

CHAPTER 6

Mapping Task Team Best Practices

6.1 CHAPTER SUMMARY

The Mapping Task Team identified and described practices used to graphically indicate the location of subsurface facilities as they relate to the surface of the earth.

The Mapping Task Team focused on the mapping practices of one-call centers, locators, facility owners/operators, project owners, and excavators. The Team researched and documented the best mapping practices under each of these areas. Section 6.6 outlines the Team's findings and collective opinion of the best mapping practices in use today.

6.2 BACKGROUND AND MOTIVATION

Accurate and up-to-date maps are not always used or available in locating facilities and this factor can be a cause of facility damage.

6.2.1 Scope and Mission

The scope of the Team was to identify and describe practices used to graphically indicate the location of subsurface utilities as they relate to the surface of the earth. It was decided that the scope of the Mapping Team was not limited to the one-call center but was inclusive of mapping in every area, including as-builts, facilities, one-call centers, locators, project owners, and excavators.

The mission of the Mapping Team in preventing damage to existing underground facilities was to provide a collection of Mapping best practices in the areas of One-Call Center, Locating, Excavating, Facility Owner/Operator, and Project Owner.

6.2.2 Goals

- Eliminate damage to existing underground facilities.
- Encourage partnerships between the facility owners/operators, excavators, one-call centers and locators.
- Encourage facility owners/operators to keep accurate and up-to-date records.

- Encourage facility owners/operators to provide the one-call center with sufficient information to notify the operator when their underground facilities are in the area of excavation.
- Encourage the project owners to supply accurate mapping data to the excavator.
- Encourage the one-call centers to accept and exchange data in a variety of formats with update capabilities.
- Encourage locators and excavators to identify mapping and location discrepancies to the facility owners/operators and one-call centers.
- Encourage facility owners/operators, excavators, locators, and one-call centers to maintain, accept, and transfer data in an electronic format.
- Encourage excavators to provide complete and accurate information to one-call centers.

6.3 TEAM MEMBERS

The Mapping Task Team was composed of representatives from one-call centers, excavators, locators, facility owners/operators, trade associations, and federal and state government agencies. A brief biographical sketch of each Team member, that serves to validate their participation in the Study effort, is included in Appendix F, “Common Ground Study Team Member Biographies.”

Team Member	Representing ¹⁹	Employer
Carolyn Carter	OCSI	North Carolina One-Call
Don Carter	AGA	Atlanta Gas Light Co.
Gary Craig	OCSI	OCSI
Terry Leppla	API	ARCO Pipe Line
Mike McGrath	NARUC	Minnesota Office of Pipeline Safety
Bill Pauley, Co-Chairperson	NUCA	Fishel Co.
Christina Sames, Co-Chairperson	OPS	Office of Pipeline Safety, HQ
Perly A. Schoville	AAR	Union Pacific Railroad
Craig Sewell	NULCA	One Call Concepts
James Glyn Smith	OCSI	Palmetto Utility Protection Service

¹⁹ See Appendix D for a detailed list of acronyms.

Team Member (cont.)	Representing (cont.)	Employer (cont.)
Terry Zachman	TIA/EIA	Sprint Long Distance
John Ziakas	INGAA	Questar Regulated Services

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

Team Participant	Representing	Employer
Ben Heise, Emerging Technology Liaison	TIA/EIA	AT&T
Russ Kopidlansky, Linking Team Liaison	AGA	Wisconsin Public Service Corporation

6.4 DATA COLLECTION AND EVALUATION PROCESS

6.4.1 Sources

- Company Procedures
- Regulations
- Operating Practices
- Expert Opinions
- State Laws

6.4.2 Process for collecting information

A Task Team member most familiar with each issue was assigned the task of researching that issue and providing objective information about that issue for Team discussion.

6.4.3 Process for Selecting Issues

Using an outline developed by the Linking Team, the Task Team discussed and identified mapping issues in the categories of one-call, locator, excavator, facility owner/operator, and project owner. The Team then agreed upon the most important issues under each category.

6.4.4 Process for evaluating practices

The Mapping Task Team developed the following criteria to determine which practices were mapping best practices.

- Contributes to Damage Prevention
- Feasible
- In Use
- Transferable
- Maintainable
- Available
- Promotes consistency between one-call centers

6.5 ISSUES IDENTIFIED

6.5.1 One-Call

- The flexibility of a one-call center to accept and distribute location information in a variety of formats.
- Some one-call centers do not accept or use digital mapping data.

6.5.2 Locator

- Locators may not use accurate and up-to-date maps.
- Locators may not be properly trained to interpret maps.
- Locators may not provide mapping and location discrepancies to the one-call center.
- Locators may not provide facility mapping and location discrepancies to the facility owners/operators.

6.5.3 Excavator

- The excavator may not receive complete or correct information concerning the excavation area from the project owner.
- The excavator may not provide complete location data to the one-call center.
- The excavator may not provide correct location data to the one-call center.

6.5.4 Facility Owner/Operator

- The facility owner/operator may not always keep accurate and up-to-date maps.
- The facility owner/operator may not always provide accurate or up-to-dates maps to the locator.

- The facility owner/operator may not maintain records for abandoned facilities.
- The facility owner/operator may not transfer or retain records for abandoned or sold facilities.

6.5.5 Project Owner

- The project owner may not provide accurate and up-to-date information needed to identify the area of excavation.

6.6 FINDINGS

A decision was made by the Mapping Team to look at mapping practices from the viewpoint of the different areas represented by the Team members. Therefore, the best practices for mapping are listed in five distinct areas: One-Call Center, Locator, Excavator, Facility Owner/Operator, and Project Owner. By consensus of the Mapping Task Team, all of the findings listed below are best practices.

One-Call Center

1. The land base should be accurate.
2. The land base and database uses latitude/longitude.
3. The land base is up-to-date.
4. The database is updated by information from facility owners/operators.
5. The electronic mapping system can produce a ticket for the smallest practical geographical area.
6. The land base is available to the public.

Locator

7. Locators are trained in map reading and symbology.
8. The locator provides precise facility location to the facility owner/operator when there is a discrepancy.
9. The locator supplies feedback to the one-call center.

Excavator

10. The excavator provides accurate location information to the one-call center.
11. The excavator provides basic attributes to the one-call center.

Facility Owner/Operator

12. The facility owner/operator provides mapping data to the one-call center.

13. The facility owner/operator provides mapping data access.
14. Mapping standards are adhered to.
15. Consistent, current information is provided to the one-call center.
16. Detailed mapping information is collected.

Project Owner

17. The project owner provides accurate information.
18. The project owner determines basic coordinates.

6.6.1 One-Call Center

A one-call center uses an electronic mapping database system that includes the following:

1. Accuracy - The land base is the most precise geographical information available to the center. The one-call centers in the following states follow this practice: Arizona, Minnesota, North Carolina, Texas, and Wisconsin.
2. Latitude/Longitude (Lat/Long) - The land base and database are able to produce Lat/Long information based upon street address, street/road name, intersection, milepost marker, etc. It is also possible to determine the street address, street/road name, intersection or milepost based upon Lat/Long information. The translation of Lat/Long information is automatic. A map point (i.e., a rural area not in the immediate vicinity of a road or known map landmark) can be identified by Lat/Long information. The one-call centers in the following states follow this practice: Ohio, South Dakota, New Jersey, Missouri, and Tennessee.
3. The land base is kept up-to-date, including a process that periodically adds new street information, name changes, aliases, and municipal boundaries. The one-call centers in the following states follow this practice: Arizona, Ohio, and New Jersey.
4. The database is promptly updated as information is provided or becomes available from the facility owner/operator. The system is able to accept information in standard file format with minimal human intervention. The one-call centers in the following states follow this practice: Arizona, North Carolina, Ohio, New Jersey, and Wisconsin.
5. Location Area - The electronic mapping system is able to produce a ticket for the smallest practical geographical area. The one-call centers in the following states follow this practice: Arizona, Tennessee, Minnesota, Oregon, and Wisconsin.
6. Availability - The land base is available to the public for the identification of the excavation area. The land base and database are available to the one-call center membership for the update of member database information. The one-call centers in the following states follow this practice: North Carolina, Ohio, and South Dakota.

6.6.2 Locator

Locators use maps to assist in finding the excavation site and to assist in determining the general location of the buried facility.

7. Locators are trained in map reading and symbology to assist in determining the location of the buried facility. The following association trains its members to carry out this practice: NULCA.
8. The locator provides to the facility owner/operator the most precise facility location information obtained from a locate when there is a discrepancy. The following state carries out this practice: Arizona Blue Stake law.
9. The locator provides feedback to the one-call center on land base mapping and location discrepancies. The following states carry out this practice: Ohio, Tennessee, and North Carolina.

6.6.3 Excavator

10. The excavator takes responsibility for giving accurate location information to the one-call center. This information includes street address, street intersection, legal description, or other acceptable one-call format and latitude/longitude if feasible.
11. The excavator provides a starting point and ending point, and on which side of the property (North, South, East, West, front, back, rear, sides, etc.) or street the excavation area is located.

If the excavator can not meet the above criteria, the excavator directly coordinates with the one-call center to establish the excavation area.

References:

- Michaels Pipeline Company, Brownsville, Wisconsin.
- Hooper Corporation, Pewaukee, Wisconsin.
- Intercon Construction, Madison, Wisconsin.

6.6.4 Facility Owner/Operator

12. The facility owner/operator provides the one-call center with data that will allow proper notification of excavation activities near the facility owner/operators' infrastructure. Facility owners/operators in all mandatory one-call states follow this practice.
13. The facility owner/operator provides access to a mapping system that can be utilized by both the locator and the facility owner/operator. The following facility owners/operators

follow this practice: Atlanta Gas Light, Sprint Long Distance, AT&T, Questar Regulated Services.

14. The facility owner/operator requires the designer to adhere to the facility owner/operator's mapping standards. The following facility owners/operators follow this practice: AT&T, Sprint Long Distance.
15. The facility owner/operator provides consistent, current information to the one-call center for the proper receipt of ticket notification. Basic information should include latitude and longitude and should be tied to a physical attribute where available, such as milepost marker. The following facility owner/operator follows this practice: Sprint Long Distance.
16. The facility owner/operator captures the following information to ensure project safety in the plan, design, construction, documentation, location, and maintenance of their longitudinal utility.
 1. Any new construction into the electronic mapping database at the time of installation
 2. The location of abandoned or sold facilities is retained in the database.
 3. The electronic mapping database includes the following detailed information:
 - a) Engineering stationing and milepost/marker post location, with latitude and longitude. Common mapping coordinate systems that allow conversion to latitude and longitude are used.
 - b) Alignment of the utility with engineering stationing at each running line change or PI (point of inflection) including signs and markers.
 - c) Bridges, culverts and rivers.
 - d) All road crossings, overhead viaducts and underpasses, including name of the street (public or private) and mile marker/marker post designation.
 - e) Small scale maps showing the overall utility route.
 - f) Physical characteristics and attributes of the system such as: pedestal, pole, transformer, meter numbers, anode bed, size, material, product and pressure.
 - g) The number of utility lines or conduits owned by the facility owner/operator in a corridor or the size of the duct package/bank.

This is universally a general practice of major pipe line and long distance telecommunication operators and railroads.

6.6.5 Project Owner

17. The project owner provides the excavator with accurate location information on the proposed excavation area using mapping information utilized by the one-call center. This information includes: a street address, street intersection, legal description, or other acceptable one-call format and latitude/longitude if feasible.

18. The project owner determines a starting point, ending point and on which side of the property (North, South, East, West, front, back, rear, sides, etc.) or street the excavation area is located.

Reference:

These are general practices of the State DOTs on Highway projects.

These are general practices of most NUCA members. The references listed in each best practice are not all inclusive.

6.7 EMERGING TECHNOLOGIES

Technology is rapidly changing. Many of the best practices identified in this chapter could be obsolete in the near future. Although the following technologies are now used in other applications, their use is not widespread in the damage prevention field.

- Geographic Information System (GIS)
- Advances in Location Technology
- The Global Positioning System (GPS)
- Orthographic and Satellite Images

GIS allows the integration of digital maps with other databases to view the relationship of physical features, conducts relational queries, and obtains additional information on a particular feature. The GIS infrastructure or base will support all of the advanced technologies of GPS, Ortho and Satellite Images.

Combining Orthographic and Satellite images with an overlay of a line map, street names, addresses and GPS coordinates of utility lines will allow one-call centers, excavators, locators, facility owners/operators, and project owners to view the accurate and relative location of utility lines.

Advanced use of these technologies in combination with advances to locating technologies is expected to reduce damage to underground facilities.