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ASCE STANDARD

American Society of Civil Engineers

Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data

This document uses both Systeme International (SI) units and customary units.

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ABSTRACT
New and emerging technologies allow for the cost-effective collection and depiction of existing utility information. This convergence of technologies and systematic use of the data derived from these technologies is known as subsurface utility engineering (SUE). A key component of SUE is affixing an attribute to utility information that denotes the quality of that utility information. This widespread and growing attribution process will benefit from the application of these guidelines and the establishment of a credible nomenclature system. Therefore, the intent of this standard guideline is to present a system of classifying the quality of existing subsurface utility data. Such a process will allow the project owner, design engineer, subsurface utility engineer, constructor, and utility owner to develop strategies to manage risks caused by existing subsurface utilities in a defined manner.

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STANDARDS

In April 1980, the Board of Direction approved ASCE Rules for Standards Committees to govern the writing and maintenance of standards developed by the Society. All such standards are developed by a consensus standards process managed by the Management Group F (MGF), Codes and Standards. The consensus process includes balloting by the balanced standards committee made up of Society members and nonmembers, balloting by the membership of ASCE as a whole, and balloting by the public. All standards are updated or reaffirmed by the same process at intervals not exceeding 5 years.

The following Standards have been issued:

ANSI/ASCE 1-82 N-725 Guideline for Design and Analysis of Nuclear Safety Related Earth Structures

ANSI/ASCE 2-91 Measurement of Oxygen Transfer in Clean Water

ANSI/ASCE 3-91 Standard for the Structural Design of Composite Slabs and ANSI/ASCE 9-91 Standard Practice for the Construction and Inspection of Composite Slabs

ASCE 4-98 Seismic Analysis of Safety-Related Nuclear Structures

Building Code Requirements for Masonry Structures (ACI 530-99/ASCE 5-99/TMS 402-99) and Specifications for Masonry Structures (ACI 530.1-99 /ASCE 6-99/TMS 602-99)

ASCE 7-98 Minimum Design Loads for Buildings and Other Structures

ANSI/ASCE 8-90 Standard Specification for the Design of Cold-Formed Stainless Steel Structural Members

ANSI/ASCE 9-91 listed with ASCE 3-91

ASCE 10-97 Design of Latticed Steel Transmission Structures

SEI/ASCE 11-99 Guideline for Structural Condition Assessment of Existing Buildings

ANSI/ASCE 12-91 Guideline for the Design of Urban Subsurface Drainage

ASCE 13-93 Standard Guidelines for Installation of Urban Subsurface Drainage

ASCE 14-93 Standard Guidelines for Operation and Maintenance of Urban Subsurface Drainage

ASCE 15-98 Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)

ASCE 16-95 Standard for Load and Resistance Factor Design (LRFD) of Engineered Wood Construction

ASCE 17-96 Air-Supported Structures

ASCE 18-96 Standard Guidelines for In-Process Oxygen Transfer Testing

ASCE 19-96 Structural Applications of Steel Cables for Buildings

ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations

ASCE 21-96 Automated People Mover Standards—Part 1

ASCE 21-98 Automated People Mover Standards—Part 2

ASCE 21-00 Automated People Mover Standards—Part 3

SEI/ASCE 23-97 Specification for Structural Steel Beams with Web Openings

SEI/ASCE 24-98 Flood Resistant Design and Construction

ASCE 25-97 Earthquake-Actuated Automatic Gas Shut-Off Devices

ASCE 26-97 Standard Practice for Design of Buried Precast Concrete Box Sections

ASCE 27-00 Standard Practice for Direct Design of Precast Concrete Pipe for Jacking in Trenchless Construction

ASCE 28-00 Standard Practice for Direct Design of Precast Concrete Box Sections for Jacking in Trenchless Construction

EWRI/ASCE 33-01 Comprehensive Transboundary International Water Quality Management Agreement

EWRI/ASCE 34-01 Standard Guidelines for Artificial Recharge of Ground Water

EWRI/ASCE 35-01 Guidelines for Quality Assurance of Installed Fine-Pore Aeration Equipment

CI/ASCE 36-01 Standard Construction Guidelines for Microtunneling

SEI/ASCE 37-02 Design Loads on Structures During Construction

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FOREWORD

In April 1995, the Board of Direction approved the revision to the American Society of Civil Engineers (ASCE) Rules for Standards Committees to govern the writing and maintenance of standards developed by ASCE. ASCE standards are developed by a consensus standards process managed by the ASCE Codes and Standards Activity Committee. The consensus process includes balloting by a balanced standards committee made up of ASCE members and nonmembers, balloting by the membership of ASCE as a whole, and balloting by the public. All standards are updated or reaffirmed by the same process at intervals not exceeding 5 years.

This guideline offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education and experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASCE standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "standard" in the title of this document means only that the document has been approved through the ASCE consensus process.

Subsurface utility engineering (SUE) has emerged in the past 2 decades as a means to better characterize the quality of subsurface utility information and to manage the risks associated with construction activities that may affect existing subsurface utilities. It combines traditional civil engineering practices of utility data collection and depiction with new technologies and new concepts for defining utility information quality. A key component of SUE is affixing an attribute to utility information that denotes the quality of that utility information. This attribution process is widespread and growing and will benefit from the application of this guideline. A standard guideline will clearly define these quality attributes and will benefit the engineer, the project owner, and the contractor regarding projects involving excavation and/or other construction activities.

This standard has been prepared in accordance with recognized engineering principles and should not be used without the user's competent knowledge for a given application. The publication of this standard by ASCE is not intended as a warrant that the information contained herein is suitable for any general or specific use, and ASCE takes no position respecting the validity of patent rights. Users are advised that the determination of patent rights or risk of infringement is entirely their responsibility.

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DEDICATION

The following two persons were not physically on this standards committee, but their spirit was essential to its formation:

Henry Garon Stutzman, Chairman Emeritus, So-Deep, Inc., the "founder" of the subsurface utility engineering profession

Jerry Poston (deceased), Federal Highway Administration, whose unflagging support for the profession resulted in a groundswell of acceptance by the highway design and construction community

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James H. Anspach, P.G., Chair, Secretary, ASCE Codes and Standards Activity Committee Representative
C. Paul Scott, P.E., Vice Chair
Dr. Thomas E. Iseley, P.E., ASCE GC Executive Committee

Capt. James R. Allen, P.E., U.S. Navy Civil Engineering Corps (CEC)
R. Wayne Brooks
Dr. C.C. Chang, P.E.
Kevin S. Nichols, P.E.
James F. Noone, P.E.
Kathe J. Sopenski, P.E.
Robert E. Stevens, P.E.
Alan J. Witten, Ph.D.
Nicholas M. Zembillas

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CONTENTS

1.0 Introduction 1
2.0 Scope 1
3.0 Definitions 2
4.0 Engineer and Owner Collection and Depiction Tasks 3
4.1 Engineer 3
4.2 Project Owner 4
5.0 Utility Quality Level Attributes 4
5.1 Quality Level D 4
5.2 Quality Level C 5
5.3 Quality Level B 5
5.4 Quality Level A 6
6.0 Deliverables Formatting 6
6.1 General 6
6.2 Basic Deliverable 7
6.3 Quality Level Attributes 7
6.4 Utility Depiction Legend 7
6.5 Examples of Mapping Deliverables 7
7.0 Relative Costs and Benefits of Quality Levels 10
7.1 Cost Savings 10
7.2 Costs 11
8.0 Information Sources 11

Appendices: Surface Geophysical Methods for Utility Imaging
Appendix A General 14
Appendix B Electromagnetic Methods 14
Appendix C Magnetic Methods 16
Appendix D Elastic Wave Methods 16
Appendix E High-Cost, Very Specialized Methods 17
Appendix F Data Processing Techniques 18
Index 19

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1.0 INTRODUCTION

The nation's infrastructure continues to grow as a result of population growth and other factors. New technologies are proliferating, such as fiberoptics, which are replacing copper communication cables. In addition, the deterioration and replacement of existing structures have expanded activities dealing with the utility infrastructure. The effort to clean up the environment has necessitated considerable excavation in areas of high-density infrastructure development. Available right-of-way is becoming limited, especially in urban and suburban areas. The "footprint" of new construction, repair, or remediation often conflicts with existing infrastructure. When this existing infrastructure is hidden from view (e.g., buried), it is often discovered in the construction phase of a project. During this phase, the costs of conflict resolution and the potential for catastrophic damages are highest.

Existing subsurface utilities and their related structures constitute a significant portion of this infrastructure. They create risks on projects. Inaccurate, incomplete, and/or out-of-date information on the existence and location of existing subsurface utilities reduces the engineers', owners', and contractors' abilities to make informed decisions and to support risk management decisions regarding the project's impact on existing utilities.

A convergence of new equipment and data-processing technologies now allows for the cost-effective collection, depiction, and management of existing utility information. These technologies encompass surface geophysics, surveying techniques, computer-aided design and drafting and geographic information systems, and minimally intrusive excavation techniques. This convergence of technologies and systematic use of the data derived from these technologies is known as subsurface utility engineering (SUE). Organizations such as the U.S. Department of Transportation, the National Transportation Safety Board, the U.S. Department of Energy, Associated General Contractors of America, Inc., universities, and utility companies are endorsing the use of SUE.

The engineer's job in collecting and depicting utility information is complicated by the relatively limited control over utility owners' record data. The utility owner is typically under no obligation to the engineer to provide information. The engineer is therefore often unable to obtain available and pertinent utility information.

Utility owners are obligated under statute in most states to mark the location of their known active facilities on the ground surface just before construction. This is often too late for design purposes or for contractor bidding purposes. A very few states have laws that encourage utility owners to mark facilities at the time of design; however, utility owners are under no legal requirement to do so. Some utility owners may desire to mark their facilities for the engineer.

For reliable information during design and construction, the engineer, owner, and constructor should be certain that utilities, active, abandoned, or unknown, are identified; that the utilities are marked correctly; that the numbers of actual utility pipes or cables under the ground are known or represented by multiple marks; that the width of facilities is correct; and that the depths of utilities are known. Reliable information has historically not always been provided by utility owners.

Engineers may have received, made, or obtained a mixture of evidence of the existence, character, and location of utilities. Evidence may vary widely as to its credibility. Application of this guideline and the establishment of a credible nomenclature system will permit affixing attributes to utility information that denote the quality of that utility information. Problems with existing utilities are routinely handled through change orders, extra work orders, insurance payouts, and contingency pricing. When problems create significant costs, the finger of blame is pointed everywhere, including at the engineer who has affixed his or her stamp to the plans, regardless of disclaimers. All involved in the design and construction process will benefit from better information for the management of risk.

2.0 SCOPE

The scope of this document is a consensus standard for defining the quality of utility location and the attribute information that is placed on plans. The standard guideline addresses issues such as (a) how utility information can be obtained, (b) what technologies are available to obtain that information, and (c) how that information can be conveyed to the information users.

The intent of this standard guideline is to present a system of classifying the quality of data associated with existing subsurface utilities. Such a classification will allow the project owner, engineer, constructor, and utility owner to develop strategies to reduce risk by improving the reliability of information on existing subsurface utilities in a defined manner. This document, as a reference or as part of a specification, will assist