

What *Lurks* Below

Canada's mapping standard for underground utilities

BY MARK BRAITER

All throughout North America, there are literally thousands of miles of underground pipes and cables whose locations have never been accurately mapped or recorded. And much of our infrastructure was constructed over 100 years ago, when as-built drawings, if they even existed, referenced surface features that have long since disappeared. The consequences of inaccurate information about buried utilities can be dire, as an underground mishap can cause significant damage, interruption of service, serious injury to workers and the public, and even a hazardous impact on the environment.

Historically, identifying and recording the accurate positional location of utility infrastructure was neither formally required nor carried out in a consistent manner. As a result, many of the mapping records that do exist are inaccurate or obsolete, as they have not been updated to capture key properties of newly constructed underground utilities. In many cases, the mapping formats are incompatible between utilities, making the sharing of data or locating the position of one company's pipes or cables relative to another's extremely difficult.

Addressing the Inadequacies

The utility industry has long recognized the risk posed by poor utility records. Tragic pipeline accidents in the United States and Canada have resulted in lives lost, evacuations, lawsuits and costly settlements. In 2003, an Ontario contractor working on a roadway for the City of Toronto pulled an underground gas line from a commercial plaza, resulting in a fatal explosion.



To address the inadequacies of utility infrastructure mapping in Canada, regional public works engineers enlisted the Canadian Standards Association (CSA) to develop a common national standard. Recognizing two important factors was fundamental to developing this standard. First, that it is a privilege, not a right, to bury anything underground in the public right of way. Second, it is in consideration of that privilege that the owners of the buried infrastructure are obliged to provide an accurate and retrievable as-built location of this infrastructure.

Adhering to Policies and Procedures

To develop industrywide standards, a committee of involved stakeholders was assembled with subject matter representatives from utility, surveying and construction companies, as well as from various municipal, provincial and federal government agencies. Following a four-year period development process, CSA S250 – *Mapping of Underground Utility Infrastructure* was published in 2011. The standards can be applied to existing infrastructure or future use situations to

ensure that accurate information about underground utilities is captured and available. CSA S250 establishes accuracy levels that set tolerances for the spatial accuracy of as-builts. It also specifies the utility use specific naming conventions, colors and symbols when describing and depicting underground utilities. The goal is to encourage consistency when data is shared and reviewed.



CSA's S250 standard has helped utility and road owners get a better handle on managing the underground space.

While the main benefits are improved location and mapping accuracy, another advantage is in the area of safety. The standards provide crucial guidelines for record keeping that will help companies, their contractors and employees to reduce the potential for utility hits or strikes. After all, the ability to quickly locate and accurately identify underground infrastructure is critical for preventing an excavation mishap.

CSA S250 also establishes procedures for creating a management system approach to mapping and record keeping for utility owners, locators, excavators and surveyors. Utility owners are expected to document their mapping programs, compliance auditing, disaster recovery improvements and training plans. The standards suggest using geographic information systems and computer-aided design for utility managements so that files are continually updated, making it easier to report location discrepancies to utility owners.

Utilizing these standards does not necessarily mean that utilities need to dispose of their current mapping policies and practices. However, adopting CSA S250 facilitates the process of establishing accuracy and quality levels that are consistent across jurisdictions. This eliminates the need for familiarity with multiple standards, making it easier for end users to respond to calls for proposals, while simplifying the practice of comparing competitive bids.

Protecting the Underground

Since the launch of CSA S250, there have been additional efforts to minimize incidents relative to underground utilities, such as damage due to ground disturbance activities. This includes digging, excavation, trenching, ditching, tunneling, drilling, grading, plowing, tree planting, blasting, quarrying and the driving of fence posts, bars, rods, pins, anchors or pilings. Damage to these buried facilities can result in major repair costs, service disruptions, environmental contamination, serious injury and even death. These unnecessary damages are generally preventable and can be avoided by utilizing proactive damage prevention processes.

In 2015, CSA published CSA Z247 *Damage prevention for the protection of underground infrastructure*. This new standard specifies preventative requirements for oil and gas pipelines, electrical and telecommunication cables, and water and sewer lines. Although this was not the first step in the evolutionary progression of ground disturbance, it is a positive step toward the overall prevention of damage to buried infrastructure.

Planning for the Future

The location of existing utilities will always play a key role in the planning, design and construction of infrastructure projects. To minimize unnecessary cost overages and schedule delays, obtaining accurate data up front is critical. However, equally as important is the continued generation of accurate, reliable maps and drawings of all new utility infrastructure placed in the ground.

Adhering to industry-approved standards will help us to maximize the underground space while minimizing our potential risks. And producing accurate underground data in accordance with these standards will not only help us to maintain the integrity of our infrastructure, it will benefit all stakeholders for years to come. 🌟



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