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# CSA S250:20
National Standard of Canada

# Mapping of underground utility infrastructure

Standards Council of Canada
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# *Revision History*

## CSA S250:20, Mapping of underground utility infrastructure

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# *CSA S250:20*

# ***Mapping of underground utility infrastructure***



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# Contents



  

  

  

# Preface

This is the second edition of CSA S250, *Mapping of underground utility infrastructure.* It supersedes the previous edition published in 2011.

The following are the major changes to this edition:

- recognized field data collection technologies have been expanded to include LiDAR, total station survey (TSS), and video recordings (for supplemental records);
- the requirement for mapping records has been expanded to include all stages of operational status, which include abandoned in-place, in-service, out-of-service, and proposed;
- minor changes have been made to the requirements for record retention;
- accountabilities and responsibilities of the locator and excavator have been revised to better align with CAN/CSA-Z247;
- the records lifecycle obligation has been upgraded to be mandatory during all phases of the lifecycle of underground utility infrastructure;
- directions on the limitations of digital base mapping has been provided, as well as obligations towards its use;
- clarification has been provided in Clause 5 on how information is collected and used to depict the location and attributes of utility infrastructure so users can be confident of its level of reliability and accuracy;
- the owner's responsibility for measuring and recording the location of underground utility infrastructures has been revised;
- the requirements for absolute spatial positioning (i.e., horizontal and vertical datums) have been revised;
- the accuracy requirements for as-builts have been streamlined in Table 1 (see Clauses 5.5 and 5.6.2 and Figures 2 to 6) and Table 2 (see Clause 5.7 and Figures 2 to 6);
- the measurement requirement has been revised to include the lowest point below grade for vertical structures (i.e., the bottom of the utility pole);
- the obligation to identify third-party data sources has been expanded within the title block of shared maps and drawings;
- the material abbreviations have been revised to better align with other industry standards;
- the specific utility infrastructure requirements and graphical representations for mapping records have been revised;
- Clause A.4.5.4.2.2 has been expanded to provide guidance on leveraging the resolution of mapping discrepancies to drive the improvement of mapping records; and
- Clause A.4.7.5 has been revised to recognize the importance of open data standards that enable data sharing between industry partners and their respective software environments.

This Standard was prepared by the Technical Committee on Mapping of Underground Utility Infrastructure, under the jurisdiction of the Strategic Steering Committee on Construction and Civil Infrastructure, and has been formally approved by the Technical Committee.

This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

**Notes:**

1) *Use of the singular does not exclude the plural (and vice versa) when the sense allows.*
2) *Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.*
3) *This Standard was developed by consensus, which is defined by* CSA Policy governing standardization — Code of good practice for standardization *as "substantial agreement. Consensus implies much more than a simple*

  

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   b) *relevant clause, table, and/or figure number;*
   c) *wording of the proposed change; and*
   d) *rationale for the change.*

  

# *CSA S250:20*
# *Mapping of underground utility infrastructure*

## 0 Introduction

The purpose of this Standard is to specify the mapping records requirements used to identify and locate underground utility infrastructure. This Standard is intended to promote the use and drive the advancement of mapping records during the planning, design, construction, and operation of underground utility infrastructure.

Underlying the development of this Standard is the two-fold recognition that it is a privilege, not a right, to bury anything underground in the public right-of-way, and that it is in consideration or exchange for that privilege that the owner is obliged to provide an accurate and retrievable as-built location of that underground utility infrastructure.

The underground is a maze of pipes and cables. Currently, thousands of kilometres of underground pipes and cables have never been accurately mapped or recorded. Infrastructure in Canada's older cities was installed more than 100 years ago when as-built drawings, if any existed, referred to surface features that have long since disappeared. Up until recently, recording the presence and location of such utilities was not formally required or was not carried out in an accurate or methodical way. Today, many of the records that do exist are in formats that are incompatible between utilities, making it difficult to position one company's pipes relative to another's cables.

With so many communications lines, fibre-optic cables, and petroleum, natural gas, electricity, water, and sewer lines, public safety issues arise as to how quickly the underground utility infrastructure can be located and accurately identified in order to avoid an excavation mishap that could result in significant damage, an interruption of service, possible serious injury to workers or the public, or negative impact to the environment.

Municipal authorities and the construction industry are now making a concerted effort to prevent accidental damage to underground utility infrastructure. For example, in the late 1980s, the Common Ground Alliance (CGA) launched the "One Call — Call Before You Dig" program designed to serve as a national resource for professional excavators. Since then, this program processes approximately 28 million underground utility locate requests a year in the United States and Canada, making it the first step in the damage prevention process.

In 2004, to measure the success of this program and to establish a benchmark to measure progress, the CGA introduced a new Damage Information Reporting Tool (D.I.R.T.) to catalogue and identify the causes of approximately 350 000 underground utility infrastructure strikes that occur each year in Canada and the United States. A "root cause" analysis of that data shows that more than half of the reported damages (52%) were the result of poor excavation practices, but approximately 17% were due to poor mapping or locating issues. A more accurate approach of mapping and identifying underground buried utility infrastructure will have a positive impact on reducing the number of those infrastructure strikes and damage near misses.

But both Call Before You Dig and the D.I.R.T. Report are reactive measures. There is much that can be done proactively to establish recording, mapping, and reporting standards that will improve the

  

usefulness of the underground mapping record going forward. The work of the Technical Committee is dedicated to that effort.

The as-built drawings, records, and mapping systems are the final component of the design and construction activity. They are the combination of many records created during the planning, design, construction, and operation lifecycle of an underground utility infrastructure. At the planning and design stages, it is decided and recorded that the plant should be locatable and identifiable during construction. At the construction stage, records are generated on how the plant is laid, how the tracer wire is applied, and how the tracer is tested. At the construction stage, records are generated to illustrate changes to the design, actual clearances from other utilities, and depth of cover. At the operation and maintenance stage, records are generated to illustrate modifications to the underground utility infrastructure and the repairs made to them at each phase of its lifecycle.

Application of this Standard on a go-forward basis does not necessarily mean that utilities need to dispose of their current mapping policies and practices. However, at a minimum, among the benefits associated with adopting this Standard is the opportunity to establish accuracy and quality levels that are consistent across all Canadian jurisdictions. Adoption of a single standard makes it easier for all end users to respond to calls for proposals, eliminates the need for familiarity with the details of multiple standards, and encourages consistency of approach.

This Standard is complemented by Annexes A to E, which provide rationale statements and explanatory material for many of the clauses.

# 1 Scope

## 1.1 General

This Standard specifies mapping requirements for the recording and depiction of underground utility infrastructure and related appurtenances at or below grade. This Standard does not apply to utility infrastructure that is normally above grade (e.g., overhead wires, pole-mounted transformers, antennas, and dishes).

## 1.2 Application

This Standard applies to proposed, existing, abandoned in-place, retired, or reserved for future use underground utility infrastructure.

This Standard applies to the generation, storage, distribution, and use of mapping records to ensure that underground utilities are readily identifiable and locatable. Application of this Standard will help capture accurate information about the location and nature of the underground utility infrastructure and make this information available for future projects.

## 1.3 Terminology

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the Standard; “should” is used to express a recommendation or that which is advised but not required; and “may” is used to express an option or that which is permissible within the limits of the Standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

  