994.

The NRC also chartered the Network Reliability Steering Committee (NRSC) to monitor major network outages on an ongoing basis. The NRSC is a standing committee of ATIS. The NRSC has published quarterly reports since 1993 and four annual reports.

In the first years after the formation of the NRSC, the number and impact of facility outages continued to grow at an alarming rate. As a response to this growth, a major recommendation of the 1994 NRSC Annual Report was to establish a Facilities Solution Team as an entity under the NRSC. The Facilities Solution Team was chartered in January 1995 by the NRSC to determine the major causes of facility outages and recommend ways to reduce their number and impact.

The Facilities Solution Team published a comprehensive report of their findings and recommendations in February 1996. The report entitled *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* provided 24 recommendations on ways to reduce the number and impact of facility outages. Appendix A provides a list of the recommendations from that earlier report.

The following chart, published in *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* and in the NRSC 1995 Annual Report, shows that at the time these reports came out the number of facility outages was growing.

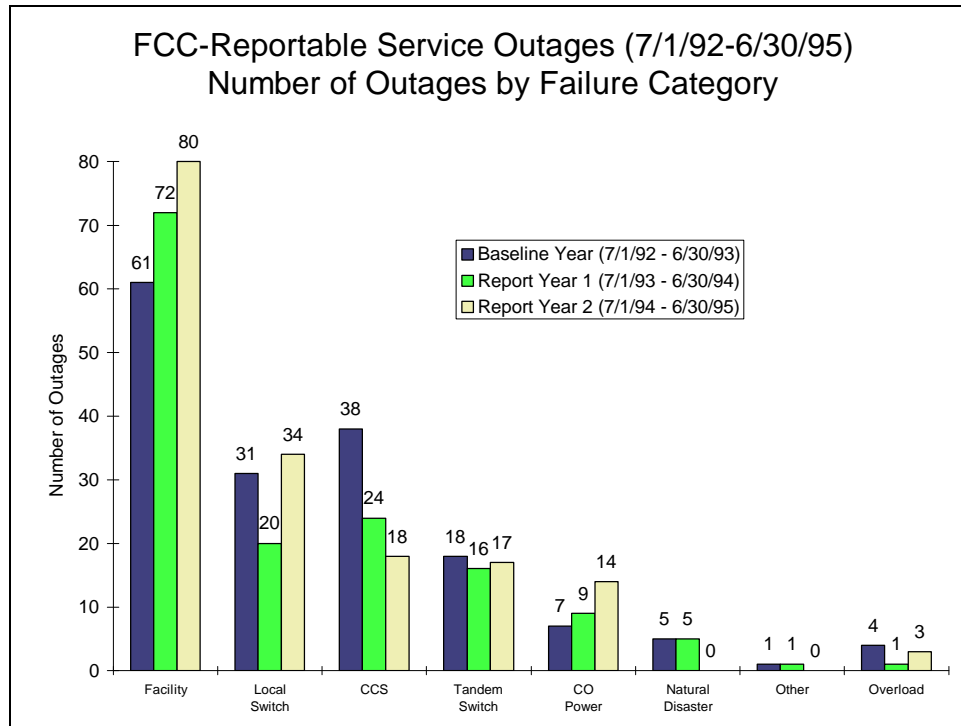


Figure 1: Failure Categories vs. Number of Outages

The recommendations in *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* were aimed at turning around this trend of increasing outages. This report discusses the current status of facility outages. It also discusses the results from three of the subteams aimed at continually reducing the number and impact of facility outages. First it discusses the new categorization of facility outages, which was the major activity of the Data Analysis Subteam. The report then covers the work of the Damage Prevention Subteam which developed guidelines for the various groups involved in preventing damage to buried cable. The report also discusses the ongoing work of the Legislative Team to get comprehensive federal One-Call legislation passed.

3. Team Membership

The Facilities Solution Team is made up of representatives of telecommunications service providers (InterExchange Carriers and Local Exchange Carriers), several large utilities, the insurance industry, contracting organizations and the Department of Transportation (DOT). One of the major changes in the Facilities Solution Team has been the expansion of the membership to leaders at National Utility Locating Contractors Association (NULCA), National Utility Contractors Association (NUCA), So-Deep, and the DOT. The major reason for the expansion was that accomplishing the goals of Facilities Solution Team could not occur without the cooperation of all the organizations involved with installing, maintaining, and using facilities. In addition, many of the new members provided valuable new perspectives on ways to reduce cable damage. A complete list of the team members is given below:

Name	Company	Name	Company
Stu Megaw	AGCA	Don Brown	CNA Insurance
Carolyn Gatov	Ameritech	Mary Jo Cooney	DOT
Rick Canaday	AT&T	Jim Swain	GTE
Mike Del Grande	AT&T	Carlton Stockton	MCI
Larry Moss	AT&T	Teri Claffey	MCI
Pete Shelus	AT&T	William Harley	NUCA
Wayne Chiles	Bell Atlantic	Bill Hillman	NUCA
Jay Bennett	Bellcore	Craig Sewell	NULCA
Paul Devaney	Bellcore	Susan Browning	NYNEX
John Healy	Bellcore	Paul Cloran	NYNEX
Dennis Henry	Bellcore	Jerry Yim	Pacific Bell
Spilios Makris	Bellcore	Mike Homick	PEPCO/CEC
John Rosenberger	Bellcore	Jim Anspach	So-Deep
Lou Scerbo	Bellcore	Roger Stepp	SWB
Griff Goad	BellSouth	Jim Gebel	Sprint
Linda Kavanagh	BellSouth		

The team was broken into four subteams:

1. Legislative Subteam
2. Data Analysis Subteam
3. Damage Prevention Subteam
4. New Technology Subteam.

The following chart indicates the leaders of the Facilities Solution Team and the subteams:

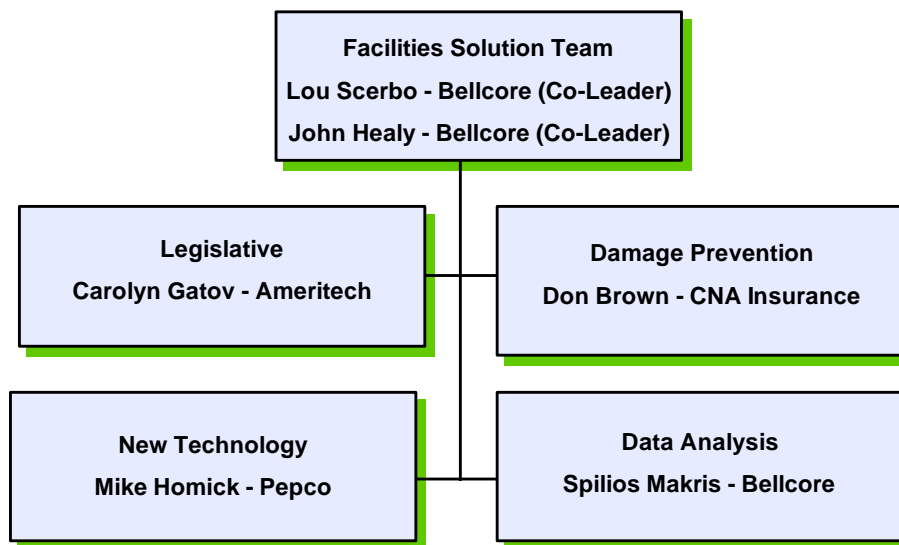


Figure 2: Facilities Solution Team Leadership

4. Status of Facility Outages

4.1 Analysis of Facility Outages

The Facilities Solution Team was formed because repeated analyses of the FCC-reportable outage data (per FCC Docket CC 91-273) indicated that facility outages were the major contributor to network outages. Of even greater concern, the number and impact of facility outages was not declining and was significantly worse than in earlier years (see Background Section). Fortunately, the work of many organizations to reduce facility outages has apparently paid off. Figure 3 below shows the number of FCC-reportable outages broken down by failure category.

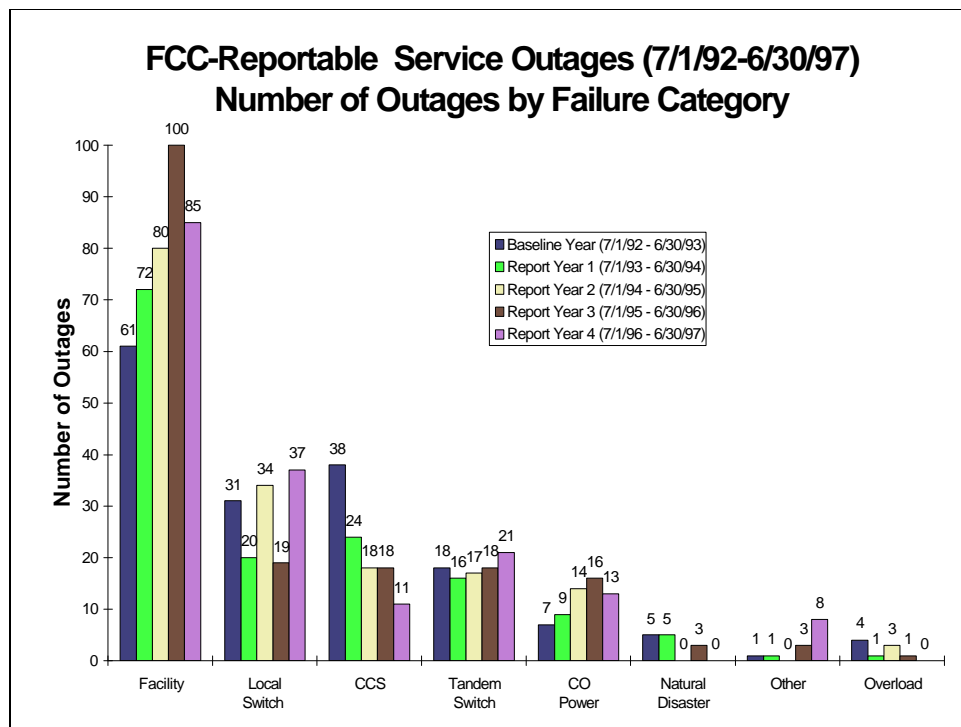


Figure 3: Number of Outages by Failure Category (5 Years Data)

Figure 3 shows that facility outages continue to be the leading cause of network outages and therefore need continued attention. The increasing trend from 1992 through Report Year 3 is statistically significant. The number of facility outages was rising each year from the Baseline Year through Report Year 3. In Report Year 4 (7/1/96 to 6/30/97), there was a decrease in facility outages. In Report Year 4, the number of reportable outages dropped from 100 to 85. Although this reduction was not statistically significant, it is encouraging.

The Facilities Solution Team also examined the impact of these outages using the outage index. The outage index measures the impact of outages on customers. The outage index is based on the length of the outage, the number of customers affected, the time of day of the outage, and the

services effected by the outage. T1A1.2 Working Group has published Technical Report No. 42 that describes this outage index.

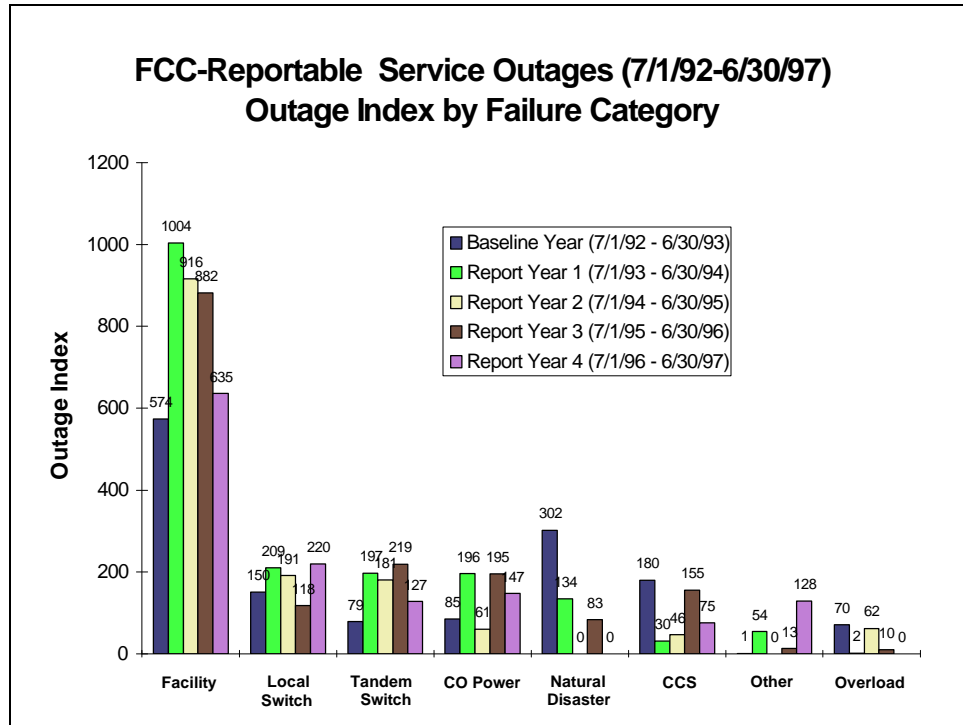


Figure 4: Outage Index by Failure Category (5 Years Data)

Figure 4 above shows that in Report Year 4 there has been a drop in the outage index. This means that the impact of facility outages appears to be going down particularly in the last year. This drop is not statistically significant but it is an encouraging sign that facility outages are moving in the right direction.

A possible explanation for this movement is the implementation of the recommendations in *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*. These recommendations are listed in Appendix A. This leads to our first recommendation:

Recommendation 1: Continue to implement the recommendations in *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*.

The leading subcategory of facility outage is Fiber Cut - Dig-Up. Figure 5 shows around 50% of the facility outages are Fiber Cut - Dig-Ups.

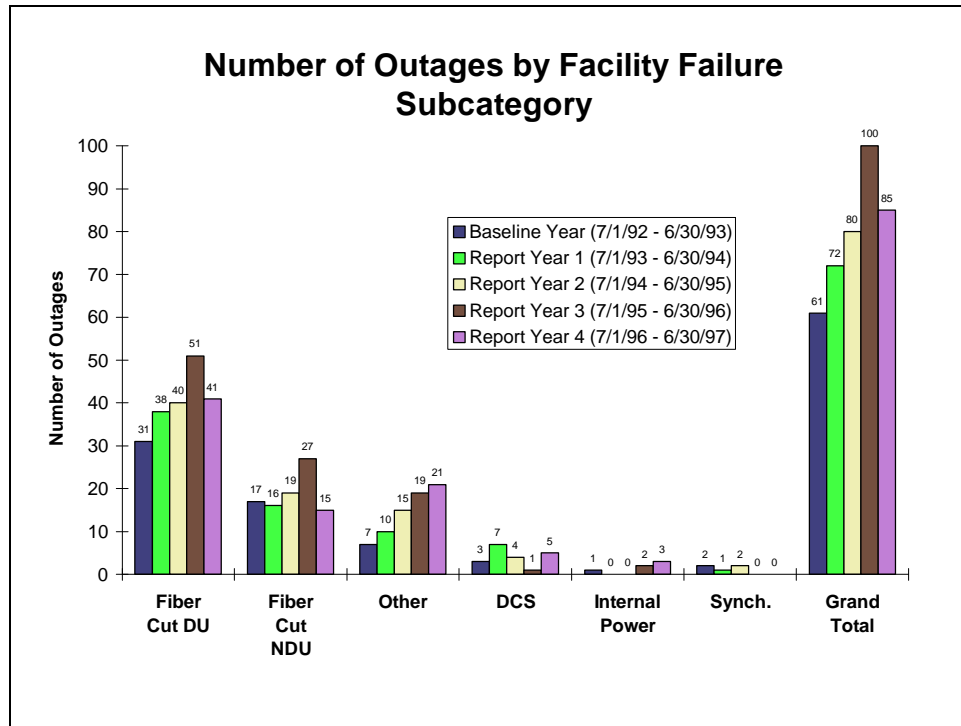


Figure 5: Number of Outages by Facility Failure Subcategory

Figure 5 shows that the number of facility outages was less in Report Year 4 for Fiber Cut Dig-Ups and for Fiber Cut Non-Dig-Ups. Fiber Cut Non-Dig-Ups include aerial cuts, subterrestrial washouts, submarine cable cuts, etc. (Please see the next section which proposes a new categorization of facility outages.) These drops are not statistically significant although the drop in Fiber Cut Non-Dig-Ups from 27 to 15 is nearly statistically significant.

Figure 6 shows that the impact of outages as measured by the outage index is also showing encouraging trends for facility outages. There has been a significant drop in the impact of Fiber Cut Non-Dig-Ups. This drop may have occurred as a result of a great deal of effort in the industry at cable damage prevention. The implementation of the recommendations in *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* undoubtedly played a role.

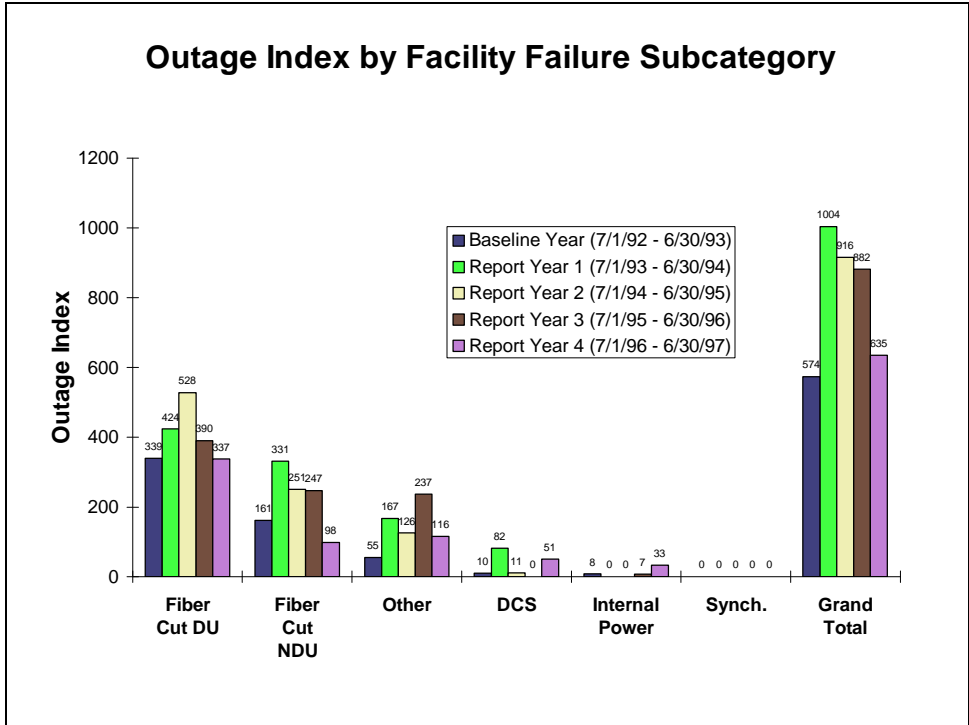


Figure 6: Outage Index by Facility Failure Subcategory

Fiber Cut Dig-Ups are the most important category of facility outage. Figure 7 shows the number of these outages by root cause.

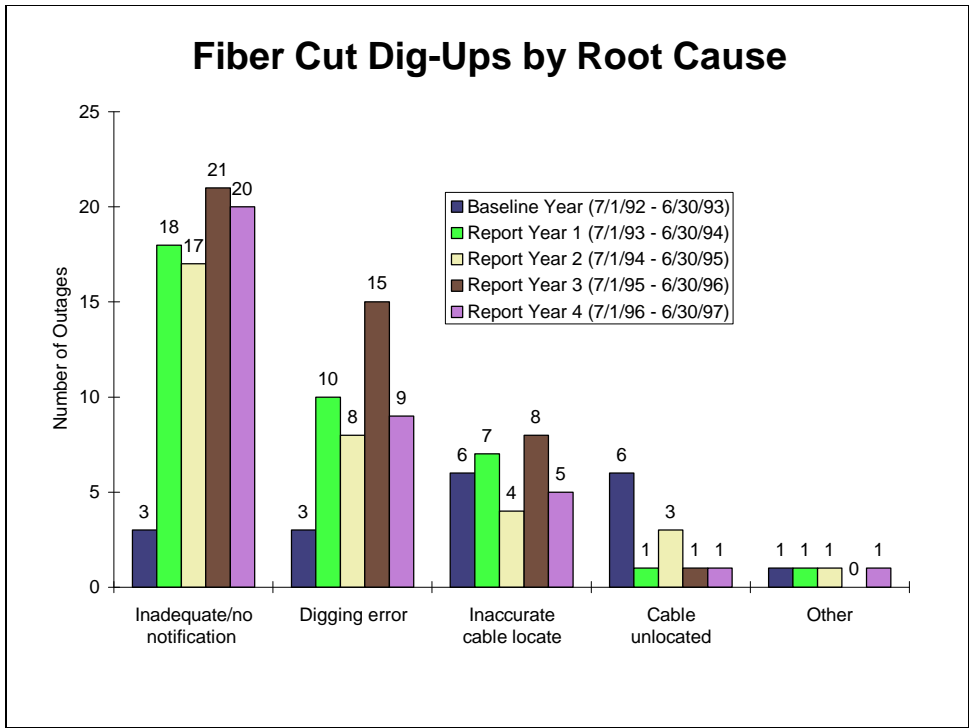


Figure 7: Number of Fiber Cut Dig-Ups by Root Cause

Federal One-Call legislation is aimed at reducing the number of Fiber Cut Dig-Ups with root cause Inadequate or No Notification. Figure 7 shows that the number of outages due to Inadequate or No Notification has not decreased over the last few years.

Figure 8 shows the impact of Fiber Cut Dig-Ups by root cause. Figure 8 shows that the impact of these outages appears to be going down. In particular the impact of outages with Inadequate or No Notification is less in Report Year 4 than in other years. This means that although the number of cable cuts due to Inadequate or No Notification has not gone down the impact of these outages is becoming less. This is primarily because the time to restore for at least a portion of the customers is improving.

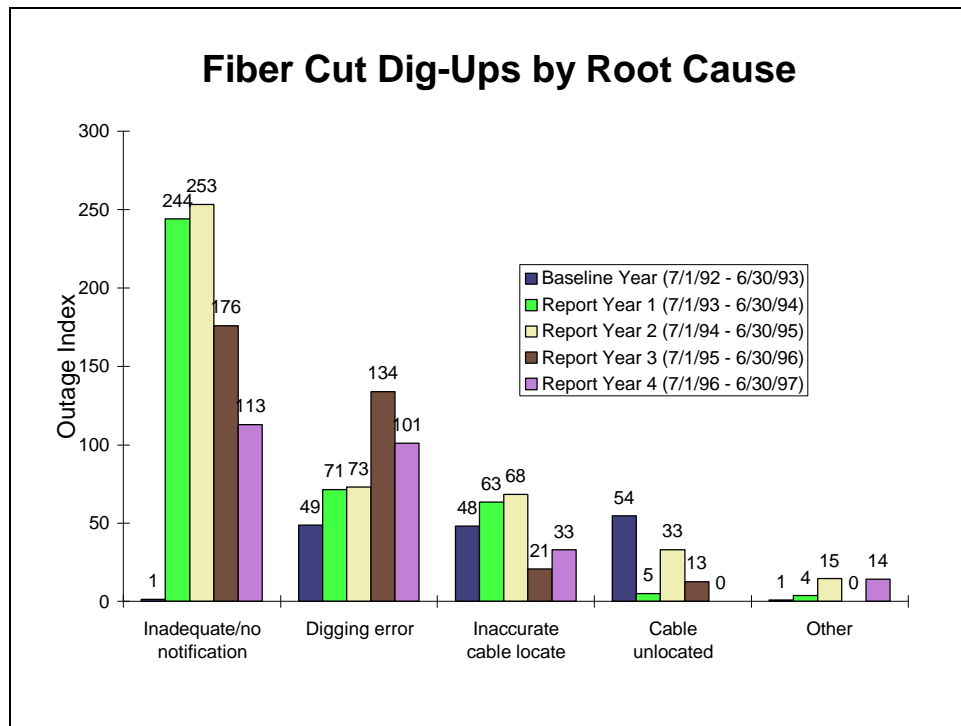


Figure 8: Impact of Fiber Cut Dig-Ups by Root Cause

5. Data Analysis Subteam Results - New Categorization

The charter of the Data Analysis subteam is to help reduce the number and impact of facility outages using any objective data available to the Facilities Solution Team. The primary sources of data for the Facilities Solution Team have been the FCC-reportable outages and any special studies commissioned by the team. The FCC-reportable outages are looked at on a quarterly basis by the NRSC. In addition, the Data Analysis subteam presents an analysis of these outages at every Facilities Solution Team meeting. In this section we discuss first why the Data Analysis subteam believed a new categorization was needed. We then describe the new categorization that was developed. Finally, we apply the new categorization to all the FCC-reportable outages and show that it will really aid the Facilities Solution Team in better understanding facility outages.

5.1 Need for a New Categorization

There are several properties of a good categorization of outages. Subcategories of outages should be easily understandable. When you say the name, most people should be able to determine in which subcategory the outage belongs. These subcategories should drive action. If the number of outages in a subcategory increases, there should be a clear path forward on what needs to be addressed. No one category should contain over 80% of the outages. On the other hand, a category is not very useful if outages rarely fall in it. Finally, catch-all categories like *Other* should be a small fraction of the outages. With time it has become increasingly apparent that the current categorization of facility outages fails almost all the rules defining a good categorization; hence the need for a new categorization.

The need for a new categorization is best illustrated by an example. Figure 9 below shows the old subcategories of facility outages. It is instructive because of its flaws. One of the largest categories is entitled *Other*. In fact, 18% of the outages are classified as *Other*. In one NRSC quarterly report, the largest number of outages fell in the *Other* category. Generally, this is a clear indication that the current way of categorizing outages is ineffective. There is no clear path forward when *Other* is an important category. It is impossible to come up with recommendations to reduce *Other* outages.

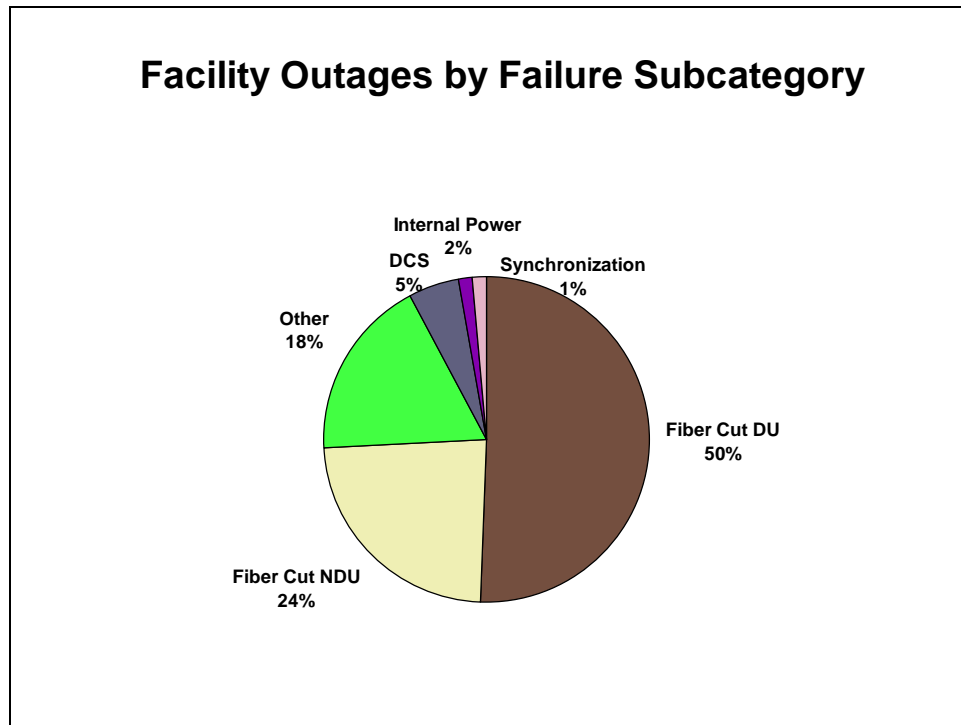


Figure 9: Number of Outages by Facility Failure Subcategory

Figure 9 also shows another major flaw in the old categorization of facility outages. For years, we had been using a category entitled *Fiber Cut Non Dig-Up*. In Figure 9 the number of *Fiber Cut Non Dig-Ups* is about 24% of all the outages. Unfortunately, this category is actually a hodgepodge of aerial cable cuts, washouts of underground cable, etc. Generally, categories should be self-explanatory.

There were also several subcategories for which there were infrequent outages. An example is *Synchronization*. When the current categorization was developed, the planners felt that synchronization problems might develop into a major cause of outages; this has not materialized. The solution is to eliminate *Synchronization* as a subcategory.

The final problem with the facility categorization is related to Digital Cross-connect Systems (DCSs). DCS outages have been a subcategory of facility outages. Several experts have argued for the last few years that DCSs are complex network elements which are more similar to switches than they are to components of transport facilities. In fact, one of the recommendations of the first Network Reliability Council was to treat DCSs like switches. If we accept this reasoning, DCSs should have their own separate category just like local switches do.

5.2 The New Categorization

The new categorization of facility outages is:

- **Sub-terrestrial cable dig-ups (DU)**
- **Sub-terrestrial cable “washout”**
- **Sub-terrestrial cable damage other** (e.g., rodents, fire, vehicular accident)
- **Aerial cable cuts**
- **Submarine cable cuts**
- **Cable placing/removing**
- **Splices/connectors** (e.g., Lightguide Stranded Cable Interconnection Equipment [LSCIE])
- **Cable electronics** (e.g., repeaters, multiplexers [add/drop, M31, SONET, etc.], demultiplexers, regenerators timing source interface unit, BITS interface card, voltage control oscillator [VCXO] fuses, power unit)
- **Radio facility equipment**
- **Other.**

The new categories are generally quite easy to understand. The new categorization reduces the number of outages that fit in the *Other* category. The new categorization eliminates the category *Fiber Cut Non-Dig-Up* which was relatively difficult to explain. In the new categorization, DCS outages are no longer a subcategory of facility outages. DCS outages have their own category. Finally, synchronization no longer is a subcategory of facility outages.

The results of applying the new categorization are shown in the following pie chart:

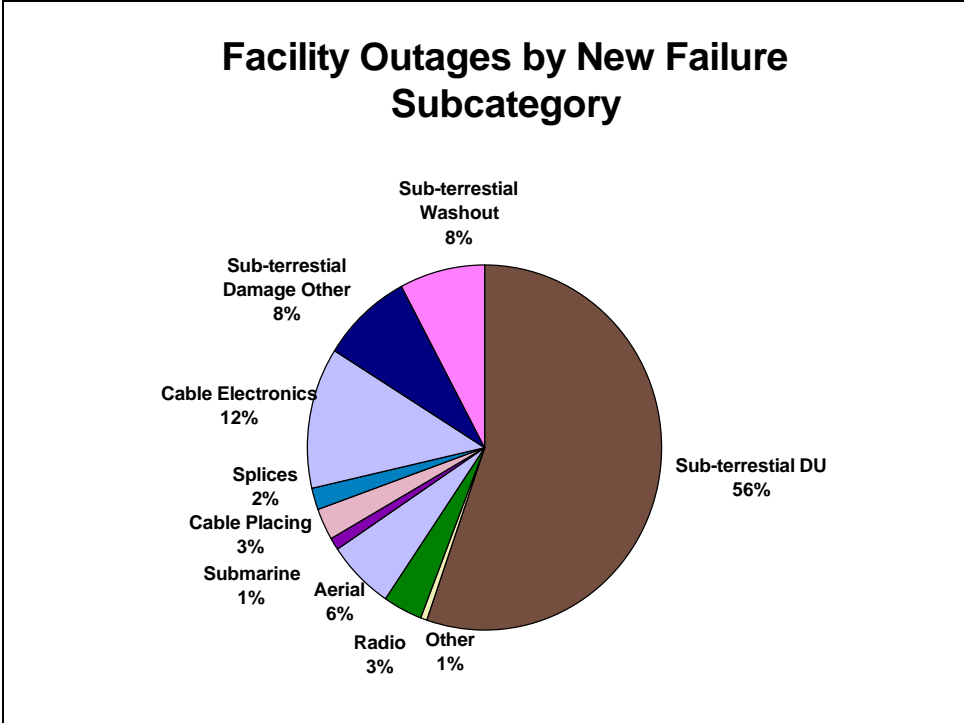


Figure 10: Percentage of Outages by New Facility Subcategories

Note that the percentage of outages in the *Other* subcategory has been reduced to 3%.

The Facilities Solution Team will continue to examine the new categorization to ensure that it works well. The new categorization should be used for all Network Reliability Steering Committee (NRSC) reports.

Recommendation 2: Track and analyze facility outages using the new categorization of facility outages. Take action if any substantial negative trend arises or persists.

Since 12% of the outages fell into the *Cable Electronics* subcategory, the Data Analysis Subteam looked into this subcategory to check for trends. Figure 11 below indicates there has been a greater number of outages in this subcategory in the last two years as before. Based on this observation, the Facilities Solution Team recommends:

Recommendation 3: Reestablish the Cable Electronics Subteam to determine ways to reduce the number and impact of cable electronics outages.

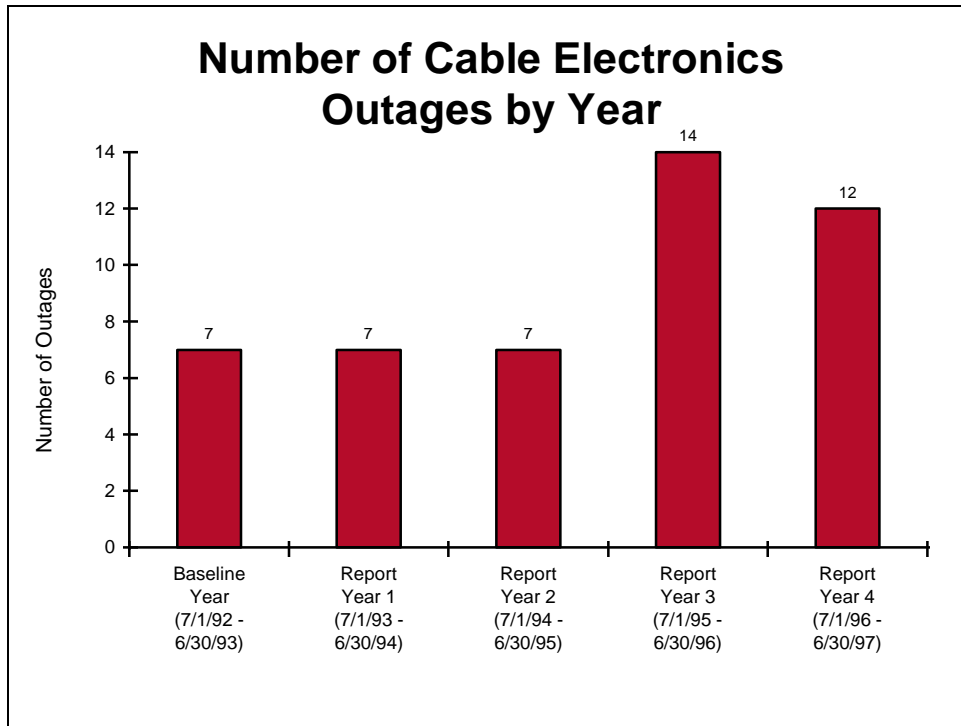


Figure 11: Number of Cable Electronics Facility Outages by Year

6. Damage Prevention Results/Recommendations

The Facilities Solution Team in its earlier report entitled *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* provided 24 recommendations aimed at reducing the number and impact of facility outages. Many of those recommendations need proactive guidelines that more completely define the scope and content of the recommendations. The goal of the Cable Damage Prevention subteam was:

Develop comprehensive proactive guidelines which are non-legislative in nature aimed at preventing facility outages.

The Cable Damage Prevention Subteam have completed the following four documents:

1. Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities
2. Minimum Performance Guidelines for One-Call Notification Systems
3. Facility Owners Minimum Guidelines for Location and Protection of Below Ground Fiber Optic Cable
4. Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout.

Each of these documents will be discussed in greater detail in the next subsections.

6.1 Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

There are several objectives for these guidelines:

- To mitigate damages by following excavation and locating industry best practices.
- To manage an accident-free workplace with reduced injuries and property damage and to assure jobs are completed on time and economically using industry standards and best practices.

The complete guidelines are attached in Appendix B. Below we present some of the highlights.

The contractor has several responsibilities. The contractor should notify the local One-Call Center and non-member facility owners before beginning any job. The contractor needs to have knowledge of all the jurisdictional requirements.

The machine operator and foreman have numerous responsibilities. Part of their responsibilities is covered under preplanning the excavation site. As expected, there are more activities needed for large projects than for small projects. In all cases, the proposed dig area should be pre-marked with white paint prior to notifying the One-Call Center. At the job site, most of the activities center on locating all the facilities. Excavating includes hand digging within 24 inches of any and all locate marks. Prior to backfilling, facility owners should be contacted to inspect any exposed facility. Backfilling must be done in a way that does not damage the cable. Occasionally damage will occur. If it does, the facility owner needs to be contacted immediately. Damage should be repaired if possible but safety regulations must be followed.

Included with the guidelines is a Pre-excavation checklist. This checklist contains items that should be completed before leaving the shop, items that should be completed at the job site, items related to excavating and items related to backfilling. One Local Exchange Carrier is already giving this checklist to all its excavators.

Recommendation 4: Follow the excavator best practices described in the Minimum Suggested Damage Prevention Guidelines - Excavation Procedures for Underground Facilities.

These best practices for excavators include:

- The contractor shall notify the One-Call Center and non-member facility owners before beginning the job.
- The proposed dig area should be pre-marked with white paint prior to notifying the One-Call Center for locates.
- The contractor should hand dig within 18 to 24 inches (depends on state regulations) from the center line of the utility line.
- Photographs or videos should be taken before and after the excavation is completed to facilitate disputes.

- The contractor should request new locates if the job extends beyond 10 days and following inclement weather.

For high priority jobs there are additional best practices like:

- Schedule a pre-excavation meeting on the job site with the facility owner and the prime contractor.
- The contractor pot holes (hand digging, use of air knives or vacuum excavation techniques) to verify locates or mark outs. An acceptable substitute procedure for pot holing would be the contractor's use of state-of-the-art utility locating equipment.
- The contractor maps the coordinates of the locates in relation to a stationary object, e.g., tree, building, fence, etc.

6.2 Minimum Performance Guidelines for One-Call Notification Systems

The objectives for these guidelines are:

- Improve the minimum level of service provided by One-Call Notification Systems to a level consistent with good practices found in a number of systems in the U.S.
- By focusing on automation, enhance the quality, efficiency and speed of communications inside One-Call Notification Systems.

Major system elements include:

- **People:** Trained operators and managers are the backbone of any One-Call System. They provide the primary interface to the excavators.
- **Communications subsystem:** This subsystem provides the communications between the One-Call Center and the user community (excavators and One-Call members).
- **Computer system:** The computer system processes the locate requests, keeps records, and manages communications.
- **Status subsystem:** The status subsystem is an automatic system to be used by excavators to check the status of any active ticket.

Appendix C contains the complete *Minimum Performance Guidelines for One-Call Notification Systems*. This includes a detailed system flow diagram along with all the required interactions between the parties involved with One-Call Notification Systems.

Recommendation 5: Conform to the Minimum Performance Guidelines for One-Call Notification Systems.

There are numerous guidelines described in Appendix C. Below we provide a subset:

- A single number per state should be used.
- Service should be provided 24 hours a day, 7 days a week.

- All calls should be recorded.
- All facility owners and excavators should participate.
- All designers should give at least 10 business days notice prior to final design.

6.3 FACILITY OWNERS MINIMUM GUIDELINES FOR LOCATION AND PROTECTION OF BELOW-GROUND FIBER OPTIC CABLE

The objective for these guidelines is:

- To establish minimum guidelines for defining the location of fiber optic cable plant to minimize the probability of damage.

A complete copy of this document is given in Appendix D. This document addresses fiber optic cables that are directly buried, placed in ducts, placed in non-navigable waterways, or placed in transition from underground to aerial structures. It further specifies the location-marking and the physical protection of such cables. It does not cover aerial, building, and submarine cables nor does it address installation methods.

The document provides several tables that describe facility owner responsibilities. The Uniform Color Code which was developed by the Utility Location and Coordination Council (ULCC) should be used to mark and identify subsurface facilities. The following table illustrates the Uniform Color Code:

Color	Facility
Red	Electric power lines and conduit
Yellow	Gas, oil, steam, and petroleum lines
Blue	Water, irrigation, and slurry lines
Green	Sewer and drain lines
Orange	Communication lines, including fiber optic cable
White	Proposed excavation

As the table indicates, orange is the color for fiber optic cable.

The depth at which the cable should be buried depends on the type of cable. It also depends on whether there are any joint facilities being buried. Another table in the document describes the minimum distance from foreign structures.

Recommendation 6: Conform to the Minimum Guidelines for Facility Owners.

There are several guidelines described in Appendix D including:

- Facility owners should clearly ground-mark their facility’s location and route if the facility is within three meters (10 feet) of the excavation site. Telecommunications companies should use the color orange.

- Facility owners should notify excavators if the facilities can not be marked. In these cases the facility owner should have an on-site meeting with the excavator to designate the location of the facility.
- Facility owners should have procedures in place to quickly respond to any damages that do occur.

6.4 Guidelines for Prospective Excavation Site Delineation and Location Markout

The objective for these guidelines is:

- To encourage consistency and quality of mark-outs and minimize the confusion with facility locations.

Appendix E contains a complete copy of the guidelines. The guidelines describe in detail what is needed for each type of excavation:

- **Single Point Excavations:** The guidelines describe how four corner marking, full line marking, radius or arc marking, and dash line marking should be done.
- **Continuous Type Excavations:** For these types of excavation, the center line should be marked with 6" x 1" arrows to show direction of excavation.

Below are the guidelines provided for facility owner location markout:

1. Marks should be approximately twelve to eighteen inches in length, spaced no more than fifty feet apart.
2. Marks should be placed over the center of the facility.
3. Marks can be placed on either side of the facility to define "Hand Dig Area".
4. An operator designator, such as company initials, should be placed at the beginning and end of the proposed work area.
5. Additional information may be provided about the facility.
6. Changes in direction and lateral connections should be clearly indicated.
7. Structures (e.g., vaults) that are physically larger than obvious surface indications should be marked so as to define the parameters of the structure.
8. Termination points or dead ends should be indicated as such.
9. If there is "no conflict" and the work area has been pre-marked, no conflict should be marked along with the company designator (e.g., GTE) within the work area. "No conflict" means there are no facilities within the scope of the delineation are within the work area from a particular company.

Recommendation 7: Conform to the Guidelines for Prospective Excavation Site Delineation and Location Markout.

7. Legislative Results and Recommendations

The Legislative Subteam of the Facilities Solution Team was established to secure comprehensive federal and state One-Call statute. While all the states in the continental U.S. have some form of One-Call legislation, not all state laws effectively protect telecommunications facilities; many exempt the major contributors to damages, and there are profound inconsistencies in the laws that preclude effective protection.

Fiber Cut Dig-Ups are the largest category of facility outages. Over 50% of facility outages are caused by dig-ups (see Figure 9 in the Data Collection Section). Further analysis of Fiber Cut Dig-Ups was done to identify root causes. The goal was to determine how many of these dig-ups might have been prevented with a call to a One-Call Center or if the facility owner was otherwise notified. Figure 12, below, illustrates the results.

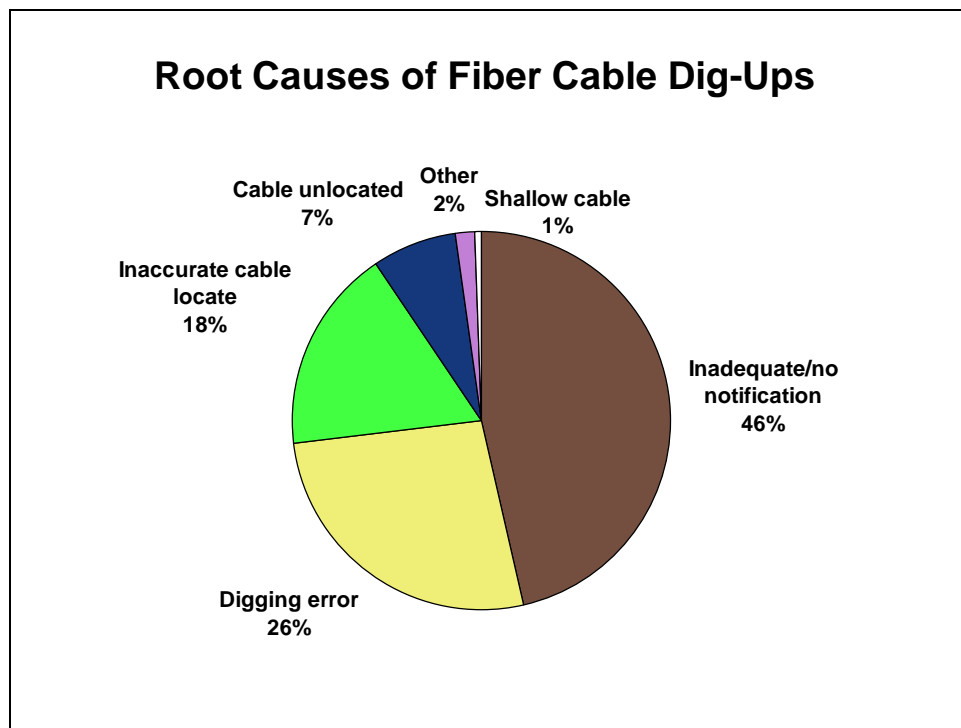


Figure 12: Percent of Fiber Cable Dig-Ups by Root Cause

Currently there is no federal One-Call statute. Recall that Figure 7 showed that the number of outages with Inadequate or No Notification as the root cause has been very flat over the last four years. With the above noted inconsistencies in state statutes, a federal law to establish minimum standards would be useful in reducing fiber cable dig-ups.

The Facilities Solution Team advocates three principles for the protection of underground telecommunications facilities:

- All excavators should call the appropriate One-Call center before excavating.
- All facility providers should respond to requests to mark their facilities.

- Enforcement should be clear, consistent, with appropriate penalties.

In the 104th Congress, H.R. 2482 was introduced in October, 1995 by Congressman Pallone (D-NJ) in an effort to keep the spotlight on the need for comprehensive federal One-Call legislation. *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups* contains a copy of H.R. 2482 entitled the “Comprehensive One-Call Notification Act of 1995” (Appendix F).

In June 1996, the United States House of Representatives Energy and Power Subcommittee of the Commerce Committee held an oversight hearing on underground facility protection. Casimir Skrzypczak, then President of NYNEX Science and Technology Inc., testified in support of H.R. 2482. In his statement, Mr. Skrzypczak advocated four recommended principles of legislation:

- **Notice and Responsibility:** Owners of underground facilities should provide information about their facilities. Excavators should provide notice of their intent to dig. Both excavators and owners should bear responsibility and be held accountable.
- **Simplicity and Flexibility:** The rules should be simple, and states should have the flexibility to adopt the rules that achieve the necessary result, subject to Federal minimum standards.
- **Broad Applicability:** Simply put, there should be no exemptions that would allow excavation activity that could damage underground facilities.
- **Industry Funding:** Owners of underground facilities should jointly fund One-Call programs.

At the conclusion of the 104th Congress, all pending bills expired which included H.R. 2482.

Commencing with the 105th Congress, two new One-Call bills have been introduced. The first bill S. 1115 (see Appendix G) was introduced by the Majority and Minority Leaders of the Senate and a bipartisan group of eight other Senators⁵. S.1115 outlines minimum standards for state One-Call programs:

- Appropriate participation by all facility operators and excavators
- Flexible and effective enforcement
- Risk/benefit analysis to be applied to the determination of appropriate participation.

The definition of “appropriate” is left to the individual states. This bill calls for a reasonable relationship between the benefits of One-Call notification and the cost of implementing and complying with the requirements of the State One-Call notification system.

Exemptions for various classes of excavators or facility providers are often proposed. S.1115 encourages states to evaluate these requests using a risk/benefit analysis. Figure 13 below shows the parties responsible for Fiber Cable Dig-Ups where no or inadequate notification has been provided. Such parties should not be granted exemptions when information contained in Figure 13 is part of the risk/benefit analysis.

⁵ Update: The One-Call bill S. 1115 (see Appendix G) was passed unanimously by the U.S. Senate on November 9, 1997.

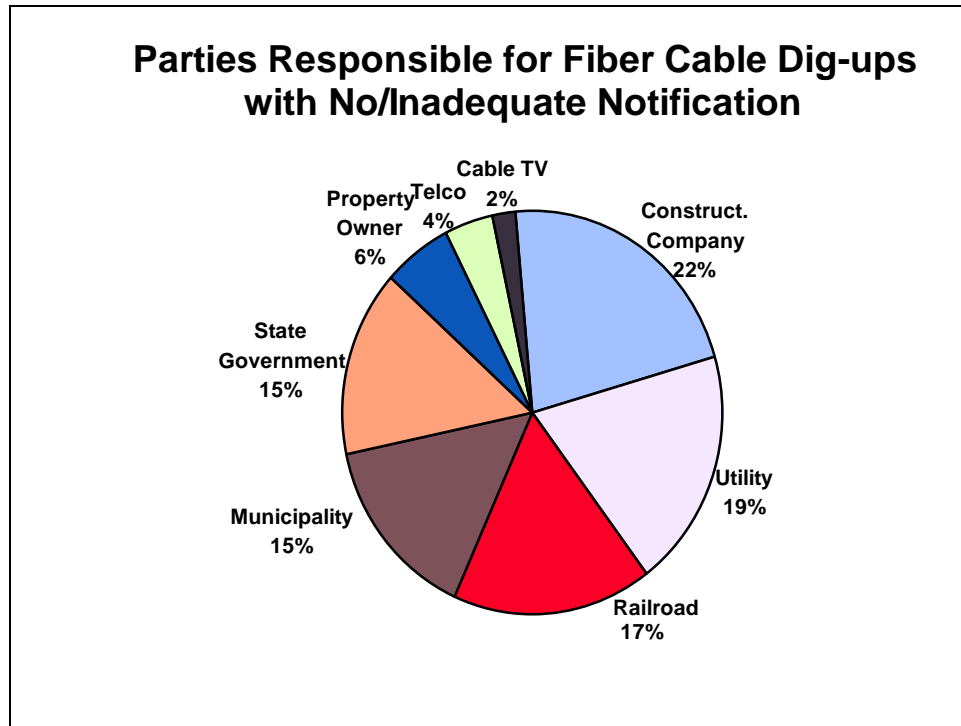


Figure 13: Parties Responsible Fiber Cable Dig-Ups

Other sections of S.1115 have the following elements:

- Penalties commensurate with the seriousness of the violation.
- States may apply for grants; grants to be evaluated by the Department of Transportation (DOT) on compliance with the minimum standards.
- DOT to report on all states' One-Call programs and the effectiveness in protecting public safety and meeting minimum standards.
- DOT to issue study on One-Call best practices.
- DOT to issue study on One-Call system practices which are most and least effective in preventing damage to underground facilities.

S. 1115 has strong bipartisan support. Secretary of Transportation, Rodney Slater, has sent a letter of endorsement for S.1115. Many of the provisions of S.1115 resulted from close work with the staff of the Department of Transportation.

H.R. 1720 (see Appendix H) was introduced in May, 1997 by Congressman Dingell (D-MI) and Oberstar (D-MN). No hearings have been scheduled. H.R. 1720, which is also supported by the Department of Transportation, has the following features:

- State One-Call programs should apply to all excavators and facility owners.
- Agricultural, cemetery, and oil/gas property owners /leaseholders are exempted.
- States should effectively enforce their programs.

- DOT can make grants to help states improve their programs; states must report progress.
- DOT to develop model One-Call program, conduct workshops and provide education.

H.R. 1720 allows for more consistent applicability of One-Call legislation than S.1115 since S. 1115 allows states to define what appropriate participation means. H.R. 1720 provides more details on enforcement sanctions, e.g., H.R. 1720 calls for criminal penalties for willful violations. Both bills give the DOT an active role.

The Facilities Solution Team recommends:

Recommendation 8: Pass comprehensive federal One-Call legislation by both Houses of Congress.

The Facilities Solution Team endorses the passage of strong and effective federal One-Call legislation to set minimum standards for the states to achieve in administering One-Call systems. Both bills, S. 1115 and H.R. 1720, work to achieve the goal of protecting underground telecommunications facilities and meet the recommended principles of legislation as stated by Mr. Skrzypczak. H.R. 1720 provides more specificity in the areas of applicability and enforcement. On the other hand, S.1115 has strong bipartisan support of both the Senate Majority and Minority Leaders, and provides a process to evaluate and hopefully repulse requests for all exemptions.

The Facilities Solution Team urges all interested parties to become involved in the legislative process to help pass strong and effective federal One-Call legislation. To this end, Mr. Frank Ianna, Executive Vice President of AT&T, testified before the Committee on Commerce of the U.S. Senate on September 17, 1997 on the need for comprehensive federal One-Call legislation.

S. 1115 was passed unanimously by the U.S. Senate on November 9, 1997. S. 1115 has, by far, the best chance of passing both Houses of Congress. It needs the full support of the telecommunications industry.

8. Path Forward

Although facility outages have been a major concern for at least the last five years, this last year has shown some progress in turning around facility problems. That progress may have occurred by diligently applying many of the recommendations that have come out of the Facilities Solution Team. There are a multitude of causes and a multitude of cures for facility outages. There has been no silver bullet to reducing the number and impact of facility outages. Only a lot of hard work with the appropriate coordination has moved the industry forward. It is extremely important that this ongoing effort on facility outages continues for at least the next year.

Recommendation 9: Maintain the ATIS/NRSC Facilities Solution Team for at Least the Next Year to Act as the Focal Point for Follow-Up.

This team recommends that the NRSC maintain the Facilities Solution Team to not only keep track of progress toward reducing the number and the impact of outages but to recommend new ways to improve the reliability of facilities. The Facilities Solution Team should continue its

mission of reducing the number and impact of facility outages. There is a lot of momentum on the team - continuing the Facilities Solution Team will prevent that momentum from dissipating.

We recommend that the Facilities Solution Team continue as a separate subcommittee under ATIS/NRSC. Having a subcommittee focused on facility outages, the leading cause of network failures, is a natural complement to the other subcommittees in the NRSC.

The ongoing Facilities Solution Team will help track the implementation of the recommendations in this document. It will be a leading advocate for the recommendations in this document.

9. Acknowledgments

The authors wish to acknowledge the unselfish effort of all members of the team, especially Don Brown, Carolyn Gatov, and Spilios Makris, who did an extraordinary amount of work leading their subteams.

The team embraced ideas from all over the industry. The varied backgrounds and perspectives of the members made the meetings interesting and the work successful. The Facilities Solution Team knows how to make it happen!

10. List of Recommendations

Recommendation 1: Continue to implement the recommendations in *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*.

Recommendation 2: Track and analyze facility outages using the new categorization of facility outages. Take action if any substantial negative trend arises or persists.

Recommendation 3: Reestablish the Cable Electronics Subteam to determine ways to reduce the number and impact of cable electronics outages.

Recommendation 4: Follow the excavator best practices described in the Minimum Suggested Damage Prevention Guidelines - Excavation Procedures for Underground Facilities (Appendix B).

Recommendation 5: Conform to the Minimum Performance Guidelines for One-Call Notification Systems (Appendix C).

Recommendation 6: Conform to the Minimum Guidelines for Facility Owners (Appendix D).

Recommendation 7: Conform to the Guidelines for Prospective Excavation Site Delineation and Location Markout (Appendix E).

Recommendation 8: Pass comprehensive federal One-Call legislation by both Houses of Congress.

Recommendation 9: Maintain the ATIS/NRSC Facilities Solution Team for the Next Year to Act as the Focal Point for Follow-Up.

11. References

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List of Appendices

Appendix A: Recommendations from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

Appendix C: Minimum Performance Guidelines for One-Call Notification Systems

Appendix D: Facility Owners Minimum Guidelines for Location and Protection of Below Ground Fiber Optic Cable

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

Appendix G: S.1115 - Federal One-Call Bill

Appendix H: H.R.1720 - Federal One-Call Bill

Appendix A: Recommendations from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

Recommendation 1: Pass comprehensive federal one-call legislation

Recommendation 2: Pass comprehensive state one-call legislation

Recommendation 3: Increase industry coordination and cooperation on federal and state one-call legislation efforts

Recommendation 4: Establish a dedicated Cable Damage Awareness/Prevention Program with excavators, locators, and municipalities

Recommendation 5: Identify critical routes and provide these routes with additional protection

Recommendation 6: Promote the development of industry standard markings

Recommendation 7: Establish training, qualification and performance evaluation of internal and external utility locators

Recommendation 8: Design and place new facilities to minimize risk; use subsurface utility engineering

Recommendation 9: Provide physical diversity on critical routes when justified by a thorough risk/value analysis

Recommendation 10: Play active role on One-Call Board

Recommendation 11: Jointly relocate facilities

Recommendation 12: Employ courtesy or mutual right of way jeopardy notification

Recommendation 13: Track and analyze major outages

Recommendation 14: Evaluate the performance of contracted excavators against internal performance

Recommendation 15: Implement a rapid restoration program with quick, easy access to records

Recommendation 16: Implement a rapid restoration program aimed at reducing time to locate faults

Recommendation 17: Provide the communication and equipment access needed for a rapid restoration program

Recommendation 18: Implement a rapid restoration program with faster and better dispatch

Recommendation 19: Implement a rapid restoration program with comprehensive site preparation

Recommendation 20: Provide the tools to implement a rapid restoration program

Recommendation 21: Provide fast splicing as part of the rapid restoration program

Appendix A: Recommendations from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

Recommendation 22: Assess and implement most of the DCS Focus Group's recommendations when operating large SONET/ATM ADM's

Recommendation 23: Take additional precautions when deploying SONET OC-192 or 10G bit/sec ADMs or DCSs

Recommendation 24: Maintain the Facilities Solution Team for the next two years to act as the focal point for follow-up

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

Part 1. Machine Operators/Foremen

Objective:

- To support the company's objective of managing an accident-free work place to mitigate injuries and work within operating budgets to insure that the job is completed profitably, and on time, by utilizing industry standards and best practices.
- To mitigate damages by following excavating and locating procedures. Those that effectively implement the guidelines described below, as part of their normal daily routine, will significantly reduce accident potential.

Preplanning of excavation project:

- Notify local One-Call Service Center: Federal O.S.H.A. rules and legislation in most states require contractors who plan to excavate to notify the local One-Call Center and non-member facility owners 48 to 72 hours before the job begins. Additionally, there should be no excavating of any kind, mechanical or by hand, without first obtaining locates. If private lines exist, they too must be properly located. Property managers or owners of private facility systems can assist in calling for locates.
- The excavator must have a thorough knowledge of the jurisdictional regulations in which the dig site is located and planned for accordingly. For example, in some metropolitan areas it is unlawful for contractors to touch water valves or other utility control devices.
- To enhance the quality of the job preplanning phase, the company must determine if the excavation involves **critical or high priority** facilities. The contractor should specifically ask the owner to identify these in their bid specifications, or at least discuss with the owner and document it. These accidents would be any dig-up that could result in severe injury, death, or extensive property damage causing major outages to thousands of customers. Some examples would be high pressure gas, petroleum (catastrophic explosion), water lines (flooding and ground collapse), power transmission facilities, and fiber optic communication cables producing an FCC-reportable incident (service disruption to 30,000 or more customers for 30 minutes or more).

Identify Facilities - Large Projects

- Be sure to maintain documentation of the locate request number and a sketch of the locates. This documentation should be available at the site of excavation.
- Make sure the request numbers are valid and that they are issued in your company's name.
- The proposed dig area should be pre-marked with white paint prior to notifying the One-Call Center for locates.
- Request a pre-construction meeting with facility owners and locators to review the excavation area. This is very important if the job involves a critical or high priority facility or the job is in a congested metropolitan area. The owner should be questioned concerning the need for Subsurface Utility Engineering.
- Make sure that all members and non-member facility owners of the One-Call Center have been contacted for locates.

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

- Photograph or videotape of dig area in relation to the locates in case of problems later on. An alternative would be to map the coordinates of the locates in relation to a stationary object(s) such as a tree, fence, building, etc.

Identify Facilities - Small Projects

- The proposed dig area should be pre-marked with white paint prior to notifying the One-Call for locates.
- Make sure that all utility owners (one-call members and non-member owners) have been contacted for locates.
- Be sure to maintain documentation of the locate request number and a sketch of the locates if supplied by the facility owner. This documentation should be available at the site of excavation.
- Make sure request numbers are valid and that they are issued in your company's name.
- If there is a critical or high priority facility line in dig area, make arrangements for the locator and the facility owner to be on the job site with you during the excavation. If the locator and/or facility owner refuses to be present, then document this response by appending it to the ticket request.

On the job site:

- Once on the job site, begin job preparation by reviewing list of multiple non-members of your One-Call Service Center that are in your dig area and make sure that locate marks for all facilities are present. Consult your color chart if necessary to ensure all facilities have been located. If any underground system is not marked, contact your supervisor and call the owner immediately and then document responses.
- Account for all feeds to houses or buildings before you excavate. You should be able to see them in the air or marked on the ground.
- Identify and/or have located all private facilities that have not already been located. This includes propane and private lines, sprinklers, etc. Look for sewer vents on the roof of the house, look for sprinkler heads and turn on the system if necessary. Look for physical evidence that facilities have not been located.
- Sketch the location and document the depth of all public and private facilities on your work order for future reference.
- If there is not a sketch of all other facilities, draw a sketch of locates with measurements to fixed objects for future reference.
- Expose all facilities that you will be crossing. All critical or high priority facilities should be exposed by pot holing or use of locating equipment every 100 feet if parallel within 5 feet of dig area.
- If there are no locates, if marks are incomplete, or if exposing indicates locates are not accurate, **DO NOT DIG**. Contact the facility owner to complete the locates.

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

- Request new locates if the job extends beyond 10 days and following inclement weather.
- Once you have verified the location of all lines and you have completed the Job Check List, you can begin to excavate. Remember to complete the sketch of your dig site before you start excavating.
- Photograph or video tape the dig site in relation to the locates before the excavation begins so that valid documentation can be presented in case of problems later on.

Excavating:

- You should hand dig within 24 inches (or as your state requires) of any line, pedestal, closure, riser guard, pole (with riser), meter or other structure.
- If you must use mechanical equipment within 24 inches of a mark you should expose the line first.
- If you are paralleling a critical or high priority line, or working on one, you should pot hole every 100 feet to verify the location and depth of the line. An alternative to pot holing is the use of state-of-the-art locating equipment. If the locate is not accurate, the facility owner should be contacted immediately.
- If you are using a boring machine, you should try to bore away from all facilities. If you must cross a facility, expose the line to verify location and depth and change the bore route and/or depth to avoid the facility. Contact your supervisor to approve route changes.
- Do not place excavated dirt or street plates on top of locate marks. Every attempt should be made to keep marks visible and fresh at all times. When excavated spoil must be placed on locate marks, ensure that a detailed sketch of the marks has been made and pictures taken to support the sketch.

Backfilling:

- All lines exposed during excavation must be supported to prevent damage, stretching, kinking, etc.
- Before backfilling, extra caution must be taken to remove large rocks, sharp objects, and large chunks of hard packed clay or dirt.
- No trash or pieces of abandoned lines should be backfilled into the trench.

What to do if a damage does occur:

- All damages, including kinking or sheath damage must be reported immediately to a supervisor and to the facility owner or operator.
- Pictures will be taken and reports completed to help document the damage and assist in resolving any claim that may be filed.
- If a water line is damaged, you should attempt to stop the flow of water if allowed to do so within jurisdictional regulations at the site.
- If a gas or power line is damaged, it may be necessary to leave the area immediately and notify other workers in the area and facility owners . **REMEMBER, SAFETY FIRST!!! FOLLOW COMPANY SAFETY STANDARDS AND PROCEDURES.**

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

- Complete Facility Damage Report (see attached example in this appendix) and submit to your supervisor.

Employee Accountability:

Be advised that failure to perform any of the following procedures may result in disciplinary action.

- Digging without obtaining locates.
- Smoking is not permitted in, or around, the excavation in case of gas leaks.
- Excavating, including hand digging, without locates for any or all facilities including private lines.
- Report any facility damage regardless of severity.
- Failure to check paperwork or equipment before leaving the shop.
- Failure to utilize the job check list provided.

Obtain and learn the laws and regulations that pertain to excavating in your state.

Everyone will incorporate these procedures into their daily routine. By utilizing these procedures, it will increase your productivity and efficiency, not to mention the obvious safety benefits.

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

Pre-Excavation Check List

DO NOT DIG WITHOUT LOCATE MARKS

Complete and sign this sheet prior to excavation taking place.

BEFORE YOU LEAVE THE SHOP

- Obtain locate number.
- Check to see if locates has been completed (look at due date).
- Make sure you have a field sketch or if one was left at job site.

If you do not have what you need as listed above, do not leave the shop. See your Supervisor

ON THE JOB SITE

Pre-Survey (checking for locates)

- Check for field sketch.
- Check for all facility marks on ground.
- Verify all service feeds from buildings and homes and that they have been located and/or that they are aerial.
- Draw a sketch of the marked facilities for future use.
- Check for any visible signs of pedestal, riser, new trench lines that may have been missed in your dig area.
- Check to make sure that dig area is defined and is same on locate sketch when possible.
- Check for any private facilities not located. If they are not located, locate them or contact someone to get them located.
- If there are high priority facilities in your dig area, make sure facility owner/locator is on job site and/or has been contacted for advice.

If lines are not located completely, consult locate card and contact responsible party.

Public and Private Utilities

- Ask for assistance from homeowner and utilize locating equipment and use common sense.
- Locate septic lines.
- Locate water yard lines.
- Locate private power lines to sheds, wells, invisible fences, etc.
- Locate private gas or propane lines.

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

- Locate sprinkler lines and heads and drip systems.
- Draw a sketch of locations for all private facilities on job site.
- Locate telecommunication cable (TV, Telephone, fiber optics, etc.)

EXCAVATING

- If paralleling or working on a critical or high priority line, pot hole or use locating equipment to expose and verify location and depth of facility every 100 feet.
- Hand dig within 24 inches (or as required in your state) of lines, peds, pole risers, meters or other structures.
- Bore away from facilities.
- Verify depth of any facilities boring across, change route or depth as required, notify supervisor.
- Do not place excavated dirt on locate marks, flags, whiskers, etc.
- Support all lines exposed during excavation to avoid kinks or other damage.

BACKFILLING

- Shade all lines placed or exposed with good fill dirt.
- Verify all fill dirt is free from rocks, cable trash, crew trash, and large dirt clods.

PLEASE DIG SAFELY

As an excavator, you are responsible for verifying that all facilities within the dig area have been located.

You are responsible for locating all private and public facilities. Have the homeowner assist you if needed.

Failure to comply with the procedures listed above may result in disciplinary action up to and including termination

COMPLETED BY: _____

Date: _____

**Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for
Underground Facilities
Facility Damage Report**

DATE OF REPORT _____

DATE AND TIME OF DAMAGE _____

MACHINE OPERATOR _____

TICKET # _____

DATE OF LOCATE _____

NAME OF LOCATE COMPANY _____

FACILITY OWNER _____

FACILITY DAMAGED _____ SIZE _____

LIVE OR ABANDONED _____

LOCATE ACCURATE YES ___ NO ___

MEASUREMENT OFF BY FEET INCHES

LOCATES _____ PAINTED ___ FLAGGED _____

PICTURES TAKEN YES ___ NO ___

HOW MANY TAKEN _____

LOCATE SKETCH ATTACHED YES ___ NO ___

WAS LOCATE SKETCH ON JOB SITE YES ___ NO ___

WAS HAND DIG COMPLETED 24" EACH SIDE OF MARK _____

WAS LINE FOUND AND EXPOSED BY HAND _____

DAMAGE BY HAND OR MACHINE _____

CAUSE CODE _____

NAME OF MACHINE OPERATORS SUPERVISOR

WHAT HAPPENED TO CAUSE THIS DAMAGE _____

WHY DID THIS HAPPEN _____

WHAT IS BEING DONE TO INSURE THIS WILL NOT HAPPEN AGAIN _____

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

COMMENTS ON DAMAGES _____

MACHINE OPERATORS SIGNATURE _____ DATE _____

SUPERVISOR SIGNATURE _____ DATE _____

MANAGER SIGNATURE _____ DATE _____

OK TO PAY _____ DATE ____/____/____ DEPT. CODE _____

CLAIM NUMBER: _____ AMOUNT PAID: _____ DATE CLOSED: _____

CHECK NUMBER: _____ P.O. NUMBER: _____

CAUSE CODES LOCATE ERROR

- LO1 Facility not marked
- LO2 Abandoned facility
- LO3 Mark off, but facility was not damaged
- LO4 Locate marks off
- LO5 Other (Explain)

CAUSE CODES DIG ERROR

- D02 Out of dig area
- D03 No locate requested
- D04 Expired locate
- D05 Digging prior to locate
- D06 Hit on locate - within 24" of mark
- D07 Marks destroyed - drawing incorrect
- D08 Unable to investigate/not notified
- D09 Found all cables marked
- D10 Other (Explain)

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

Part 2. Owners/Senior Managers

Owners and senior managers of excavating construction firms need to take special precautions by following best practices and prepare defensive documentation that will help the machine operators and job-site foreman plan and execute an accident free excavation.

All Excavations

- The contractor communicates with the local One-Call Service Center **AND** utility owners who are not members of the one-call center. This communication must take place 48 hours to 72 hours, but not more than 10 days (or per state regulations) prior to the start of the excavation.
- The complete route of the excavation will be white lined (usually with white spray paint) before the locator arrives on site.
- The contractor hand digs within 18 inches or 24 inches (depending on state regulations), vertically and horizontally, from the center of the utility line.

Many contractors will mechanically scoop off the top layer of dirt directly above the underground utility system to save excavation time. However, this should not be done because they do not know how deep the line is buried beneath ground level. Some locating equipment can identify the depth of the system, such as subsurface penetrating radar, but utility owners will not release this information due to liability concerns. Owners feel that buried facilities, especially fiber optic cable, tend to move vertically over time.

- The contractor requests new locates to again identify the underground facilities on all excavations incurring extended time requirements of 10 days or more and following inclement weather.
- Photographs or videos are taken after the utility has been marked before the excavation begins.

Critical /High Priority Excavations

On numerous occasions contractors will be required to excavate on a or near critical or high priority underground facilities. These utilities, if hit during the excavation, can result in death, severe injury, or extensive property damage causing major power outages to thousands or consumers. Examples would include high pressure gas, petroleum lines (catastrophic explosions), and water lines (flooding and ground collapse), power transmission facilities, and fiber optic communication cables (service disruption the contractor must aggressively discuss this risk with the owner to identify if critical or high priority facilities are located at the excavation site.

If so, addition to the 5 best practices defined above, the following 3 best practices also apply:

- The contractor must request a pre-excavation meeting on site with the facility owner and prime contractor (if any).
- The contractor pot holes (hand digging, use of air knives or vacuum excavation techniques) to verify utility locates or marks- outs. An acceptable substitute procedures for pot holing would be the contractors use of state-of-the-art utility locating equipment.
- The contractor maps the coordinates of the locates in relation to a stationary object(s), such as a tree, fence, building, etc.

Appendix B: Minimum Damage Prevention Guidelines - Excavation Procedures for Underground Facilities

Documentation Regarding Compliance with Best Practices

Documentation will take many forms, but it must include the following information, signed and dated by the construction owner or senior manager:

ALL EXCAVATIONS	
NAME OF CONTRACTOR:	DATE AND TIME OF DAMAGE
DATE(s) ONE-CALL NOTIFIED	TICKET #
NAME OF NON-MEMBERS NOTIFIED 1. 2. 3.	4. 5. 6. CONTINUE ON REVERSE SIDE.
FACILITY DAMAGED:	SIZE
LOCATE ACCURATE: YES NO	MEASUREMENT OFF BY: FEET INCHES
ROUTE WHITE LINES: YES NO	HAND DUG 18" 24"
DIRT ABOVE MARKED FACILITY MECHANICALLY REMOVED: YES NO	NEW LOCATES REQUESTED: YES NO N/A
PHOTOS/VIDEOS TAKEN: YES NO	IF YES, SUBMIT COPEs

Appendix C: Minimum Performance Guidelines for One-Call Systems

One-Call Systems have been in operation since the late 60's. Based on the increase in third party damage primarily due to non-compliance with state laws and lack of universally available coverage the following standards are intended to improve the availability of service at a level consistent with good practices found today in a number of systems in the U.S.

1. Single number coverage for each state.
2. Services should be provided 24 hours a day, 7 days a week.
3. All calls should be voice recorded on a logging recorder. Each work site identified should be given a unique file number and the caller should be given a list of those facility owners being notified in the immediate dig site area.
4. All records should be maintained for one year beyond the applicable statute of limitations prescribed by State law.
5. The One-Call System should provide periodic administrative reports on its operation and performance.
6. All facility owners and excavators/designers should participate in the system. All participants should receive a safety certification every 36 months. Certification can be provided by State associations for each industry within that State after qualifying to provide such certification by the One-Call System or the Secretary of Transportation.
7. The One-Call System should be fee supported and self-sufficient. Funding to be provided by its participants.
8. The One-Call System should have a public education plan to broaden the awareness of anyone with the potential of excavating. The plan should consist of four notices provided to the excavating public per year.
9. All designers should give no less than ten business days nor more than 90 business days notice prior to final design. Pre-construction engineering and planning requests should be made by the designer not less than 10 business days nor more than 90 business days notice prior to final design.

THE ONE-CALL CENTER SHOULD REQUIRE:

- a. All excavators to give no less than two business days nor more than 10 business days notice in advance of planned excavations.
- b. Emergency notice to be given at the earliest possible time, but should not be subject to special time periods.
- c. All notifications to be transmitted to the members in a timely fashion according to their priority.
 - Emergency and digging now within three minutes of receipt.
 - Short Notice within ten minutes of receipt.
 - Routine and Design within twenty minutes of receipt.
- d. The One-Call System should process all construction related notifications; i.e., excavation, demolition, road work; planned and emergency.

Appendix C: Minimum Performance Guidelines for One-Call Systems

MINIMUM SUGGESTED ONE-CALL SYSTEM CONFIGURATION

Major System elements

A One-Call System consists of people, communications devices, computer system(s), buildings, facility owners, excavators. Each element depends on the others for an efficient operation. The system must be able to take locate-requests from excavators, transmit them to the correct members, and keep accurate records of all transactions.

People

Trained operators and managers are an essential element that must be provided. They are the key to a well-functioning one call and provide the primary interface to the excavators. They must be courteous and professional and there must be enough operators to provide the level of service required.

Communications subsystem

The communications subsystem provides the communications between the One-Call Center and its user community (excavators and one-call members). It also provides the means to distribute the work to the operators and to disable operator positions when they are not active. Some features required are:

1. **Automatic number identification:** The number of the caller will be logged into the record of each transaction. The (caller id) number can also be used to preload the caller information into a new ticket to speed up the data input.
2. **Automatic call distribution:** The PBX will distribute incoming calls to the operators on a load sharing basis as required by the center manager.
3. **Off premises work station:** The communications system will provide means to switch calls to an off premises work station as required for off-hour operations or for load sharing, part-time operators, telecommuting operators, emergency conditions etc.
4. **Management reports:** The communications system will provide reports and alarms that indicate the wait times and number of dropped calls as well as alert the manager when the wait time (queue depth) for excavators is excessive.

Computer System:

The computer system is the heart of the One-Call Center. It processes the locate requests, keeps the records, manages the communications, and archives the transactions to satisfy the legal requirements. It must provide the following as a minimum requirement.

1. Enough storage for all the required maps and database in a redundant storage system such that the failure of any one component will not fail the whole nor will any data be lost. Either a mirrored disk system or a RAID (redundant array of inexpensive disks) may be used.
2. The failure of any one computer component will not fail the whole. Either a non-stop system or a fail-safe system so that the system continues to function with one or more inoperative

Appendix C: Minimum Performance Guidelines for One-Call Systems

components. The computer should be fast enough to handle the peak load without delaying the operator or delaying the dispatch of tickets to the members.

3. An archive system. Legal requirements dictate that records of all transactions are kept for 3-7 years (depending on state law). The computer should keep an archive in on-line storage for a short period (approximately 90 days) and in off-line but addressable storage for the remainder of the legal requirement. On-line storage may be disk or optical disk or WORM. Off-line storage may be removable optical disk, WORM, or other random access archival media. Both on-line and off-line archives must be indexed such that a record or a set of records may be retrieved quickly by date or originator or assignment.
4. The system must not require periodic down time. It must operate 24 hours a day and seven days a week.
5. The computer system must be scaleable so that normal growth and feature additions will not require replacement.
6. The computer system must provide the software tools to assist the operators. Functions such as near real time map displays, look up streets and display, be able to calculate distance and display on map, follow roads and water features automatically as the excavator describes directions to the dig site, identify features, magnify are required.
7. The software must be modular so that features may be added as needed without disrupting the operation of the existing processes.
8. The operating system should be an industry standard, well documented, operation system that is not proprietary and can be operated without special training. UNIX is one suggestion.

Data communications

The locate requests are sent to the members using data communications. Data communication devices shall be sufficient in number to insure tickets will not be delayed. In addition, remote data entry for members and large excavators requires interactive data communications. Two types of data communications will be provided:

1. Dial-up data modems complying with CCITT v.34bis for sending tickets to members who have printers or computer systems. The system will be able to communicate at 300, 1200, 2400, 9600, 14400 or 28800 bits per second as required by the receiving equipment. The system will provide one set of modems for sending out tickets and one set of modems for remote (batch) entry.
2. Fax data modems group II or group III or group IV fax protocol as required by the member's equipment. An incoming fax modem or fax machine will be provided to accept faxed locate requests from excavators.

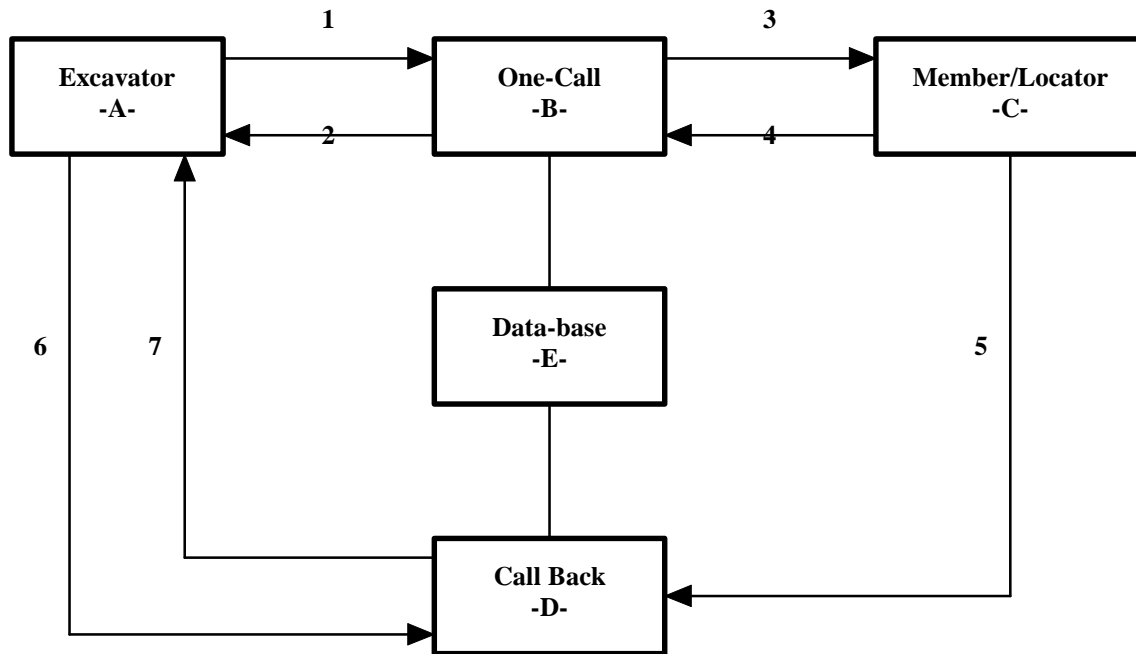
Status subsystem:

An automatic voice response status subsystem will be provided so excavators may call for status of any active ticket. This system will accept Touch Tone input and respond with synthesized voice to give the caller the current status of any ticket or set of tickets. Status may also be requested via the data modems using a remote terminal program.

Appendix C: Minimum Performance Guidelines for One-Call Systems

System Flow diagram

The path of a locate request through the model one call passes through each system element per the following diagram:



One-Call Ticket Flow Functional Description

FUNCTION A - Excavator

A-1 The excavator initiates the process by communicating information regarding the desire to dig, etc. to the One-Call.

A-2 This dig site information may be transferred via:

- Electronic means, batch process or remote data entry.
- Paper fax.
- Voice to a One-Call agent/operator.

INTERFACE 1 - From the Excavator to the One-Call

I-1.1 The content or information in this message must be defined.

I-1.2 A standard format must be adopted. The format of the ticket should be definable by the One-Call or the Member/Locator within the bounds of the standard ticket document (attachment) Items Identified as standard in the standard ticket document should be used as described. The form, format, and content of each identified field must comply with the standard.

I-1.3 Either a GIS code {latitude/longitude coordinate(s)} or valid address or street and cross street must be provided.

Appendix C: Minimum Performance Guidelines for One-Call Systems

FUNCTION B - One-Call

- B-1 Tickets must be screened automatically by the computer system.
- B-2 The dig site location must be Geocoded -- i.e., Determine the latitude-longitude coordinate point of the dig site. This may be done automatically by the GIS subsystem or may be determined by a computer assisted operator. The dig site location can be a point, an area or box, or a polygon. If the dig site is depicted as a point, the accuracy must be better than 50 feet. For a special rectangle (maximum/minimum latitude/longitude) the dig site must be wholly within the included area and the rectangle should be no more than 500 ft larger than the actual dig site dimensions. For a polygon, the boundary of the polygon should be no more than 500 feet outside the actual dig site area.
- B-3 Geocoding of dig sites will be accomplished using one or more of the following:
- Street and address
 - Street and cross street (intersecting street(s))
 - Latitude and longitude
 - Township, range, section, or other gridding system(s)
 - Direction and distance of dig (i.e., a linear excavation such as a ditch)
- B-4 The system must determine which members should receive a ticket based on the dig site Geocode and a member defined polygon or a member subscription to a place code or grid(s).
- B-5 Only tickets that fall in member defined polygons or in geographic areas subscribed to by the members should be transmitted to that member.
- B-6 The list of members that should receive each ticket must be generated and tickets distributed accordingly.
- B-7 A standard ticket format must be used to transmit locate requests and messages to the members. All reports and status messages should use a standard machine parsable format.
- B-8 In “real time” contractors should be advised which utilities/members are being sent a ticket. This can be done by voice response from the one-call operator or by an automated response such as a faxed copy of the ticket or by synthesized voice. “Real time” in this instance means that the information must be provided while the caller (excavator) is still on the phone or provide it via fax within five minutes if requested.
- B-9 Standards for accuracy will be established and reports generated outlining the number and nature of all errors of entry and delivery of locate requests.
- B-10 A verification of the address will be performed by the one-call system. The “dig site” information will be verified for correctness. Cross checks will be performed to determine that the address is correct for the city provided, the city is in the county, the street is in the city and county and there is no duplicate address/street. Other software/database checks will be used where appropriate to reduce errors.

INTERFACE 2 - From the One-Call back to the Excavator:

- I-2.1 Acknowledgment of receipt of the ticket with serial number and time stamp.
- I-2.2 Acknowledgment of data quality on the ticket.

Appendix C: Minimum Performance Guidelines for One-Call Systems

- I-2.3 Courtesy copy of the ticket if it was communicated to the One-Call via voice. (Optional fax copy if the excavator has a fax and requests a copy(s))
- I-2.4 A list of the members/utilities that were sent a ticket.
- I-2.5 Provide and audit trail to excavators, if they request one and if they have at least dig request for the day.

INTERFACE 3 - From the One-Call to the Member/Locator

- I-3.1 The One-Call ticket must be transmitted to the member using a standard ticket format.
- I-3.2 Standards for accuracy, integrity of the transmission process and quality verification must be developed.
- I-3.3 Error correcting modems must be used as part of the quality assurance in the transmission process.
- I-3.4 One-Calls must be able to send tickets to “800” numbers.

FUNCTION C - Member/Locator

- C-1 Member/Locator is responsible for screening the ticket and determining a clear or conflict status.
- C-2 Status of a ticket is considered to be active until it is cleared or completed by the member/locator or the active time has expired.

INTERFACE 4 - From Member/Locator back to One-Call

- I-4.1 Positive acknowledgment that a ticket has been received.

INTERFACE 5 - From Member/Locator to Call Back

- I-5.1 Status of a ticket either Conflict/Involved or Clear/Not Involved.
- I-5.2 This status update could be accomplished via Touch Tone phone as an alternative to electronic data transfer.
- I-5.3 For electronic data transfer the standard ticket document should be used as a starting point.

FUNCTION D - Call Back

- D-1 The purpose for this function is to update the status of the tickets in the One-Call’s data base and to notify excavators of the status as well.
- D-2 Excavator can receive automatic ticket status updates via fax/electronic batch transmission or can initiate a status inquiry via Touch Tone phone. Touch Tone status requests will be recorded and verified using caller ID or other methods.
- D-3 If a Touch Tone inquiry is initiated by an excavator, a method of reaching a One-Call operator will be provided.
- D-4 The status of a ticket sent from the One-Call to the Member/Locator will be considered Conflict/Involved until the member indicates otherwise.
- D-5 The status of the ticket may be changed by the member/locator by a call to an operator or by Touch Tone (using the ticket serial number and his access code) or by remote data entry.

Appendix C: Minimum Performance Guidelines for One-Call Systems

FUNCTION E - One-Call Data Base

E-1 The One-Call data base consists of 6 components:

- Land base data, i.e., streets and waterways (maps).
- Grid system data used by the One-Call and member subscription lists.
- Facility layout data for members or the polygons that define member buffer zones.
- Ticket data.
- Member accounting data.
- Member communications interface characteristics.

Ticket data should have the following characteristics:

- E-2 Held in the Data Base for a defined period of time after last activity (status update) and then archived as inactive.
- E-3 New status should be appended to the ticket as it is received, and all status updates will be time stamped and originator identified.
- E-4 All status inquiries will be recorded, time stamped, and caller identified. All automated and manual status reports to excavators will be recorded and time stamped. This record will be linked to the ticket and retained in the archive.

Land Base data issues:

- E-5 Spatial accuracy will provide the location of any feature to better than 150 feet.
- E-6 The land base data will be continuously updated such that new features are added within 90 days of the first locate request that refers to it. The source of the information will be determined by the One-Call management.
- E-7 Responsibility for accuracy of the land base data should be the One-Call's rather than the member's.
- E-8 One-Call should distribute a copy of the data periodically to the members as required.
- E-9 The spatial data base (land base) will be able to identify as a minimum:
- Streets and address ranges.
 - Grid systems (Township-range-section or other gridding system).
 - City political boundaries.
 - City mail address boundaries (5 digit zip code boundary(ies)).
 - Member polygons (or grid subscriptions).
 - Political boundaries other than city such as Townships, boroughs, etc.

Facility Layout (Member) data issues:

- E-10 Mechanization of the process for communicating this data from the member to the One-Call and keeping it up to date needs to be emphasized in order to achieve our cost goals and objectives.
- E-11 A standard interface for the transmission of latitude and longitude points that define a polygon needs to be defined.

Appendix C: Minimum Performance Guidelines for One-Call Systems

E-12 Responsibility for the integrity of the data needs to be defined and agreed to.

INTERFACE 6 - From the Excavator to Call Back

I-6.1 Ticket Status Inquiry -- An excavator may call the one-call for status on any ticket. The ticket number is used to retrieve the status of the ticket.

I-6.2 The inquiry may be by Touch Tone phone with synthesized voice response or:

I-6.3 The inquiry may be by Touch Tone phone with FAX response or:

I-6.4 The inquiry may be by data modem with interactive query and response.

INTERFACE 7 - From Call Back to the Excavator

Automatic status reports may be sent by the system (when excavator requests them) beginning 24 hours after receipt of the locate request and each time the status changes.

I-7.1 Ticket status update to the Excavator by FAX.

I-7.2 Response by synthesized voice.

I-7.3 Response by electronic data transmission (send by E-mail or to a printer).

I-7.4 Auto-status update may be sent to excavators that subscribe to the service. (FAX)

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

INTRODUCTION

As fiber optic cables have become increasingly common in communications construction, much publicity has been given to instances of cable cuts resulting in loss of service, and to fixing of responsibility. Much publicity has also been given to the fact that physically small fiber optic cables can carry enormously greater numbers of communication circuits than do copper conductor cables of comparable size.

The contracting industry has been alarmed by the difficulty of determining and verifying the presence and location of fiber optic facilities and the total impact of cable cuts. The communications facility operators are also concerned about the number of cuts that have been occurring, and they want to reduce service interruptions.

SCOPE

The purpose of this document is to establish minimum guidelines that defines the location of installed outside fiber optic cable plant relative to its physical environment, including related protective measures necessary to reduce the probability of cable damage.

The guideline addresses fiber optic cables that are directly buried, placed in duct, in non-navigable waterways, or in transition from underground to aerial structures. It further specifies the location-marking and physical and operational protection of such cables.

This guideline does not address installation methods or existing cable plant, nor does it cover aerial, building, and submarine cables, or cables placed in navigable waterways.

Uniform Color Code — An APWA guide that has been accepted as a national convention for the color-coded temporary marking of subsurface facilities to prevent accidental damage by those excavating nearby. The Uniform Color Code was developed by the Utility Location and Coordination Council (ULCC) and adopted by the APWA to both mark and identify subsurface facilities. This color code is also recommended for permanent above-ground and below-ground markings. The colors assigned and types of facility are specified in Table D-1.

Table D-1 — Uniform color code

Color	Facility
Red	Electric power lines and conduit
Yellow	Gas, oil, steam, and petroleum lines
Blue	Water, irrigation, and slurry lines
Green	Sewer and drain lines
Orange	Communication lines, including fiber optic cable
White	Proposed excavation

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

REQUIREMENTS — FIBER OPTIC CABLE INSTALLATION PLANNING:

The facility owner is responsible for correct route design and installation of the fiber optic cable. Fiber optic cable plant should be constructed in accordance with plans and specifications prepared under the supervision of a qualified engineer. The proper design of a fiber optic cable below-ground route is important, this being the first step in avoiding damage to that cable by future work operations performed in the area.

The following guidelines are provided to convey additional advice and information, and to emphasize the advantages of fiber optic cable placement in accordance with this guideline. They should not be taken as all-inclusive and may not be applicable to all installations.

- Plans for the location and installation of below-ground fiber optic cable should be made using information obtained from a field survey.
- The installation plans should identify the fiber cable facility's route and placement information sufficient to locate other subsurface structures. Special measures to be taken for known conflicts and obstructions should be provided, and nearby structures that can assist as landmarks for route identification and future facility location should be shown and noted.
- In recognition of possible right-of-way congestion, the route design should take into account interference between the present installation and future subsurface structures.
- Once the route is planned, right-of-way and required permits should be obtained, recognizing needs to access, work area, equipment enclosures, and future maintenance. Land acquisition rights and permission should be obtained before installation work begins.
- When appropriate for the project, the facility owner should conduct a preconstruction meeting with involved local government agencies, contractors and other utilities to cover construction plans, schedules, sequence of operations, and other concerns.
- The facility owner should conduct inspections as necessary to ensure that the installation is in accordance with the approved plans.
- As-built facility location records should be maintained by the facility owner. Location record information should be available for reference when other parties or government agencies are planning work in the area to allow them to plan to avoid damage or conflicts with the fiber optic cable facilities. As-built records cannot be expected to reflect subsequent changes in landscape, public works, landmarks, or foreign underground structures. Such records cannot be considered as a substitute for field locating and marking of the fiber cable as required in Table D-1.

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

LOCATION

Depth of plant

Buried or conduit plant as described in Table D-2 shall be installed so that a minimum depth of cover as shown in the table is obtained. In conditions where this depth is not feasible or permitted, additional physical protection should be afforded the facility. Deviations from these requirements may lead to additional risks and must be evaluated on an individual basis.

Table D-2 — Depth of plant

Facility	Minimum cover mm (in.)
Toll, trunk cable	750 (30)
Feeder, distribution cable	600 (24)
Service/drop lines	450 (18)
Underground conduit (see NOTE)	750 (30)

NOTE — Multiple-duct conduit underground, with manhole access. For other duct applications, depth requirements for buried plant shall apply.

Joint construction

Depth of cover for power cables is governed by *National Electrical Safety Code* (NESC) Rule 353D. For joint facilities, the minimum depth of cover shall be determined either from Table D-2 above, or Table D-3, *whichever depth is greater*.

Table D-3 — Depth of electrical supply cable

Maximum Voltage Phase-to-Phase, Volts	Depth of Cover, mm (in.)
0 — 600	600 (24)
601 to 50,000	750 (30)
50,001 and above	1070 (42)

Additional requirements for random separation of power cables and communications cables at the same depth with no deliberate separation between them are covered in NESC Rule 354C. Where conduit is required for short special conditions in buried distribution systems, separate ducts for power and communications facilities must be provided as covered in NESC Rule 341A6.

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

Separations From Foreign Structures

The minimum desirable separation between existing foreign structures and communications cables (or underground conduit containing communications cables) should be as shown in Table D-4.

Table D-4 — Minimum separations from foreign structures

Electric-light, power, or other conduits	Other foreign services: gas, water, oil, etc.
75 mm (3 in.) of concrete	300 mm (12 in.) from transmission pipelines
100 mm (4 in.) of masonry	150 mm (6 in.) from local distribution pipelines
300 mm (12 in.) of earth	
(Unless greater separations are required by state of local regulations)	

These clearances are necessary to provide sufficient space for maintenance of foreign structures, although they may be subject to adjustment to meet particular conditions. Questions that occur regarding any reduction of these clearances should be discussed with a responsible representative of the owning company.

Permanent markings

Either permanent above-ground markers or underground warning tape, or both, are recommended to identify the general location of the facility route. These devices, however, cannot be relied upon to determine the precise location of the underground facility.

Permanent markers should be placed at line-of-sight intervals so that the direction of the route is clearly indicated. These markers should be visible from the adjoining marker, but separated by no more than 300 m (1000 ft.), if land use permits. Markers are usually placed at right-of-way boundaries, utility or vehicular crossings, or at other locations dictated by local conditions. These markers should be identified with the name of the facility owner and one or more telephone contact numbers to obtain the precise facility location.

Where a warning tape is used, it should be buried at least 300 mm (12 in.) above the cable and should not deviate more than 450 mm (18 in.) from the outside edge of the facility. Care must be exercised during its placing to ensure proper final positioning of the tape. The use of warning tape above service or drop lines on private property is optional.

Warning tapes should have sufficient tensile strength and elongation properties so that when encountered in excavating they are not easily broken and will stretch significantly before breaking.

Extended periods of burial in soil should not degrade their mechanical characteristics, color, or markings. Tapes with metallic coatings will generally exhibit less elongation than dielectric tapes. Tapes should be at least 50 mm (2 in.) wide and color coded in accordance with the Uniform Color Code of the American Public Works Association (APWA)—Utility Location and Coordination Council (ULCC). The tape should be marked with warning information identifying the type of facility that is below. Additional information is desirable to show specific contact information and to identify the facility owner. No quantitative performance characteristics for tape can be stated, since no industry standard specification for warning tape is known to exist. Warning tape serves **only as a warning**; never use it as a device for locating cable.

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

Riser poles

Fiber optic cables on riser poles should have mechanical protection such as a duct or U-guard on the pole extending from the ground for approximately 2.5 meters (8 feet). This mechanical protection should extend below ground level via a conduit bend to the specified burial depth of the cable (see Table D-2). Risers should be located on the pole in the safest position with respect to possible traffic damage and climbing space. For added cable protection above the U-guard or duct, the fiber cable may be placed in innerduct extending above the U-guard up and onto the supporting aerial strand. From an underground conduit, this innerduct may be run from the manhole, through the subsidiary duct and U-guard onto the supporting aerial strand.

Building entrances

Buried fiber cable may enter a building at the same depth as the facility (see Table D-1) through the building wall via a duct. Entrance to the building may also be made above ground. The exposed fiber cable should be secured to the building and mechanically protected with conduit, innerduct, or U-guard.

Underwater cable crossings

The Army Corps of Engineers regulates activities involving interstate waters and associated marshes and tributaries, intrastate waters (which could affect interstate or foreign commerce), and the territorial seas for a seaward distance of 5 km (3 mi.). The Corps is responsible for work up to the headwaters of freshwater streams, wetlands, swamps, and lakes.

The Corps' Regional District Engineer will advise applicants as to the types of permits required for proposed work. Any of the Corps District Engineers, located in many major cities of the country, will advise and inform applicants of the requirements to obtain permits for activities in waters under their jurisdiction.

In addition, even where a Corps permit is required, an environmental review and permit from a state or local agency, or both, may also be required. The state and local agencies should be contacted to ensure compliance with environmental review statutes and regulations. Permission or easements from property owners may also be required.

Railroad crossings

A railroad must be notified of a planned fiber optic cable crossing their railroad tracks or property. The facility owner is responsible for the engineering and construction of the railroad crossing, including preparing a subsurface profile of the construction site. The chief engineer of the railroad should be consulted to determine the approved methods of crossing the railroad.

Work must be done at the time when it will not interfere with proper and safe use or operation of the property and tracks of the railroad company. Arrangements have to be made with the duly authorized representative of the railroad company for the date and time to begin work.

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Bridge crossings

The diversity of bridge designs and structures makes it impractical to prescribe installation standards for fiber optic cable bridge crossings. Conduit is normally used to provide the structure and mechanical protection for these cable crossings.

Each bridge crossing must be individually designed to conform to local conditions and constraints imposed at the bridge site. The design of the conduit assembly and associated support structure, or cable attachment, should be consistent with pertinent local regulations controlling bridge construction. Where no guidelines exist for structural design, reference should be made to *Standard Specifications for Highway Bridges*, published by the American Association of State Highway and Transportation Officials (AASHTO).

The design of bridge cable crossings must be compatible with the cable approach, must ensure that the cable is not subject to damage by normal bridge use, and must maintain the required clearances over railroads or other traveled ways crossed. Separation of the fiber cable from other utilities on the bridge should be in accordance with the provisions of the *National Electrical Safety Code* or other appropriate regulations.

Attachment should not be made to the bridge until approval is secured from the proper authority.

Tunnel installations

Each tunnel will have its own unique environmental and administrative requirements. To ensure continued use of the tunnel for a fiber optic cable facility, written permission and agreement should be obtained from the tunnel regulatory authority, or owner(s). Such permit agreements should cover installation methods as well as administrative and operating rules for this occupancy and accommodation. Each situation must be evaluated in accordance with the tunnel's basic use, environment, and presence of other utilities to minimize the possibility of damage to the cable.

Installation standards for tunnels cannot be limited to mechanical and structural aspects alone. In the *National Electrical Safety Code*, Section 39, requirements are listed for environmental factors that should be observed and other applicable requirements contained in Part 3 of the Code. Also, suitable corrosion-resistant markers or cable tags showing appropriate facility owner-operator information should be placed to facilitate visual identification of the fiber cable.

Highway accommodations

All states, and many political subdivisions, have statutes or regulations that permit and define the use and occupancy of public highways and streets. Franchise agreements may also specify the legal rights covering the placement of utility facilities in highway right-of-way.

A basic reference for highway utility use is *A Guide for Accommodating Utilities Within Highway Right-of-Way*, issued by the American Association of State Highway and Transportation Officials (AASHTO). It may be referred to and used to the extent that it is consistent with state and local laws and policies for accommodating utility facilities in highway right-of-way.

The guidelines for placement of fiber optic cables in highway rights-of-way are to be interpreted to the extent that they are consistent under the responsible highway authority's rules, codes, and regulations.

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

Recommended Procedures For Facility Owners

The following are the facility owners' responsibilities that are recommended to minimize the likelihood of accidental damage to subsurface fiber cable facilities. Even though the following steps may not be specified in damage prevention laws and regulations, it is recommended that they be followed by the facility owner to decrease the likelihood of damage to facilities.

The facility owner, when required by state law or regulations, should register with the central registry of the city, town, or county. In addition, whether or not required by law to register, each facility owner should become a member of the one-call bureau(s) covering the area(s) of the owner's operation.

When notification of excavation is properly communicated, owners should complete marking of the facility location within two working days of notification, or by mutually agreed-upon date. If not otherwise specified by state law or other regulations, all facilities within 3 meters (10 feet) of the excavation site should be located and marked. The owner should notify the excavator when no facility will be affected by the excavation.

- Facility owners should clearly ground-mark their facility's location and route if the facility is within 3 meters (10 feet) of the excavation site. The ULCC Uniform Color Code temporary marking color should be used to mark the centerline of the facility. Markings should include the name, initials, or logo of the owner, and the width of the facility where that width is greater than 50 mm (2 in.). (Orange is the ULCC-specified marking color for all communication facilities, which includes fiber optic cable.) The facility location markings should be made above and in line with the facility, not placed at an angle over the facility, to allow for correct determination of the tolerance zone. Stakes, where used to supplement surface markings, should be clearly identified with the ULCC Uniform Color Code orange on at least the top 150 mm (6 in.) of the stake. (See Table D-1). The owner should notify the excavator when marking is complete, unless as specified otherwise by state law.
- Facility owners should contract with fully qualified locating firms who follow precise quality control standards and employing highly trained field locators.
- The owner should notify the excavator if the facility cannot be marked before the excavation start date. The owner should arrange with the excavator for a prompt new marking completion date or schedule, as may be specified by state law. If requested by the excavator, the owner may assign an on-site representative to provide facility locating services until normal facility marking has been completed.
- Where conditions exist that will not allow centerline facility marking, offset staking and marking should be used. This marking will clearly indicate distance and direction of the facility from the offset stakes.
- Where marking or staking cannot be used or is insufficient, the operator should designate the facility location during an on-site meeting with the excavator. The facility should be exposed sufficiently to verify its location and direction, or its location should be determined by other means that are mutually agreeable.
- The facility owner should respond promptly to an excavator's call for assistance in facility locating, review of marking, identification of an unknown facility, damage, or other emergency request.

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

- On **critical, or high priority** jobs, the owner should communicate to the excavator that special precautions are required. When located in congested metropolitan areas, the facility owner should consider Subsurface Utility Engineering to greatly reduce the risk of facility damage during excavation.
- Selection of the materials and methods used to apply the ULCC Uniform Color Code temporary markings should be such that the markings will remain in place until no longer required by the excavator. The facility owner should respond promptly when notified by the excavator that a facility's markings have not been preserved.

Damage Restoration

Facility owners should be prepared to restore fiber optic cable damage. The way to meet a service emergency is to prepare in advance for handling it. Each damage case presents different situations, circumstances, and conditions that should be handled and coordinated for rapid service restoration.

No listing can be expected to cover the specific handling of all types of damage cases. The owner should establish overall procedures and routines with appropriate practices for each operation essential to the restoration work.

The generic items and procedures for restoration work include:

- Spare-cable requirements for restoration and repair work — lengths, type, quality, inventory, and availability, based on network layouts and design
- Network records, maps, installed-facility measurement data, requirements, and availability needed for rapid and effective restoration of service
- Splicing restoration kits — tools, materials, test-set availability and inventory
- Trained facility personnel
- Restoration site procedures based on temporary or permanent restoration requirements:
 - a) for temporary restoration, protect the site until permanent restoration is made
 - b) make facility test measurements of both temporary and permanent restoration
 - c) request assistance of excavator if required
- Complete reports and documentation

Appendix D - Facility Owners Minimum Guidelines For Location And Protection Of Below-Ground Fiber Optic Cable

REFERENCES

American National Standards:

- Accredited Standards Committee C2-1997, *National Electrical Safety Code* (NESEC).
- ASTM-E380, *Standard Practice for Use of the Internal System of Units (SI) (The Modernized Metric System)*.
- Army Corps of Engineers, *Regulatory Program — Applicant Information*.
- Association of American Railroads, *Recommended Practices for Communication Lines Crossing the Tracks of Railroads*.
- American Railway Engineering Association (AREA), *AREA Manual for Railroad Engineering*.
- American Association of State Highway and Transportation Officials (AASHTO), *A Guide for Accommodating Utilities Within Highway Right-of-Way*.
- *Code of Federal Regulations*.
- American Public Works Association, *Guidelines for Uniform Temporary Marking of Underground Facilities*.
- One Call Systems International, *Excavator's Damage Prevention Guide and Directory*.

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

General Guidelines

This guide provides for temporary uniform surface marking of both planned excavations and of subsurface structures in potential conflict of planned excavations. White markings are used for excavation delineation. Subsurface structure markings are of a specific color. Appropriate color and common abbreviations are listed in Tables E-1 and E-2.

Table E-1: Color Code Identifiers	
Red	Electric
Orange	Communications/CATV
Green	Sewer
Pink	Temporary Survey Markings
Yellow	Gas/Oil/Steam
Blue	Water
Purple	Reclaimed Water
White	Proposed Excavation

Table E-2: Common Marking Identifiers	
E	Electric
G	Gas
SD	Storm Drain
SL	Street Lighting
S	Sewer
TEL	Telephone
TS	Traffic Signal
TV	Television
W	Water/Reclaimed Water

Note: Temporary markings should be clearly seen, functional, and considerate to the surface aesthetics and the local community. Also check to see if any local ordinances apply.

Marking in Paved Areas

Avoid excessive or oversized marking, especially if marking outside the excavation area. Conditions permitting, use spray chalk paints, water based paints, or equivalent less permanent type marking. Limit length, height, and interval of marks to those recommended. Letter and numbers should not exceed 3" to 6" in height.

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

Marking in Non-Paved Areas

When paint is not used, use appropriately colored stakes, lath, pennants or chalk lines. Select marker types that are most compatible to the purpose and marking surface. Adhere to paved area marking suggestions to the extent practical.

If any marking information is omitted due to site conditions, communicate omitted data by direct contact, sign, phone, fax. etc.

“Offset” markings should clearly indicate the direction, the distance, and the path of the facility or excavation.

Guidelines for Excavation Delineation

Excavators are reminded that pre-marking (delineation) of excavations is a requirement in states which minimizes confusion with facility locations.

Delineate the area to be excavated before calling the One-Call. Delineated areas should be identified in white markings with the requester’s company name or logo within the pre-marked zones (see examples).

Failure to pre-mark when practical may jeopardize your permit, or result in civil penalty where laws are in effect.

If pre-marking is not practical, the excavator should contact the One-Call Center to advise the operators that the excavator will identify the area to be excavated in another manner sufficient to enable the operator to determine the exact area of the excavation to be field marked.

Delineation must not be misleading, duplicative, or misinterpreted as traffic control or pedestrian control marks.

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

Single Point Excavation

Delineate the exact area of excavation with the use of dots or dashes, or a continuous solid line. Limit the size of each dash to approximately 6" in length and 1" in width interval spacing not less than approximately 4 feet. Dots of approximately 1" diameter are typically used to define arcs or radii and may be placed at closer intervals in lieu of dashes. Limit width of lines to 1". See Figure 1 for examples of marking techniques.

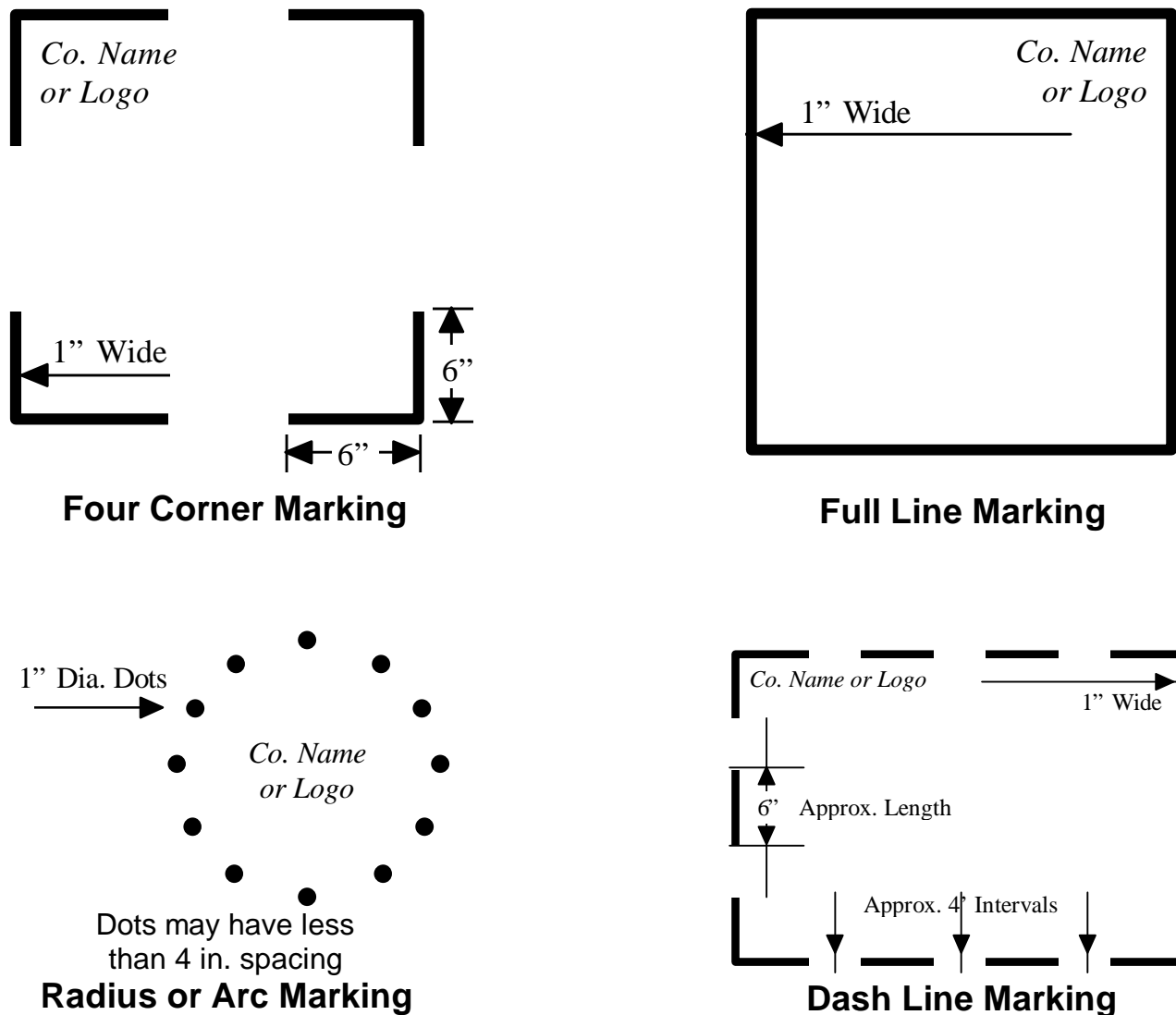


Figure 1: Single Point Excavation Marking Techniques

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

Trenching, Boring, or Other Continuous Type Excavations

Mark center line of planned excavation with 6" x 1" arrows (approximately 4 feet apart) to show the direction of excavation. For boring or continuous type operations where marked paving is not to be removed, mark at critical points with maximum mark separation of approximately 50 feet. Mark lateral excavations with arrows showing excavation direction from center line with marks at curb or property line if crossed. Intermittently indicate excavation width on either side of center line in 3" to 6" high figures. Dots may be used for curves and closer interval marking. See Figure 2 for an example of continuous excavation marking.

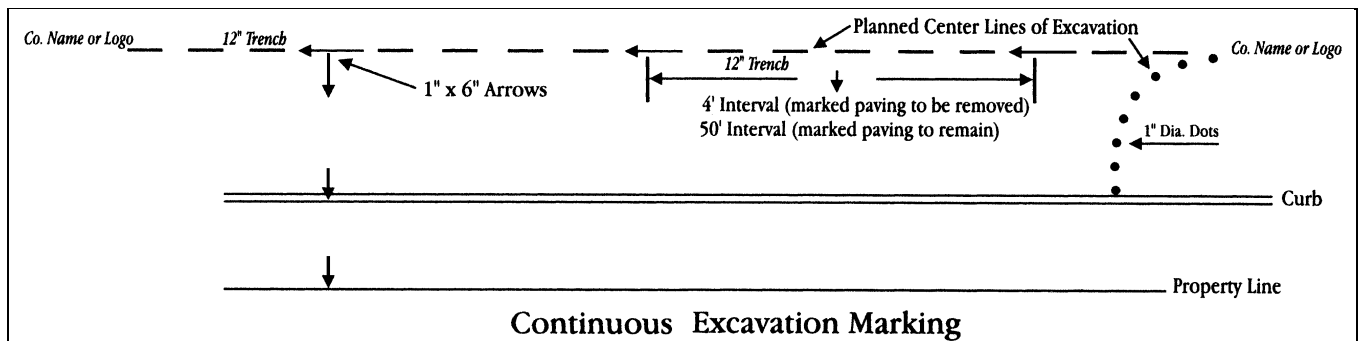


Figure 2: Continuous Excavation Marking Technique

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

Guidelines for Facility Owner Location Markout.

Marks in the appropriate color should be approximately 12" to 18" in length, spaced no more than 50 feet apart. See Figure 3 for an example.

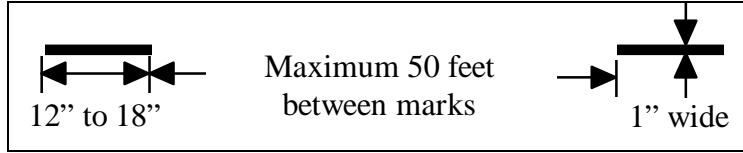


Figure 3: Facility Owner Marking

The marks should be placed over the approximate center of the facility. See the Figure 4 for an example.

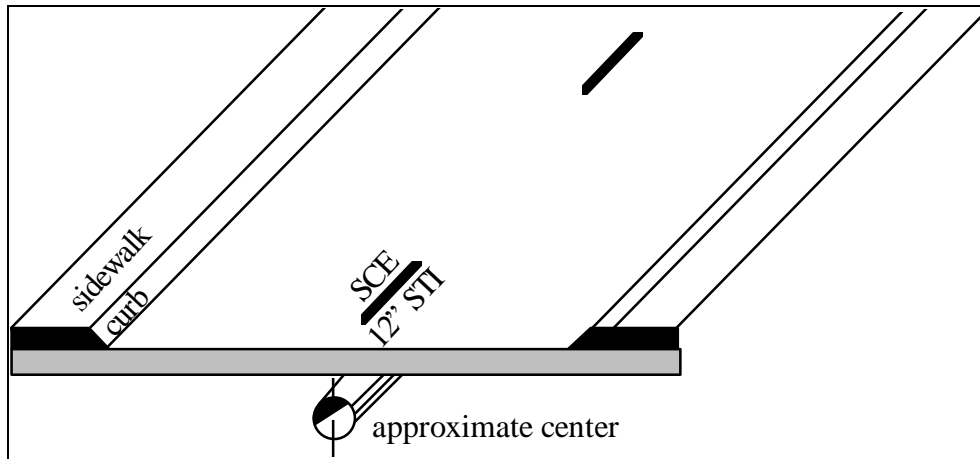


Figure 4: Facility Owner Marking - Centering

As an alternative, or in addition to, marks can be placed on either side of the facility to define the "hand dig area." The "hand dig area" is defined as width of the facility itself plus the tolerance zone of 24" (or as the state requires) either side of the facility. See Figure 5 for an example of this marking.

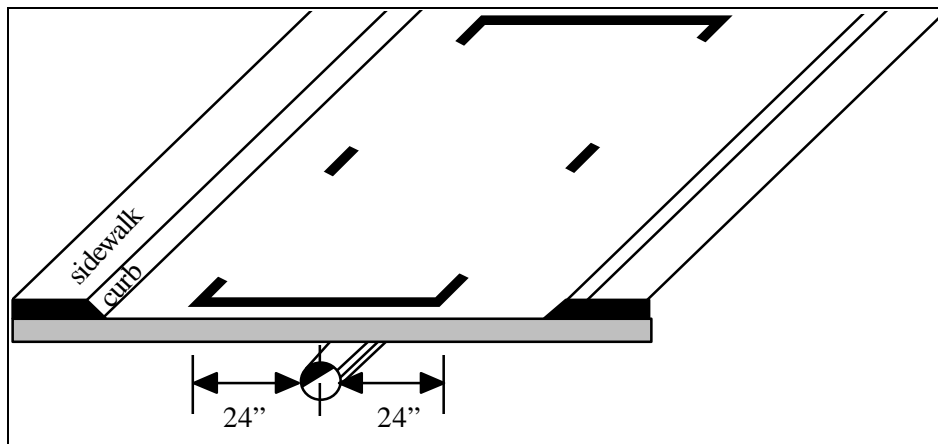


Figure 5: Facility Owner Marker - Hand Dig Area

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

An operator designator, such as company initials, should be placed at the beginning and end of the proposed work area. This instead of a generic designator such as TEL to avoid confusion between more than one operator of the same type of facility. See Figure 6 for examples.



Figure 6: Facility Owner Marking - Identification

Additional information may be provided (e.g., duct) of the facility, as is shown in Figure 7.

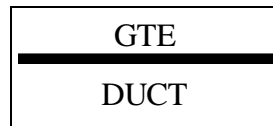


Figure 7: Facility Owner Marking- Additional Information

Changes in direction and lateral connections should be clearly indicated at the point where the change in direction or connection occurs, with an arrow indicating the path of the facility. A radius should be indicated with marks describing the arc. See Figure 8 for an example.

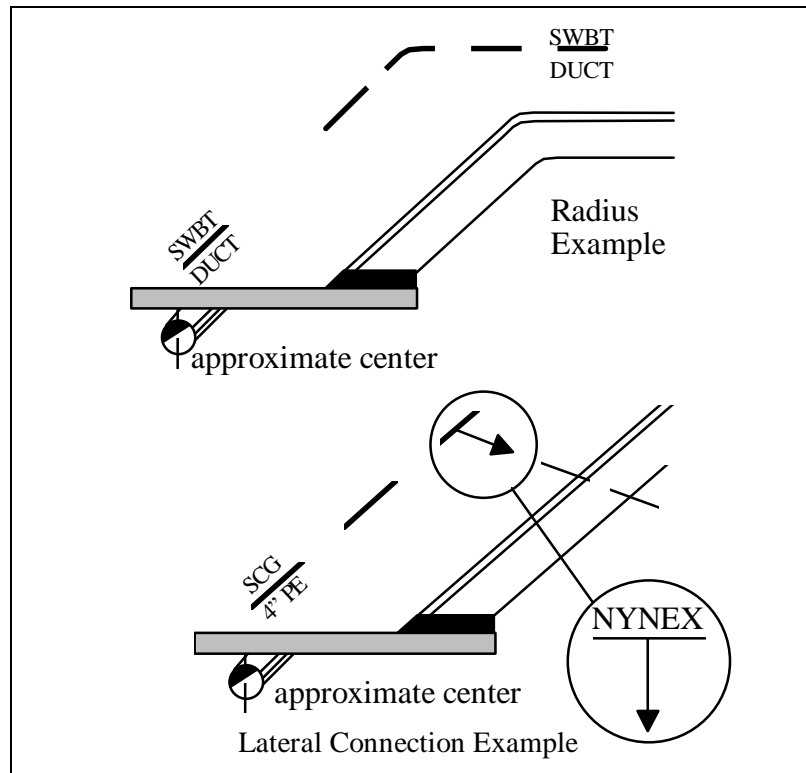


Figure 8: Facility Owner Marking - Changes in Direction

Appendix E: Guidelines for Prospective Excavation Site Delineation and Facility Owner Markout

Structures such as vaults that are physically larger than obvious surface indications should be marked so as to generally define the parameters of the structure. See Figure 9 for an example.

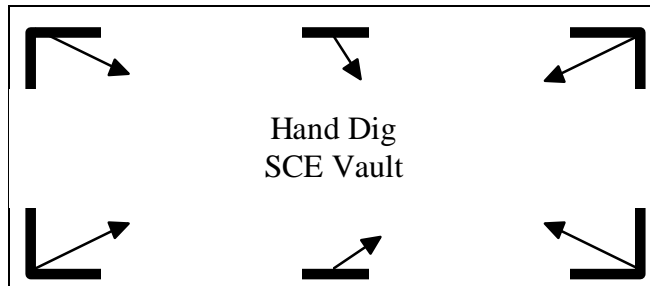


Figure 9: Facility Owner Marking - Outsized Structures

Termination points or dead ends should be indicated as shown in Figure 10.



Figure 10: Facility Owner Marking - Terminations/Dead Ends

If there is no conflict and the work area has been pre-marked*, no conflict should be marked along with company designator within the delineated work area or the excavator should be notified verbally, or in writing (e.g., fax). If the work area is not delineated, the excavator should likewise be notified verbally or in writing.

No conflict marking indicates that there are no facilities within the scope of the delineation or within the work area as described on the locate ticket. See Figure 11 for an example of “No Conflict” marking technique.

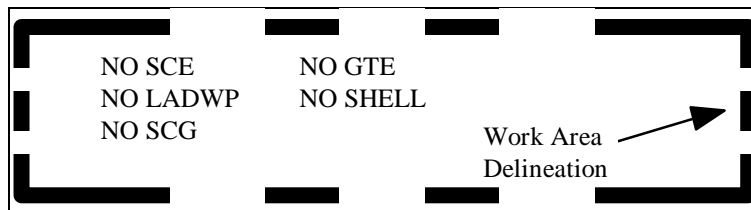


Figure 11: Facility Owner Marking - No Conflict

Figure 12 is an example of marking with an implied 60” “Hand Dig Area” (12” facility plus 24” to the right and 24” to the left).

* Caution - Allow adequate space for all facility markouts.

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

104TH CONGRESS
1ST SESSION

H.R. 2482

To require States to consider adopting mandatory, comprehensive, statewide one-call notification systems to protect underground facilities from being damaged by any excavations, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

October 13, 1995

Mr. Pallone introduced the following bill; which was referred to the Committee on Commerce

A BILL

To require States to consider adopting mandatory, comprehensive, statewide one-call notification systems to protect underground facilities from being damaged by any excavations, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the “Comprehensive One-Call Notification Act of 1995”.

SEC. 2 DEFINITIONS.

For purposes of this Act, the following definitions apply:

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

1) DAMAGE. - The term “damage” means any impact or contact with an underground facility, its appurtenances, or its protective coating, or weakening of the support for the facility or protective housing, which requires repair.

(2) EXCAVATION.- - The term “excavation” means any operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of any mechanized tools or equipment, or any explosive, but shall not include -

(A) any generally accepted normal agricultural practices and activities taken in support thereof, as determined by each State, including tilling of the soil for agricultural purposes to a depth of 18 inches or less;

(B) generally accepted normal lawn and garden activities, as determined by each State; and

(C) the excavation of a gravesite in a cemetery.

(3) EXCAVATOR.--The term “excavator” means a person who conducts excavation.

(4) FACILITY OPERATOR.--The term “facility operator” means any person who operates an underground facility.

(5) PERSON.--The term “person” includes any agency of Federal, State, or local government.

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

(6) SECRETARY.--The term “Secretary” means the Secretary of Commerce.

(7) STATE.--The term “State” means a State of the United States, the District of Columbia, or Puerto Rico.

(8) STATE PROGRAM.--The term “State program” means the program of a State to establish or maintain a one-cell notification system.

(9) UNDERGROUND FACILITY.--The term “underground facility” means any underground line, system, or structure that is part of a system in interstate commerce used for transmitting or distributing electricity or communication.

SEC. 3. NATIONWIDE TOLL-FREE NUMBER SYSTEM.

Within 1 year after the date of enactment of this Act, the Secretary shall, in consultation with the Federal Communications Commission, facility operators, excavators, and one-call notification system operators, provide for the establishment of a nationwide toll-free telephone number system to be used by State one-call notification systems.

SEC.4. STATE PROGRAMS.

(a) CONSIDERATION.--Each State shall consider whether to adopt a comprehensive statewide one-call notification program with each element described in section 5, to protect all underground facilities from damage due to any excavation. Such State program may be provided for through

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the establishment of a new program, or through modification or improvement of an existing program, and may be implemented by a nongovernmental organization. Such State program may include protection of facilities not part of a system in interstate commerce.

(b) PROCEDURES.--State consideration under subsection (a) shall be undertaken after public notice and hearing, and shall be completed within 3 years after the date of enactment of this Act. Such consideration may be undertaken as part of any proceeding of a State with respect to the safety of underground facilities.

(c) COMPLIANCE.--If a State fails to comply with the requirements of subsection (a), the Secretary or any person aggrieved by such failure may in a civil action obtain appropriate relief against any appropriate officer or entity of the State, including the State itself, to compel such compliance.

(d) APPROPRIATENESS.--Nothing in this Act prohibits a State from making a determination that it is not appropriate to adopt a State program described in section 5, pursuant to its authority under otherwise applicable State law.

SEC.5. ELEMENTS OF STATE PROGRAM.

(a) IN GENERAL.--Each State's consideration under section 4(a) shall include consideration of program elements that --

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

(1) provide for a one-call notification system or systems which shall--

(A) apply to all excavators facility operators;

(B) operate in all areas of the State and not duplicate the geographical coverage of other one-call notification systems;

(C) receive and record appropriate information from excavators about intended excavations.

(D) inform facility operators of any intended excavations that may be in the vicinity of their underground facilities; and

(E) inform excavators of the identity of facility operators who will be notified of the intended excavation;

(2) provide for 24-hour coverage for emergency excavation, with the manner and scope of coverage determined by the State;

(3) employ mechanisms to ensure that the general public, and in particular all excavators, are aware of the one-call telephone number and the requirements, penalties, and benefits of the State program relating to excavations;

(4) inform excavators of any procedures that the State has determined must be followed when excavating;

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(5) require that any excavator must contact the one-call notification system in accordance with State specifications, which may vary depending on whether the excavation is short term, long term, routine, continuous, or emergency;

(6) require facility operators to provide for locating and marking or otherwise identifying their facilities at an excavation site, in accordance with State specifications, which may vary depending on whether the excavation in short term, long term, routine, continuous, or emergency;

(7) provide effective mechanisms for penalties and enforcement as described in section 6;

(8) provide for a fair and appropriate schedule of fees to cover the costs of providing for, maintaining, and operating the State program;

(9) provide an opportunity for citizen suits to enforce the State program; and

(10) require railroads to report any accidents that occur during or as a result of routine railroad maintenance to the Secretary and the appropriate local officials.

(b) EXCEPTION.--Where excavation is undertaken by or for a person, on real property owned or leased, or in which an oil or gas mineral leasehold interest is held, by that person,

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and the same person operates all underground facilities located at the site of the excavation, a State program may elect not to require that such person contact the one-call notification system before excavating.

SEC.6. PENALTIES AND ENFORCEMENT.

(a) GENERAL PENALTIES.--Each State's consideration under section 4(a) shall include consideration of a requirement that any excavator or facility operator who violates the requirements of the State program shall be liable for an appropriate administrative or civil penalty.

(b) INCREASED PENALTIES.--If a violation results in damage to an underground facility resulting in death, serious bodily harm, or actual damage to property exceeding \$50,000, the penalties shall be increased, and an additional penalty of imprisonment may be assessed for a knowing and willful violation.

(c) DECREASED PENALTIES.--Each State's consideration under section 4(a) shall include consideration of reduced penalties for a violation, that results in or could result in damage, that is promptly reported by the violator.

(d) EQUITABLE RELIEF AND MANDAMUS ACTIONS.-- Each State's consideration under section 4(a) shall include consideration of provisions for appropriate equitable relief and mandamus actions.

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(e) IMMEDIATE CITATION OF VIOLATIONS.--

Each State's consideration under section 4(a) shall include consideration of procedures for issuing a citation of violation at the site and time of the violation.

SEC.7. GRANTS TO STATES.

(a) AUTHORITY.--Using \$4,000,000 of the amounts previously collected under section 7005 of the Consolidated Omnibus Budget Reconciliation Act of 1985 (previously codified as 49 U.S.C. App. 1682a) or section 60301 of title 49, United States Code, for each of the fiscal years 1996, 1997, and 1998, to the extent provided in advance in appropriations Acts, the Secretary shall make grants to States, or to operators of one-call notification systems in such States, which have elected to adopt a State program described in section 5, or to establish and maintain a State program pursuant to subsection (b) of this section. Such grants may be used in establishing one-call notification systems, modifying existing systems to conform to standards established under this act, and improving systems to exceed such standards. Such grants may be used to--

(1) improve communications systems linking one-call notification systems;

(2) improve location capabilities, including training personnel and developing and using location technology;

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(3) improve record retention and recording capabilities;

(4) enhance public information and education campaigns;

(5) increase and improve enforcement mechanisms, including administrative processing of violations; and

(6) otherwise further the purposes of this Act.

(b) ALTERNATE FORM OF STATE PROGRAM.--

The Secretary may make a grant under subsection (a) to a State that establishes or maintains a State program that differs from a State program described in section 5 if such State program is at least as protective of the public health and safety and the environment as a State program described in section 5.

SEC.8. DEPARTMENT OF COMMERCE.

(a) COORDINATION WITH OTHER RESPONSIBILITIES.--

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(1) COORDINATION.--The Secretary shall coordinate the implementation of this Act with appropriate Federal agencies.

(2) REVIEW OF PROGRAMS.-- Within 18 month after the date of enactment of this Act, the Secretary shall review, and report to Congress on, the extent to which any policies, programs, and procedures of the Department of Commerce could be used to achieve the purposes of this Act.

(b) MODEL PROGRAM.--

(1) DEVELOPMENT.--Within 1 year after the date of enactment of this Act, the Secretary, in consultation with facility operators, excavators, one-call notification system operators, and State and local governments, shall develop and make available to States a model State program, including a model enforcement program. Such model program may be amended by the Secretary on the Secretary's initiative or in response to reports submitted by the States pursuant to section 9, or as a result of workshops conducted under paragraph (3) of this subsection.

(2) SUGGESTED ELEMENTS.--The model program developed under paragraph (1) shall include all elements of a State program described in section 5.

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

The Secretary shall consider incorporating the following elements into the model program:

(A) The one-call notification system or systems shall--

(i) receive and record appropriate information from excavators about intended excavations, including--

(I) the name of the person contacting the one-call notification system;

(II) the name, address, and telephone number of the excavator;

(III) the specific location of the intended excavation, along with the starting date thereof and a description of the intended excavation activity; and

(IV) the name, address, and telephone number of the person for whom the work is being performed; and

(ii) maintain records on each notice of intent to excavate for the period of time necessary to ensure that such records remain available for use in the adjudication of any claims relating to the excavation.

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(B) The provision of information on excavation requirements at the time of issuance of excavation or building permits, or other specific mechanisms for ensuring excavator awareness.

(C) A requirement that any excavator must contact the one-call notification system at least 2 business days, and not more than 10 business days, before excavation begins.

(D) Alternative notification procedures for excavation activities conducted as a normal part of ongoing operations within specific geographic locations over an extended period of time.

(E) A requirement that facility operators--

(i) provide for locating and marking, in accordance with the American Public Works Association Uniform Color Code for Utilities, or otherwise identifying, in accordance with standards established by the State or the American National Standards Institute, their underground facilities at the site of an intended excavation within no more than 2 business days after notification of such intended excavation; and

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(ii) monitor such excavation as appropriate.

(F) Provision for notification of excavators if no underground facilities are located at the excavation site.

(G) Provision for the approval of a State program under this Act with time limitations longer than those required under subparagraphs (C) and (E) of this paragraph where special circumstances, such as severe weather conditions or remoteness of location, pertain.

(H) Procedures for excavators and facility operators to follow when the location of underground facilities is unknown.

(I) Procedures to improve underground facility location capabilities, including compiling and notifying excavators, facility operators, and one-call centers of any information about previously unknown underground facility locations when such information is discovered.

(J) Alternative rules for timely compliance with State program requirements in emergency circumstances.

(K) If a State has procedures for licensing or permitting entities to do business, procedures for the

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

revocation of the license or permit to do business of any excavator determined to be a habitual violator of the requirements of the State program.

(3) WORKSHOPS.-- Within 6 months after the date of enactment of this Act, and annually thereafter, the Secretary shall conduct workshops with facility operators, excavators, one-call notification system operators, and State and local governments in order to develop, amend, and promote the model program, and to provide an opportunity to share information among such parties and to recognize State programs that exemplify the goals of this Act.

(c) PUBLIC EDUCATION.--The Secretary shall develop, in conjunction with facility operators, excavators, once-call notification system operators, and State and local governments, public service announcements and other educational materials and programs to be broadcast or published to educate the public about one-call notification systems, including the national phone number.

SEC.9. STATE REPORTS.

(a) REQUIREMENT.--

(1) INITIAL REPORT.--Within 3 years after the date of enactment of this Act, each State shall submit to

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

the Secretary a report on progress made in implementing this Act.

(2) STATUS REPORTS.--Within 4 1/2 years after the date of enactment of this Act, and annually thereafter, each State shall report to the Secretary on the status of its State program, if any, and its requirements, and any other information the Secretary requires.

(b) SIMPLIFIED REPORTING FORM.--Within 3 years after the date of enactment of this Act, the Secretary shall develop and distribute to the States a simplified form for complying with the reporting requirements of subsection (a)(2).

SEC.10. MORE PROTECTIVE SYSTEMS.

Nothing in this Act prohibits a State from implementing a one-call notification system that provides greater protection for underground facilities from damage due to excavation than a system established pursuant to this Act.

SEC.11. SENSE OF CONGRESS; REQUIREMENT

REGARDING NOTICE

(a) PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS.--It is the sense of Congress that, to the greatest extent practicable, all equipment and

Appendix F: Federal One-Call Bill from *Keeping the Network Alive and Well: Solving the Problem of Cable Dig-Ups*

products purchased with funds made available under this Act should be American-made.

(b) NOTICE TO RECIPIENTS OF ASSISTANCE.--In providing financial assistance under this Act, the Secretary, to the greatest extent practicable, shall provide to each recipient of the assistance a notice describing the statement made in subsection (a).

Appendix G: S. 1115 - Federal One-Call Bill

105TH CONGRESS **S. 1115**
1ST SESSION

To amend title 49, United States Code, to improve the one-call notification process, and for other purposes, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JULY 31, 1997

Mr. Lott (for himself, Mr. DASCHLE, Mr. SHELBY, Mr. ROCKEFELLER, Mr. WARNER, Mr. ROBB, Mr. INOUE, Mr. COCHRAN, and Mr. CONRAD) introduced the following bill, which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To amend title 49, United States Code, to improve the one-call notification process, and for other purpose.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the “Comprehensive One-Call Notification Act of 1997”

SECTION 2. FINDINGS.

The Congress finds that ---

(1) unintentional damage to underground facilities during excavation is a significant cause of disruptions in

Appendix G: S. 1115 - Federal One-Call Bill

telecommunications, water supply, electric power and other vital public services, such as hospital and air traffic control operations, and is the leading cause of natural gas and hazardous liquid pipeline accidents;

(2) excavation that is performed without prior notification to an underground facility operator or with inaccurate marking of such a facility prior to excavation can cause damage that results in fatalities, serious injuries, harm to the environment and disruption of vital services to the public; and

(3) protection of the public and the environment from the consequences of underground facility damage caused by excavations will be enhanced by a coordinated national effort to improve one-call notification programs in each State and the effectiveness and efficiency of one-call notification systems that operate under such programs.

SEC. 3. ESTABLISHMENT OF ONE-CALL PROGRAM.

(a) IN GENERAL. ---Subtitle III of title 49, United States Code, is amended by adding at the end thereof the following:

“Chapter 61. ONE- CALL NOTIFICATION PROGRAM.

“Sec.

“6101. Purposes

“6102. Definitions

“6103. Minimum standards for State one-call notification programs

“6104. Compliance with minimum standards

“6105. Review of one-call system best practices

Appendix G: S. 1115 - Federal One-Call Bill

“6106. Grants to States

“6107. Authorization of appropriations

“§ 6101. Purposes

“The purposes of this chapter are---

“(1) to enhance public safety;

“(2) to protect the environment;

“(3) to minimize risks to excavators; and

“(4) to prevent disruption of vital public services,

by reducing the incidence of damage to underground facilities during excavation through the adoption and efficient implementation by all States of State one-call notification programs that meet the minimum standards set forth under section 6103.

“§ 6102. Definitions

“For purposes of this chapter --

“(1) ONE-CALL NOTIFICATION SYSTEM. --- The term “one-call notification system” means a system operated by an organization that has as one of its purposes to receive notification from excavators of intended excavation in a specified area in order to disseminate such notification to underground facility operators that are members of the system so that such operators can locate and mark their facilities in order to prevent damage to underground facilities in the course of such excavation.

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“(2) STATE ONE-CALL NOTIFICATION PROGRAM.

The term “State one-call notification program” means the State status, regulations, orders, judicial decision, and other elements of law and policy in effect in a State that establish the requirements for the operation of one-call notification systems in such State.

“(3) STATE---The term ‘State’ means a State, the District of Columbia, and Puerto Rico.

“(4) SECRETARY.---The term ‘Secretary’ means the Secretary of Transportation.

“§ 6103. Minimum standards for State one-call notification programs

“(a) MINIMUM STANDARDS.---A State one-call notification program shall, at a minimum, provide for ---

“(1) appropriate participation by all underground facility operators;

“(2) appropriate participation by all excavators; and

“(3) flexible and effective enforcement under State law with respect to participation in, and use of, one-call notification systems.

“(b) APPROPRIATE PARTICIPATION. ---In determining the appropriate extent of participation required for types of underground facilities or excavations under subsection

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(a), a State shall assess, rank, and take into consideration the risks to the public safety, the environment, excavators, and vital public services associated with -----

“(1) damage to types of underground facilities;
and

“(2) activities of types of excavators.

“(c) IMPLEMENTATION.-----A State one-call notification program also shall, at a minimum, provide for -----

“(1) consideration of the ranking of risks under subsection (b) in the enforcement of its provisions;

“(2) a reasonable relationship between the benefits of one-call notification and the cost of implementing and complying with the requirements of the State one-call notification program; and

“(3) voluntary participation where the State determines that a type of underground facility or an activity of a type excavator poses a *de minimis* risk to public safety of the environment.

“(d) PENALTIES. ---To the extent the State determines appropriate and necessary to achieve the purposes of this chapter, a State one-call notification program shall, at a minimum provide for ---

“(1) administrative or civil penalties commensurate with the seriousness of a violation by

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an excavator or facility owner of a State one-call notification program;

“(2) increased penalties for parties that repeatedly damage underground facilities because they fail to use one-call notification systems or for parties that repeatedly fail to provide timely and accurate marking after the required call has been made to a one-call notification system;

“(3) reduced or waived penalties for a violation of a requirement of a State one-call notification program that results in, or could result in, damage that is promptly reported by the violator;

“(4) equitable relief; and

“(5) citation of violations.

“§ 6104. Compliance with minimum standards

“(a) REQUIREMENT.----Each State shall, within 2 years after the date of the enactment of the Comprehensive One-call Notification Act of 1997, submit to the Secretary a grant application under subsection (b).

“(b) APPLICATION.---

“(1) Upon application by a State, the Secretary shall review that State’s one-call notification program, including the provisions for implementation of the

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program and the record of compliance and enforcement under the program.

“(2) Based on the review under paragraph (1), the Secretary shall issue a certificate of compliance for the State program if the Secretary determines that the program meets the minimum standards for such a program set forth in section 6103 in order to qualify for a grant under section 6106.

“(3) In order to expedite compliance under this section, the Secretary may consult with the State as to whether an existing State one-call notification program, a specific modification thereof, or a proposed State program would result in a positive determination under paragraph (2).

“(4) The Secretary shall prescribe the form of, and manner of filing, an application under this section that shall provide sufficient information about a State’s one-call notification program for the Secretary to evaluate its overall effectiveness. Such information may include the nature and reasons for exceptions from required participation, the types of enforcement available, and such other information as the Secretary deems necessary.

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“(5) The application of a State under paragraph (1) and the record of actions of the Secretary under this section shall be available to the public.

“(c) ALTERNATIVE PROGRAM.---A State may maintain an alternative one-call notification program if that program provides protection for public safety, the environment, or excavators that is equivalent to, or greater than, protection under a program that meets the minimum standards set forth in section 6103.

“(d) REPORT.---Within 3 years after the date of the enactment of the Comprehensive One-Call Notification Act of 1997, the Secretary shall begin to include the following information in reports submitted under section 60124 of this title---

“(1) a description of the extent to which each State has adopted and implemented the minimum Federal standards under section 6103 or maintains an alternate program under subsection (c);

“(2) an analysis by the Secretary of the overall effectiveness of the State’s one-call notification program and the one-call notification systems operating under such program in achieving the purposes of this chapter;

“(3) the impact of the State’s decisions on the extent of required participation in one-call notification

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systems on prevention of damage to underground facilities; and

“(4) areas where improvements are needed in one-call notification systems in operation in the State.

The report shall also include any recommendations the Secretary determines appropriate. If the Secretary determines that the purposes of this chapter have been substantially achieved, no further report under this section shall be required.

“§ 6105. Review of one-call system best practices

“(a) STUDY OF EXISTING ONE-CALL SYSTEMS.--- Except as provided in subsection (d), the Secretary, in consultation with other appropriate Federal agencies , State agencies, one-call notification system operators, underground facility operators, excavators, and other interested parties, shall undertake a study of damage prevention practices associated with existing one-call notification systems.

“(b) PURPOSE OF STUDY.---The purpose of the study is to assemble information in order to determine which existing one-call notification systems practices appear to be the most effective in preventing damage to underground facilities and in protecting the public, the environment, excavators, and public service disruption. As part of the study, the Secretary shall at a minimum consider---

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“(1) the methods used by one-call notification systems and others to encourage participation by excavators and owners of underground facilities;

“(2) the methods by which one-call notification systems promote awareness of their programs, including use of public service announcements and educational materials and programs;

“(3) the methods by which one-call notification systems receive and distribute information from excavators and underground facility owners;

“(4) the use of any performance and service standards to verify the effectiveness of a one-call notification system;

“(5) the effectiveness and accuracy of mapping used by one-call notification systems;

“(6) the relationship between one-call notification systems and preventing intentional damage to underground facilities;

“(7) how one-call notification systems address the need for rapid response to situations where the need to excavate is urgent;

“(8) the extent to which accidents occur due to errors in marking of underground facilities, untimely marking or errors in the excavation process after a one-call notification system has been notified of an excavation;

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“(9) the extent to which personnel engaged in marking underground facilities may be endangered;

“(10) the characteristics of damage prevention programs the Secretary believes could be relevant to the effectiveness of State one-call notification programs; and

“(11) the effectiveness of penalties and enforcement activities under State one-call notification programs in obtaining compliance with program requirements.

“(c) ~~REPORT---~~Within 1 year after the date of the enactment of the Comprehensive One-Call Notification Act of 1997, the Secretary shall publish a report identifying those practices of one-call notification systems that are most and least successful in---

“(1) preventing damage to underground facilities; and

“(2) providing effective and efficient service to excavators and underground facility operators.

The Secretary shall encourage States and operations of one-call notification programs to adopt and implement the most successful practices identified in the report.

“(d) ~~SECRETARIAL DISCRETION---~~Prior to undertaking the study described in subsection (a), the Secretary shall determine whether information described in subsection (b) is readily available. If the Secretary determines that such

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information is readily available, the Secretary is not required to carry out the study.

“§ 6106. Grants to States

“(a) IN GENERAL.---The Secretary may make a grant of financial assistance to a State that has a certificate of compliance under section 6104(b) to assist in improving---

“(1) the overall quality and effectiveness of one-call notification systems in the State;

“(2) communications systems linking one-call notification systems;

“(3) location capabilities, including training personnel and developing and using location technology;

“(4) record retention and recording capabilities for one-call notification systems;

“(5) public information and education;

“(6) participation in one-call notification systems;

or

“(7) compliance and enforcement under the State one-call notification program.

“(b) STATE ACTION TAKEN INTO ACCOUNT.---In making grants under this section the Secretary shall take into consideration the commitment of each State to improving its State one-call notification program, including legislative and regulatory actions taken by the State after the

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date of enactment of the Comprehensive One-Call Notification Act of 1997.

“(c) FUNDING FOR ONE-CALL NOTIFICATION SYSTEMS. A State may provide funds received under this section directly to any one-call notification system in such State that substantially adopts the best practices identified under section 6105.

“§ 6107. Authorization of appropriations

“(a) FOR GRANTS TO STATES.---There are authorized to be appropriated to the Secretary in fiscal year 1999 no more than \$1,000,000 and in fiscal year 2000 no more than \$5,000,000, to be available until expended, to provide grants to States under section 6106.

“(b) FOR ADMINISTRATION.---There are authorized to be appropriated to the Secretary such sums as may be necessary during fiscal years 1998, 1999, and 2000 to carry out sections 6103, 6104, and 6105.

“(c) GENERAL REVENUE FUNDING.--- Any sums appropriated under this section shall be derived from

general revenues and may not be derived from amounts collected under section 60301.”.

(b) CONFORMING AMENDMENTS.---

“(1) The analysis of chapters for subtitle III of title 49, United States Code, is amended by adding at the end thereof the following;

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“CHAPTER 61-ONE-CALL NOTIFICATION PROGRAM”.

“(2) Chapter 601 of title 49, United States Code, is amended---

(A) by striking “sections 60114 and” in section 60105(a) of that chapter and inserting “section”;

(B) by striking section 60114 and the item relating to that section in the table of sections for that chapter;

(C) by striking “60114(c), 60118(a).” in section 60122(a)(1) of that chapter and inserting “60118(a).”;

(D) by striking “60114(c) or” in section 60123(a) of that chapter;

(E) by striking “sections 60107 and 60114(b)” in subsections (a) and (b) of section 60125 and inserting “section 60107” in each such subsection; and

(F) by striking subsection (d) of section 60125, and redesigning subsections (e) and (f) of that section as subsection (d) and (e).

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TITLE XI--UNDERGROUND DAMAGE PREVENTION

SEC. 11001. SHORT TITLE.

This title may be cited as the “Underground Damage Prevention Act of 1997”.

SEC. 11002. UNDERGROUND DAMAGE PREVENTION.

(a) Subtitle VIII of title 49 is amended by adding a new chapter 602 to read as follows;

“CHAPTER 602-- UNDERGROUND DAMAGE PREVENTION

“Sec.

“60201. Definitions.

“60202. Nationwide toll-free telephone number system.

“60203. Elements of a State program.

“60204. Enforcement.

“60205. “Grants to States.

“60206. “Model program.

“60207. “Department of Transportation role.

“§ 60201. Definitions

“In this chapter --

“(1) ‘damage’ means an impact or contact with an underground facility, its appurtenances, or its protective coating, or weakening of the support for the facility or protective housing, that requires repair.

“(2) ‘excavation’ means an operation in which earth, rock, or other material in the ground is moved, removed, or otherwise displaced by means of any mechanized tools or equipment, or any explosive, but does not include --

“(A) tilling of the soil for agricultural purposes to a depth of 18 inches or less and other common agricultural practices, as determined by each State;

“(B) common lawn and garden activities, as determined by each State; or

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“(C) the digging of a grave in a cemetery.

“(3) ‘excavator’ means a person who conducts excavation.

“(4) ‘facility operator’ means a person who operates an underground facility.

“(5) ‘hazardous liquid’ has the same meaning as in section 60101 (a) (4) of this title.

“(6) ‘gas’ has the same meaning as in section 60101 (a) (2) of this title.

“(7) ‘person’ in addition to its meaning under section 1 of title 1, includes any agency of Federal, State, or local government.

“(8) ‘State’ has the same meaning as in section 60101 (a) (20) of this title.

“(9) ‘State program’ means the program of a State to establish or maintain a comprehensive statewide one-call notification program to protect all underground facilities from damage due to excavation that contains each element described in section 60204 of this title.

“(10) ‘underground facility’ means an underground line, system, or structure used for gathering, storing, transmitting, or distributing hazardous liquids, gas, communication, electricity, water, steam, sewage, or other commodities the Secretary of Transportation determines should be included under the requirements of this Act, but does not include a portion of a line, system, or structure only used to provide services or materials within real property controlled by a person with an oil or gas mineral leasehold interest in that property unless that portion is used for hazardous liquid or gas and is located within an easement for a public road, a toll highway, bridge, or tunnel (within the meaning of 23 U.S.C. 101 (a) and 129 (a) (2)) or within the boundaries of a city, town, or village.

“§ 60202. Nationwide toll-free telephone number system

“The Secretary of Transportation shall, in consultation with the Federal Communications Commission, facility operators, excavators, and one-call notification system operators, consider the establishment of a nationwide toll-free telephone number system to be used in State one-call notification programs.

“§ 60203. Elements of a State program

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“(a) IN GENERAL.--A State program shall --

“(1) provide for a one-call notification system that --

“(A) applies to all excavators and to all facility operators;

“(B) operators in all areas of the State and does not duplicate the geographical coverage of other one-call notification systems;

“(C) receives and records appropriate information from excavators about intended excavations;

“(D) informs facility operators of any intended excavations that may be in the vicinity of their underground facilities; and

“(E) informs excavators of the facility operators who will be notified of the intended excavation;

“(2) provide for 24-hour coverage for emergency excavation, with the manner and scope of coverage determined by the State;

“(3) employ mechanism to ensure that excavators and the general public are aware of the one-call telephone number and the requirements, sanctions, and benefits of the State program;

“(4) inform excavators of State damage prevention procedures to be followed when excavating;

“(5) require that an excavator contact the one-call notification system in accordance with State specifications, which may vary depending on whether the excavation is short-term, long-term, routine, continuous, or emergency;

“(6) require facility operators to locate and mark or otherwise identify their facilities at an excavation site, in accordance with State specifications, which may vary depending on whether the excavation is short-term, long-term, routine, continuous, or emergency;

“(7) provide effective mechanisms for enforcement as described in section 60205 of this title; and

“(8) provide for a fair and appropriate schedule of fees to cover the costs of providing for, maintaining, and operating the State program.

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“(b) EXCEPTION. --- A State program need not require an excavator to contact the one-call system if the excavation is undertaken on behalf of a person with an oil or gas mineral leasehold interest in a real property who also operates all underground facilities on that property.

“(c) IMPLEMENTATION. --- A State program may be provided for through the establishment of a new program, or through modification or improvement of an existing program and may be implemented, in whole or in part, by a nongovernmental organization, including a railroad or an airport authority.

“§ 60204. Enforcement

“(a) GENERAL. -- Effective mechanisms for enforcement of a State program shall be developed by the State. The State shall consider inclusion of the following elements:

“(1) Enforcement against an excavator or facility operator who violates the requirements of the State program.

“(2) Appropriate civil penalty sanctions administratively assessed.

“(3) Increased penalties of a violation is substantially the same as a prior violation, or if a violation results in death, serious bodily harm, or actual damage to property exceeding \$50,000, or in the release of more than 50 barrels of hazardous liquid.

“(4) Criminal sanctions for a knowing and willful violation.

“(5) Lesser sanctions in case of a violation that is promptly reported by the violator.

“(6) Equitable relief to compel compliance.

“(7) Procedures for issuing a citation of violation at the site and time of the violation.

“(b) STATE ENFORCEMENT. --- Nothing in this section limits a State in developing any mechanism for enforcement that the State finds effective.

“§ 60205. Grants to States

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“(a) **AUTHORITY.** --- The Secretary of Transportation may make grants to States or to operators of one-call notification systems to plan for, establish, or implement a State program. For the purposes of making these grants, there is available to the Secretary until expended from amounts collected under section 60301 of this title, \$1,000,000 for fiscal year 1998, and such sums as may be necessary for fiscal years 1999 and 2000, to the extent provided in appropriations Acts.

“(b) **CRITERIA.** --- Grants under this section may be used to ---

“(1) evaluate a State’s damage prevention needs and to plan for establishment of a qualified State program;

“(2) improve communications systems linking one-call notification systems;

“(3) improve location capabilities, including training personnel and developing and using location technology;

“(4) improve record retention and recording capabilities;

“(5) enhance public information and education campaigns, including promotional activities;

“(6) develop enhanced enforcement mechanisms; and

“(7) otherwise further the purposes of this chapter.

“(c) **ALTERNATE FORM OF STATE PROGRAM.** --- The Secretary may make a grant under subsection (a) to a State that establishes or maintains a comprehensive statewide one-call notification program to protect all underground facilities from damage due to excavation that does not meet the requirements for a State program if the Secretary determines that the program is at least as protective of public safety and the environment as a program that has the elements described in section 60203 of this title.

“(d) **PROGRESS REPORTS.** --- As a condition of receipt of a grant under this section, a State or an operator of a one-call notification system shall report to the Secretary on progress made in implementing this chapter. The Secretary shall prescribe the form and contents of the report, including available data on use of the one-call notification system and excavation damage.

“§ **60206. Model program**

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“(a) DEVELOPMENT OF MODEL PROGRAM. -- Within 1 year after the date of enactment of this chapter, the Secretary of Transportation, in consultation with facility operators, excavators, one-call notification system operators, and interested government agencies, including State and local governments, shall develop and make available to States a model State one-call notification program. The Secretary may amend the model program from time to time.

“(b) ELEMENTS OF MODEL PROGRAM. -- The model program developed under subsection (a) shall include all elements of a State program described in section 60203 of this chapter. In addition, the Secretary shall consider incorporating the following elements into the model program:

“(1) specific information that a one-call notification system must receive and record from excavators;

“(2) length of time one-call records must be retained;

“(3) recommended practices on distributing information on damage prevention to excavators;

“(4) a requirement that an excavator contact the one-call notification system at least two (2) business days, and not more than ten (10) business days, before excavation begins;

“(5) alternative notification procedures for excavation activities conducted as part of ongoing operations within specific geographic locations over an extended period of time;

“(6) guidelines for incorporating into a one-call notification system alternative notification and marking systems in special circumstances such as within railroad rights-of-way or at airports;

“(7) specific reference to standards for identifying underground facilities developed by the American Public Works Association Uniform Color Code for Utilities and the American National Standards Institute;

“(8) a requirement that a facility operator mark underground facilities at the site of an intended excavation within two (2) business days after notification;

“(9) a provision for notification of excavators if no underground facilities are located at the excavation site;

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“(10) procedures for excavators and facility operators when the location of underground facilities is unknown;

“(11) practices to improve underground facility location capabilities;

“(12) recommended procedures for emergency circumstances; and

“(13) revocation of the license or permit to do business of any excavator determined to be a habitual violator of the requirements of the State program.

“(14) recommended procedures for protecting underground facilities from intentional damage as a result of the line being marked or located and from security breaches.

“(c) **WORKSHOPS.** --- The Secretary shall conduct workshops with facility operators, excavators, one-call notification system operators, and interested government agencies, including State and local governments, in order to develop, amend, and promote the model program, and to provide an opportunity to share information among such parties.

“(d) **PUBLIC EDUCATION.** --- The Secretary shall work with facility operators, excavators, one-call notification systems operators, and interested government agencies, including State and local governments, to develop public service announcements and other educational materials and programs to be broadcast or published to educate the public about one-call notification systems.

“§ 60207. Department of Transportation role

“The Secretary of Transportation shall coordinate the implementation of this chapter with the implementation of chapter 601 of this title. An activity conducted by the Secretary under this chapter shall be deemed an activity related to gas or hazardous liquid under chapter 601 of this title.”

(b) The analysis of Subtitle VIII is amended by adding a new item,

“CHAPTER 602--UNDERGROUND DAMAGE PREVENTION.”

SEC. 11003. TECHNICAL AMENDMENT.

Title 49 is amended by striking and reserving section 60114, and striking the item for section 60114 in the analysis of chapter 601.