

# THE LOCATOR

2019

## A DAY IN THE LIFE OF A LOCATOR

Professional locators are critical to a  
successful ground disturbance project

NEW HEALTH AND SAFETY  
RULES MAKE JOB SITES SAFER

KEYS TO RESOLVING  
LOCATING PROBLEMS



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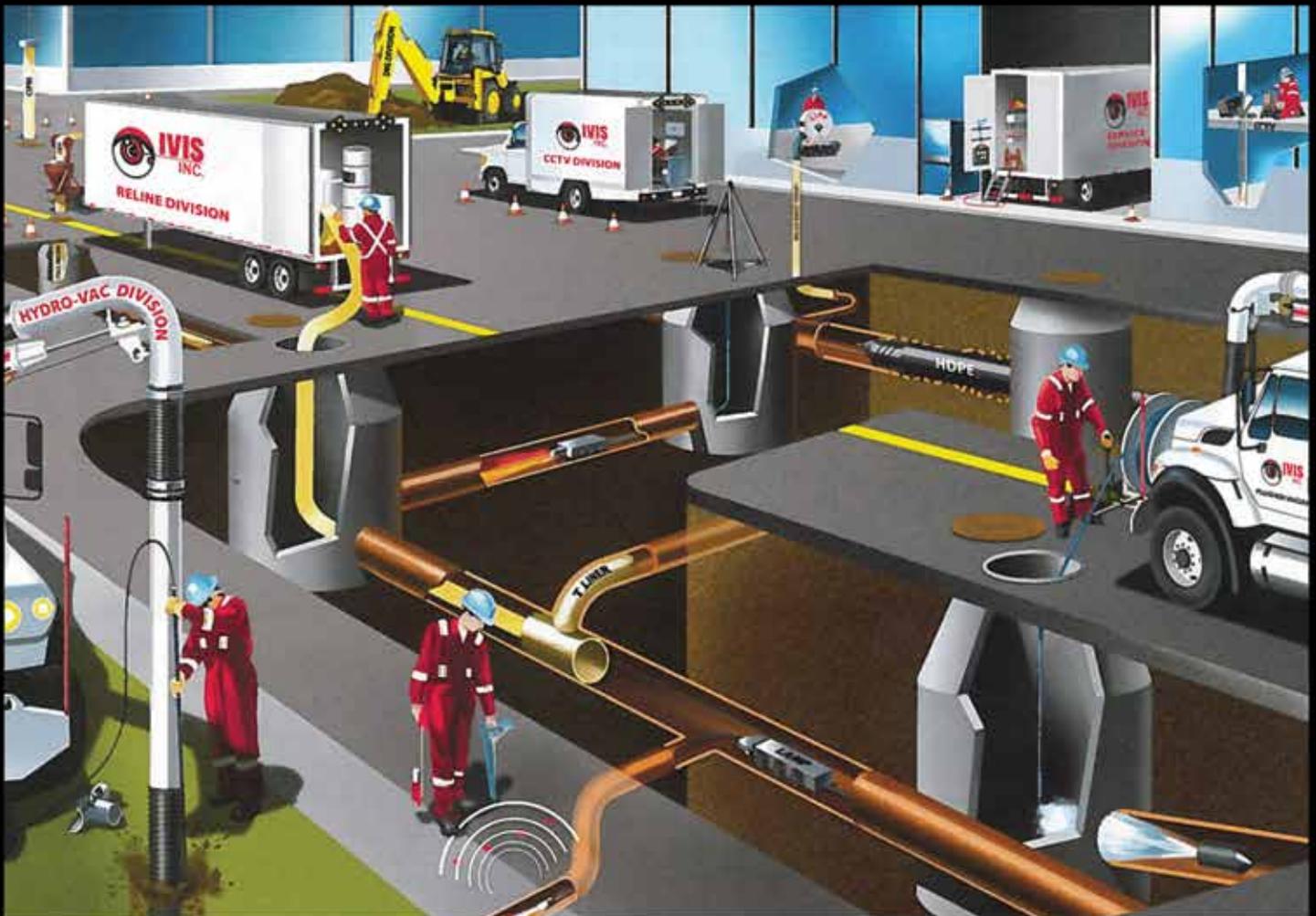
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is published by  
DEL Communications Inc.  
www.delcommunications.com

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S.G. Bennett Marketing Services  
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Publications mail agreement #40934510

Return undeliverable  
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PRINTED IN CANADA 10/2018

# CONTENTS

- 4** Message from CAPULC  
President Randy Palaniuk
- 6** Special announcements from  
CAPULC Executive Director  
Jason Mugford
- 8** Message from the Honourable  
François-Philippe Champagne,  
Minister of Infrastructure and  
Communities
- 10** New health and safety rules  
make Alberta job sites safer
- 12** Keys to resolving locating problems
- 18** A day in the life of a locator
- 20** Fighting fatigue: embracing the suck
- 24** Professional locators are critical to a  
successful ground disturbance project
- 26** The truth about locating
- 28** Innovations in mapping  
underground infrastructure
- 32** Predicting the future
- 33** The top five reasons to hire a  
private locator
- 34** Motion Canada is your #1 source for  
Aervoe Inverted Marking Paint
- 36** Making your mark
- 37** LN Land Development Technologies Inc.:  
Your all-in-one solution
- 38** Index to advertisers
- 39** CAPULC sponsors



# Message from the president of CAPULC

## RANDY PALANIUK



I would like to take this opportunity to thank everyone for their contributions to The Locator magazine. We have had very positive feedback thus far from the inaugural issue, and we welcome any suggestions for topics in our future editions. We hope you continue to find the magazine's content current, useful, and interesting.

Throughout the years, underground facilities have multiplied within public and private properties and rights-of-way. The exact location, types and numbers of facilities have not always been accurately documented. The lack of this important information presents unique challenges to ensure public and worker safety. Discovering unknown facilities during construction can cause major delays, leading to project cost overruns and put people, property, and the environment at risk. Stakeholders involved in damage prevention must recognize that there are limits to "Click or Call Before You Dig". Although one-call centres provide

a very convenient and valuable service, there can be serious limitations:

- Not all buried facility operators are members of the one-call centres.
- The one-call centre doesn't know which buried facility operators are not.
- The one-call centre can only work with the information provided to them.
- One-call centre locates do not locate privately owned facilities.

Placing a locate request through a one-call centre does not guarantee that all buried facilities at a site have been located. The existence of a low-cost, easy, and quick-to-use tool that can identify all buried facilities does not exist. The current technologies available are often ineffective, and the methods performed are clearly inefficient. Trying to locate buried facilities utilizing incomplete facility records with inadequate equipment and training is clearly problematic. Project owners can mitigate facility-related challenges by integrating policies and procedures that require adequate qualification and training requirements. The use of locating equipment by personnel with varying levels of training on how to use the equipment isn't conducive to effective damage prevention.

While locating technologies continue to improve, knowledge of these technologies and their capabilities must be taught. CAPULC has long recognized the need for locator training standards and competency requirements in efforts to increase the accuracy and reliability of locates. Competencies were developed based on everyday work tasks that make up the knowledge, skills and technology used by locators. CAPULC believes competency-based education, training, and final assessment of locators will help alleviate technology shortcomings, incomplete or inadequate records, and one-call limitations.

This magazine endeavors to provide locators (and those stakeholders benefitting from the efforts of locators) with answers to questions and challenges that affect locating, ground disturbance, and damage prevention.

We hope you enjoy reading this publication and that you can apply the content to your locating and/or otherwise damage prevention responsibilities. Be safe out there! ●

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# Message du président de la CAPULC

## RANDY PALANIUK

J'aimerais profiter de la présente occasion pour remercier toutes les personnes qui ont contribué à notre revue. Jusqu'ici, nous avons reçu une rétroaction très positive au sujet du premier numéro de notre revue et nous accueillons toutes les suggestions d'articles pour les numéros futurs. Nous espérons que vous continuerez de trouver que le contenu de la revue est actuel, utile et intéressant.

Au cours des ans, les installations souterraines se sont multipliées sur les propriétés et les emprises publiques et privées. L'emplacement exact, ainsi que les types et le nombre des installations, n'ont pas toujours été documentés avec précision. Le manque de renseignements importants présente des défis uniques pour assurer la sécurité du public et des travailleurs. La découverte d'installations inconnues pendant des travaux de construction peut causer des délais importants, ce qui entraîne des dépassements de coûts des projets et l'exposition des gens, des propriétés et de l'environnement à des risques. Les intervenants engagés dans la prévention des dommages doivent reconnaître qu'il y a des limites au slogan « Cliquez ou téléphonez avant de creuser ». Bien que les centres d'appel unique offrent un service très pratique et valable, ils peuvent comprendre des limites sérieuses :

- ce ne sont pas tous les exploitants d'installations enfouies qui sont membres d'un centre d'appel unique;
- un centre d'appel unique ne connaît pas les exploitants qui n'en sont pas membres;
- un centre d'appel unique ne peut travailler qu'avec les renseignements qu'on lui a fournis;
- les localisations des centres d'appel unique ne s'appliquent pas aux installations privées.

La soumission d'une demande de localisation à un centre d'appel unique ne garantit pas que toutes les installations enfouies sur un site seront localisées. Il n'existe pas un outil peu coûteux, facile et rapide à utiliser, qui peut localiser toutes les installations enfouies. Les technologies présentement disponibles sont souvent inefficaces et les méthodes utilisées sont clairement insuffisantes. Essayer de localiser des installations enfouies en utilisant des dossiers incomplets, ainsi que des équipements et une formation inadéquats, est clairement problématique. Les propriétaires de projet peuvent atténuer les problèmes liés aux

installations en intégrant des politiques et des procédures qui exigent des compétences et une formation adéquates. L'utilisation d'équipements de localisation par du personnel ayant divers niveaux de formation sur la façon de les utiliser n'est pas propice à une prévention efficace des dommages.

Bien que les technologies de localisation continuent de s'améliorer, la connaissance de celles-ci et de leurs capacités doit être enseignée. La CAPULC reconnaît depuis longtemps la nécessité de normes de formation des localisateurs et d'exigences relatives aux compétences dans un effort d'accroissement de l'exactitude et de la fiabilité des activités de localisation. Des compétences ont été développées sur la base des tâches de travail quotidiennes qui constituent les connaissances, les habiletés et la technologie utilisées par les localisateurs. La CAPULC croit que l'éducation, la formation et l'évaluation finale des localisateurs fondées sur les compétences aideront à atténuer les lacunes technologiques, la présence de dossiers incomplets ou inadéquats et les limites des centres d'appel unique.

Notre revue s'efforce d'offrir aux localisateurs (et aux parties intéressées qui bénéficient des efforts des localisateurs) des réponses aux questions et aux défis qui touchent la localisation, la perturbation du sol et la prévention des dommages.

Nous espérons que vous apprécierez la lecture de notre publication et que vous pourrez appliquer son contenu dans vos activités de localisation et de prévention des dommages. Assurez votre sécurité au travail! ●

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# JASON MUGFORD

## CAPULC is pleased to announce that we will be hosting our first ever National Locate Rodeo!

### 2018 National Locate Rodeo

**What:** The National Locate Rodeo recognizes the profession of underground utility locating and demonstrates the safety, skills and ongoing educational efforts associated with high-quality workmanship.

**Purpose:** The purpose of the National Locate Rodeo is to showcase the underground facility locating profession. The professionalism, knowledge, and skill utilized daily by utility line locators are important factors in underground damage prevention and in keeping our community safe.

**Where:** Festival Place, Sherwood Park, Alberta

**When:** Thursday, April 18, 2019

We have reached out to the Alberta Common Ground Alliance (ABCGA) and Edmonton Area Pipeline Utility Operators

Committee (EAPUOC) to help us organize and plan this important competition and event for facility locators across Canada. At the end of the competition, the participants will say the judging was fair and consistent and the Rodeo was a pleasant and fun event. More details and registration form to come.

Our next step is to plan and organize the event, review the official rules, rodeo agenda, organize volunteer positions, etc. In doing so, we would like to invite all members to participate in our National Locate Rodeo Committee. If you are interested in joining our committee to ensure this is a huge success for all locators, please contact [admin@capulc.ca](mailto:admin@capulc.ca). Our first committee meeting was held at the ATCO Gas Building in Sherwood Park, Alberta on October 5, 2018 at 9:00 a.m. prior to the General Member Meeting. More details will be announced from the committee later this fall. Watch your inbox for more news from CAPULC.

## CAPULC is pleased to announce that our 2019 CAPULC AGM & Safety Conference will also be held at Festival Place on Wednesday, April 17, 2019.

This year's safety conference will focus on raising OHS awareness by focusing on areas affecting our industry. Attendee's will learn about impairment in the workplace from prescription or recreational drugs to stress and fatigue. Another area of focus will be workplace violence and mental health. We will have sessions on locating obstacles, industry best practices, new regulations and changes in our industry and new technologies for locating. Again this year, we welcome our vendors back to showcase their new products. Please reach out to me to reserve your booth today.

The 2018 CAPULC AGM and Safety Conference was a huge success with positive feedback received from our members. We are anticipating another great turnout this year, and we look forward to bringing our conference attendees valuable information that they can take back to their individual organizations. Damage Prevention is a shared responsibility, and we all play a vital role in protecting underground critical infrastructure and the safety of the public. ●



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## La CAPULC est heureuse d'annoncer qu'elle organisera son premier Rodéo national de localisation!

### Rodéo national de localisation de 2018

**Quoi** — Le Rodéo national de localisation reconnaît la profession de localisateur des services publics souterrains et démontre la sécurité, les compétences et les efforts éducatifs continus qui sont liés à une exécution du travail de qualité élevée.

**But** — Le but du Rodéo national de localisation est de mettre en évidence la profession de localisateur des installations souterraines. Le professionnalisme, les connaissances et les compétences utilisés quotidiennement par les localisateurs de canalisations des services publics sont d'importants facteurs de la prévention des dommages souterrains et du maintien de la sécurité de nos collectivités.

**Où** — Festival Place, Sherwood Park, Alberta.

**Quand** — Le jeudi 18 avril 2019.

Nous avons communiqué avec les organismes Alberta Common Ground Alliance (ABCGA) et Edmonton Area Pipeline Utility Operators Committee (EAPUOC) pour qu'ils nous aident à organiser et à planifier cet important événement compétitif pour tous les localisateurs d'installations du Canada. À la fin de la compétition, les participants diront que les juges ont été équitables et cohérents et que le Rodéo a été un événement agréable et amusant. De plus amples renseignements et un formulaire d'inscription sont à venir.

La prochaine étape consiste à planifier et à organiser l'événement, à passer en revue les règlements officiels et l'ordre du jour du rodéo, à établir les postes des bénévoles, etc. Pour cela, nous aimerions inviter tous les membres à participer au comité du Rodéo national de localisation. Si la participation au comité vous intéresse afin d'assurer le succès de l'événement pour tous les localisateurs, veuillez transmettre un courriel à [admin@capulc.ca](mailto:admin@capulc.ca). La première réunion du comité aura lieu à l'immeuble d'ATCO Gas à Sherwood Park (Alberta) le 6 octobre 2018 à 9 h, avant l'Assemblée générale annuelle (AGA). Le comité annoncera d'autres détails au cours de l'automne. Surveillez votre corbeille d'arrivée pour d'autres nouvelles de la CAPULC.

### La CAPULC est également heureuse d'annoncer que son AGA et sa Conférence sur la sécurité de 2019 auront lieu aussi à Festival Place le mercredi 17 avril 2019.

La conférence sur la sécurité de cette année se concentrera sur l'accroissement de la sensibilisation à la santé et à la sécurité au travail en mettant l'accent sur les éléments qui touchent notre industrie. Les participants en sauront davantage sur l'affaiblissement des facultés au travail en raison des médicaments sur ordonnance, des drogues à usage récréatif, du stress et de la fatigue, entre autres. Un autre domaine d'intérêt particulier englobera la violence au travail et la santé mentale. Nous aurons des séances sur les obstacles à la localisation, les pratiques exemplaires de l'industrie, les nouveaux règlements et les changements dans notre industrie et les nouvelles technologies de localisation. Encore une fois cette année, nous inviterons nos vendeurs à présenter leurs nouveaux produits. Veuillez communiquer avec moi pour réserver votre kiosque dès aujourd'hui.

L'AGA et la Conférence sur la sécurité de 2018 de la CAPULC ont été un franc succès et nos membres nous ont transmis une rétroaction positive. Nous prévoyons une autre assistance nombreuse cette année et nous attendons avec impatience la possibilité d'offrir aux participants des renseignements précieux dont ils pourront faire profiter leurs organismes respectifs. La prévention des dommages est une responsabilité partagée et nous jouons tous un rôle vital dans la protection des infrastructures souterraines critiques et la sécurité du public. ●

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## Message from the Honourable **FRANÇOIS-PHILIPPE CHAMPAGNE, P.C., M.P.**, Minister of Infrastructure and Communities

**T**hank you for the invitation to be a part of this issue of *The Locator*. As Canada's Minister of Infrastructure and Communities, I value every opportunity to express my gratitude to all those that lend a hand in making this country's infrastructure strong and resilient.

The work you do provides leadership and promotes safe practices within Canada's locating industry. We appreciate the important role you play in keeping Canadians safe as, together, we build our communities for the future.

Infrastructure is the backbone of our communities. It is about supporting Canadians and their communities – helping people move around, access services and good jobs, and connect with each other.

Our government is working closely with our partners to implement our historic infrastructure plan — one that will see over \$180 billion dollars invested in communities, big and small. Since the launch of our Plan two years ago, we have made significant progress, and work is underway from coast to coast to coast.

With thousands of projects underway across the country, the Investing in Canada plan is already delivering results for our communities. Accessible, efficient public transit is connecting Canadians to opportunities to learn new skills, get a new job, or start a new business. Better housing and cleaner drinking water are improving the health of Canadians and improving the lives of Indigenous peoples.

The first phase of our Plan helped ensure

that communities across the country had access to upgraded transit systems, and cleaner and safer water, and it supported affordable housing projects in communities across Canada, including Indigenous communities.

We're now moving to the long-term phase of our Plan, which will focus on projects that will transform our communities for generations. Our Plan is about thinking big.

We created the Canada Infrastructure Bank (CIB) as another innovative tool for our partners to fund infrastructure investments. The CIB helps public dollars go further by engaging the expertise and capital of the private sector to deliver transformative, revenue-generating infrastructure that is in the public interest, and it recently announced its first investment- to support the Réseau express métropolitain project in Montréal. When complete, this 26-station, 67-kilometre long light rail network will be the fourth largest automated transportation system in the world, making it easier for Montrealers and visitors alike to move within the city.

Modern infrastructure brings communities together and create ripple effects across the economy and society for generations. It is the foundation of strong communities and a strong Canada. I look forward to working with organization like yours as we move forward on implementing our Plan. ●

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L'honorable

**FRANÇOIS-PHILIPPE CHAMPAGNE, C.P.,**

député Ministre de l'Infrastructure et des Collectivités

**M**erci de m'avoir invité à participer à ce numéro de The Locator. En tant que ministre de l'Infrastructure et des Collectivités du Canada, j'apprécie chaque occasion qui m'est offerte d'exprimer ma gratitude à tous ceux qui contribuent à rendre les infrastructures du pays résistantes et résilientes.

Le travail que vous faites assure un leadership et permet de faire la promotion de pratiques sécuritaires au sein de l'industrie canadienne de la localisation. Nous apprécions le rôle important que vous jouez pour assurer la sécurité des Canadiens pendant que, ensemble, nous bâtissons nos collectivités pour l'avenir.

Les infrastructures sont l'épine dorsale de nos collectivités. Elles permettent de soutenir les Canadiens et leurs collectivités en aidant les gens à se déplacer, à accéder aux services et à de bons emplois, et à établir des liens entre eux.

Notre gouvernement travaille en étroite collaboration avec ses partenaires à la mise en œuvre de notre plan d'infrastructure historique, qui prévoit l'investissement de plus de 180 milliards de dollars dans les collectivités, grandes et petites. Depuis le lancement de notre plan il y a deux ans, nous avons fait des progrès considérables et des travaux sont en cours d'un océan à l'autre.

Avec des milliers de projets en cours

partout au pays, le plan Investir dans le Canada produit déjà des résultats pour nos collectivités. Les réseaux de transport en commun accessibles et efficaces permettent aux Canadiens d'acquérir de nouvelles compétences, d'obtenir un nouvel emploi ou de démarrer une nouvelle entreprise. De meilleurs logements et une eau potable plus propre améliorent la santé des Canadiens et améliorent la vie des peuples autochtones.

La première phase de notre plan a contribué à faire en sorte que les collectivités de tout le pays aient accès à des réseaux de transport en commun améliorés et à de l'eau plus propre et plus sûre, et elle a appuyé des projets de logements abordables dans des collectivités partout au Canada, y compris dans des collectivités autochtones.

Nous passons maintenant à la phase à long terme de notre plan, qui mettra l'accent sur des projets qui transformeront nos collectivités pendant des générations. Notre plan consiste à voir grand.

Nous avons créé la Banque de l'infrastructure du Canada (BIC), un autre outil novateur qui permet à nos partenaires de financer des investissements en infrastructure. La BIC aide à optimiser les fonds publics en faisant appel à l'expertise et aux capitaux du secteur privé pour mettre en place des infrastructures transformatrices et génératrices de revenus qui sont dans l'intérêt public, et elle a récemment annoncé son premier investissement,

soit le projet de Réseau express métropolitain à Montréal. Une fois terminé, ce réseau de train léger sur rail de 26 stations et de 67 kilomètres de long sera le quatrième réseau de transport automatisé en importance dans le monde entier. Il facilitera les déplacements des Montréalais et des visiteurs à l'intérieur de la ville.

Les infrastructures modernes rapprochent les membres des collectivités et créent des effets d'entraînement dans l'ensemble de l'économie et de la société pendant des générations. Elles sont le fondement de collectivités fortes et d'un Canada fort. J'ai hâte de travailler avec des organisations comme la vôtre dans le cadre de la mise en œuvre de notre plan. ●



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# NEW HEALTH AND SAFETY RULES MAKE ALBERTA JOB SITES SAFER

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**W**orkers now have more rights and protections under Alberta's Occupational Health and Safety (OHS) rules. These rules are designed to prevent work-related injuries, illnesses, and deaths so more workers go home safely to their families at the end of the day.

Employers can learn about the new rules and find information on how to implement them at their work sites online at [alberta.ca/ohs](http://alberta.ca/ohs). The changes cover workplace violence and harassment, joint work site health, safety committees, and more.

Workers now have three fundamental rights: the right to know, the right to participate and the right to refuse dangerous work.

The right to know means workers must be informed of potential haz-

ards and have access to basic health and safety information at their workplace. When workers are informed, they are better equipped to take proper safety precautions.

The right to participate means workers need to be involved in health and safety discussions at their work site. That is why joint work site health and safety committees or health and safety representatives are now required. Work sites with 20 or more workers with work lasting 90 days or more need a joint work site health and safety committee. Work sites with five to 19 workers with work lasting 90 days or more need a health and safety representative.

The right to refuse dangerous work is clear. Employers cannot force workers to do dangerous work and cannot fire or take any other discriminatory action if a worker exercises this right.

Under the new rules, workplace harassment and violence are clearly defined and include domestic and sexual violence. Employers must develop workplace harassment and violence prevention plans and address incidents when they do occur in the workplace.

These rules are in place for a reason. Each year, hardworking Albertans are killed or injured on the job. In 2017, 166 workers died of work-related diseases or in workplace incidents or motor vehicle crashes. In addition, our provincial disabling injury rate rose almost seven per cent. We can and must do better.

In addition to the new rules, OHS recently completed a focused inspection campaign on residential construction work sites. The construction and construction trades services sector has had the highest number of fatality claims accepted by the Workers' Compensation Board every year in the last five years. The focused inspections took place during regular working hours and during evening and weekends during the busy construction season to ensure all work site parties were following the rules.

There are many ways to learn about the new OHS requirements. Go online to [alberta.ca/ohs](http://alberta.ca/ohs) and read the information, download the guides, sign up for webinars or view pre-recorded webinars. If you have questions, please call the OHS Contact Centre at 1-866-415-8690. Together, we can make sure Alberta workers are safe, healthy and treated fairly. ●



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# KEYS TO RESOLVING LOCATING PROBLEMS

By Paul Richard, President, Locate Management

**D**amages to buried facilities resulting from insufficient locating practices can be costly. Statistics gathered from accident files, news reports, and the CGA's Damage Information Reporting Tool (DIRT) Analysis and Recommendations report continue to conclude that locating practices are insufficient.

Locating equipment manufacturers advertise that their products make locating easy and fast. However, the report Encouraging Innovation in Locating and Characterizing Underground Utilities, by the Federal Laboratory Consortium (FLC), concluded "At present, there is no prospect that a tool will be developed in the foreseeable future that can simply and quickly locate and characterize all

buried utilities at a site. In truth, there is little likelihood that such a tool could ever be developed."

We need to recognize that locating technologies are only as good as the human operating them. People are born with the greatest processing mechanism in the world: their brain. However, it's unfortunate that we don't make better use of its power. The best solution for resolving locating problems is, quite simply, adequate education and training.

Despite the extensive network of underground facilities across North America, very few formal education and training institutions specifically address system design, construction standards, plant recognition, advanced locating methods, and problem-solving skills for loca-

tors.

Continuing down the path of minimal education will undoubtedly result in more frequent and catastrophic line strikes.

The CGA Best Practices states that locators are properly trained and that the training is documented. These practices define minimum guidelines and practices for locator training, including the following points:

- Understanding facility records or prints – details shown on records assist locators in determining if facilities shown on records matches those on site. These also should help the locator to determine where to begin the locate. Unfortunately, these typically don't include important information pertaining to obstacles that might affect the locate.
- Understanding construction standards and practices - although this is essential, standard layouts are the exception rather than the norm. Locators need to ask themselves:
  - What type of facility needs to be located? Are these conductive or non-conductive?
  - What construction method was used to install the facility? Was it plowed, trenched, pushed, pulled, or bored?
  - Is the facility in a joint or common trench?
  - What type of ground disturbance



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is to be completed (new construction, horizontal directional drilling [HDD], vertical drilling, leveling, pile driving, anchoring, planting, blasting, stabilizing, auguring, etc.)?

— What safety procedures must be followed when locating around traffic, gaseous atmospheres, electric power cables, or any other hazardous environments?

▪ Equipment training and techniques – these need to include more than what’s provided in an equipment manufacturer’s manual or in a basic locating course.

— The existence of a low-cost, easy and quick to use locating tool that identifies all facilities at any given site does not exist.

— Locators must be able to accurately resolve the position of any facility, even in the presence of other locating obstacles or facilities.

— Signal interpretation can be extremely complex and can result in user defined guessing, which is extremely problematic and just isn’t good enough.

— Locators must know how to select and use the appropriate tools and adhere to safety procedures required to access facilities and connect to or disconnect from these.

▪ Plant Recognition Training – Understanding facility anatomy is necessary because of the complex infrastructure in which locators operate. Just as a doctor needs to understand the human body to make an accurate diagnosis of a patient’s symptoms, a locator needs to understand facility infrastructure to perform an accurate locate. Locators need to recognize and distinguish between different types of pipe and cable materials and other infrastructure (cabinets, vaults, meters, etc.) to per-

form a thorough visual inspection and locate.

▪ Theory of Locating – This should include:

- applying an active signal;
- frequency as it applies to electromagnetic locating;
- how conductor types affect conductivity;
- electrical isolation and bonding;
- why signal distortions occur and how to minimize unwanted coupling; and
- various grounding techniques to create better signals

▪ Daily Operations – Locating involves several processes, including receiving a locate request, gathering and reviewing documentation, and performing, confirming and documenting the locate.



### **Key to Resolving Locating Problems**

Damages to buried facilities resulting from insufficient locating practices can be costly.

Statistics gathered from accident files, news reports, and the CGA’s Damage Information Reporting Tool (DIRT) Analysis and Recommendations report continue to conclude that locating practices are insufficient.

Locating equipment manufacturers advertise that their products make locating easy and fast. However, the report “Encouraging Innovation in Locating and Characterizing Underground Utilities”, by the Federal Laboratory Consortium (FLC), concluded “At present, there is no prospect that a tool will be developed in the foreseeable future that can simply and quickly locate and characterize all buried utilities at a site. In truth, there is little likelihood that such a tool could ever be developed.”



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# Continuing down the path of minimal education will undoubtedly result in more frequent and catastrophic line strikes.

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- Safety Procedures Per Federal, State/ Provincial and Local Laws – Locators are responsible for knowing and adhering to an abundance of regulations, which require facility owners and employers to ensure that locators who work on their behalf are qualified.
- Written and field testing – Written tests must go beyond basic knowledge, and field testing must include pertinent abnormal operating conditions (AOCs). Testing helps to determine a locator’s equipment operation and locating troubleshooting skills.
- Field training – Must validate the knowledge components of training and include:

- recognizing, evaluating, and controlling all hazards associated with the work activities;
  - proper procedures for locating under normal and adverse conditions;
  - observation and positive confirmation training;
  - marking procedures and guidelines.
- As a child, most of us have probably played “connect the dots”. Just as this game teaches number and letter recognition while drawing lines to create an image, locators are expected to connect the dots to form accurate images, while using inadequate equipment, utilizing inaccurate or incomplete records, or having minimal education and training.

- Annual retesting – To substantiate the competencies of the locator and should include both written and field testing.

Clearly insufficient locating practices, as the root cause of many accidents, is a direct result of inadequate education.

Without adequate training, it’s virtually impossible to perform locates with any degree of success and is mission impossible.

As facilities need to be replaced, rehabilitated or maintained, and as new lines are needed to serve new developments, the potential for damage and the value of improved locating grows.

Adequate locator education will enable locators to gather and assimilate information and make informed decisions during the locating process to help ensure public safety by preventing facility damages.

Unfortunately, too many locators “fly by the seat of their pants”, which results in economic, environmental, and human consequences. Stakeholders must ensure that locators are adequately educated and trained in innovative solutions under both normal and abnormal operating conditions.

Adequate education and training are critical for resolving locating obstacles. ●



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# A DAY IN THE LIFE OF A LOCATOR

By Jamie Andersen, First Alert Locating Ltd.

you must plan an efficient and effective execution of the locate orders or it's a ripple effect and your next day quickly gets overloaded. Remembering always that you have deadlines for each locate ticket and going over that deadline could mean an extra-long day, angry clients, unsafe digging practices with potential line hits, reporting and/or fines, and ultimately added stress to your day that you would like to try to prevent.

Calling the client, arranging a meeting time, verifying access to site, driving to site, confirming your work area(s), and researching your maps are all essential steps to organizing each locate ticket. Many times things will not go as planned; distance to the site can be exceptional, work areas can change, clients may not be able meet when you can, you may need special training to enter a worksite, you may need additional equipment to perform the locate, you may need to meet someone for a permit, or an emergency locate ticket diverts your attention...there are many curve balls thrown at you throughout each day's plan. Obviously, delays to your next locate ticket or rescheduling is not always convenient.

Once you finally reach the worksite, have talked to your client, completed your hazard assessment, verified the work area, and completed your research, you begin your locate tasks. Pulling the locate machine out from the back seat, grabbing some marking paint/flags or lathe you set out to identify the underground facilities that could conflict with the work area. With some locate tickets,

you may discover there's nothing to mark; however, in most cases there is. You start out by directly connecting the locate machine to the underground facility you need to locate, and sometimes that can mean walking a good distance to another location. Finally, you turn everything on and start the locate, placing paint marks/flags or lathe crisscrossing the work area. It could be one quick underground line to locate or it can be multiple; either way, this process is followed on each underground facility until you have laid all your locate marks. Some facilities can be easy to mark, and others can take hours of puzzle solving and troubleshooting – paying attention to manholes, accessing basements, interviewing landowners, making ground observations all help in ensuring everything was found. Once that task is finished, you may still need to complete an inductive scan over the entire work area to ensure nothing was missed. Finding something means more investigation and locating. Once you're confident that you are finished your tasks, you fill out the appropriate paperwork and track down your client. A final conversation with the client verifies the locating results and provides them with the proper paperwork to ensure he or she has what they need to proceed. Then, you return to your vehicle and you're off to start the next locate ticket...and the process repeats itself.

As you drive off to the next locate request, you steal a few minutes to eat a snack. You might wonder why this job is so interesting. The challenges of dealing with cold and hot weather, clients, dogs

**W**hether you are working weekdays or weekends, your day as a locate technician starts out like any other workday. Alarm goes off at 5:30 a.m., get dressed, fix lunch, eat breakfast, and head out the door to solve the day's puzzles.

Whether you are a utility or contract locator, your environment may be different, but your responsibility is equally important; locating and protecting the vast web of underground infrastructure just beneath the ground provides an essential step in damage prevention prior to ground disturbance activities. Missing something could potentially mean life or death for an excavator.

Remaining focused, ensuring competence, confirming accuracy, and providing essential communication to your client are your top priority. Reviewing through the locate requests for the day,



in the backyard, tight deadlines, emergencies, navigating difficult terrains, walking miles a day, questioning if you missed something, or working a long day might seem exhausting to others. But then you consider the balance created in knowing the significance of the profession you have undertaken, by the satisfaction in a job well done, the relationships you build with the people you work with, the

freedom of completing your own work independently, knowing that each job is different, the enjoyment of working in the outdoors, and the potential for wildlife sightings. Each night there is a different story from what might have happened that day or something fantastic that was learned. All of these things make your day exciting.

That vast web of underground infrastruc-

ture will always exist. There will always be ground disturbance activities taking place. Whether it's a pipeline installation or a homeowner planting a tree, those underground facilities will need to be located. Therefore, long-term job security is inevitable. This job isn't for everybody, but for those who can see the importance of this profession will have strong motivation to succeed in this type of a career! ●



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# EMBRACING THE SUCK

By John Brix

**M**y portfolio is filled with a very diverse set of careers, and because of that, I can speak firsthand that the most important aspect of fatigue management is cultural management.

How tired, how exhausted or, on the flip side, how awake and energized your workforce is falls completely on the culture your company has cultivated. I will be walking you through my experiences working for different organizations and how those subcultures affected the base of how fatigue was managed.

My first career was in law enforcement, and fatigue management is more of a cultural aspect of “embracing the suck”. Odd shift rotations, continual alteration of shifts to match “the needs of the service” and no real fatigue management program in place are all direct indicators to the culture toward fatigue management in the police service.

We did have “quiet rooms” that we were told was for us to get some sleep in if you needed it, but we all knew that if you

used it, the stigma would be that you are lazy, weak and not part of the team. The rooms were dirty, stuffy, and usually stacked with storage items. Very apparent clues that the rooms were being supplied as a fatigue management tool, but it was more than apparent that using them was not culturally acceptable.

As a cop, functioning off a couple hours of sleep on a regular basis and being awake for more than 24 hours at a time was a regular occurrence. It was a culture of bravado and machismo that took bragging rights on how little sleep we could function on. Yet, it was the highest risk work I have ever done, fatigue was playing Russian roulette with everyone's life.

Oil & gas was a little bit of a better culture because if you didn't get eight hours off between shifts, you were not allowed to work. It was recognized that the level of risk to the worker was increased dramatically with lack of sleep but what isn't recognized is that if someone is feeling fatigued at work, the idea of properly managing that fatigue was not culturally

acceptable. There was no way you could get a brief nap in to feel recharged or thusly safer. It was a culture of “you better go to bed early” at the end of the shift but continue to work at full production while you are here. The oil & gas world had a “cowboy up” culture towards fatigue management.

All the while, the work in the oil & gas industry was fraught with risks and various attention-needed processes. Fatigue could be deadly and costly.

Now working in the construction IT industry, building huge mega structures, there is a culture valuing quality of time, not quantity of time. It's a culture based on understanding that it is not about how many hours you work but what you produce and if you meet your expectations.

We have quiet rooms, sleep pods, and massage chairs. We have an amazing culture where if you choose to get a 20-minute nap in, people commend such self-care. If you are nodding off or looking exhausted, supervisors will tell you to get a recharge in. Fatigue in this industry can be costly, but because it's a culture of peak performance, it recognizes the loss of efficacy that occurs when fatigued.

Now that I have had the chance to experience the difference in true fatigue management, I found an ironic correlation to how the culture toward dealing with fatigue and the level of risk that the work entails. It seems to follow that psychological phenomenon that if people live in an earthquake-prone environment, they focus less on that looming danger. Having such high-risk work seemed to create a culture that we failed to recognize and deal with the increased risk of not being rested enough.

Seeing how fatigue is managed with my

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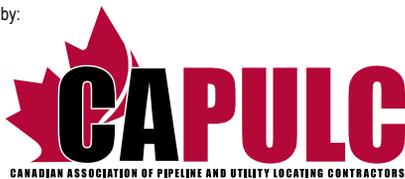
Through shared responsibility among all stakeholders, the CCGA works to reduce damages to underground infrastructure - ensuring public safety, environmental protection, and the integrity of services by promoting effective damage prevention practices.

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Grâce à la responsabilité partagée de tous les intervenants, le CCGA travaille à réduire les bris d'infrastructures souterraines par la promotion de bonnes pratiques d'excavation et de prévention. De telles pratiques permettent d'assurer la sécurité du public, la protection de l'environnement et l'intégrité des services essentiels.

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new employer, many of the preconceived notions I started with when I entered the IT industry changed. I changed my views after seeing how successful it was because of how different fatigue management and productivity culture were. I saw firsthand that part of their fatigue management culture was to manage your fatigue, not simply grab another cup of coffee to artificially stimulate you for the next few hours.

Watching this new culture, I saw that no

one is abusing the quiet rooms, sleeping countless hours away while at work. No one's performance is lowered, and there's a positive gain on production.

All of this is because workers can recover. I have seen how recharged, how engaged, and how energized workers are if they can get a brief moment of rest if they need it.

I feel we need to pay attention to how people's interpretations of risks are shaped by their own experiences, per-

sonal feelings and values, company values, cultural beliefs, and interpersonal and societal dynamics. Through this we can cultivate a new path forward, increasing productivity, increasing worker engagement, reducing worker burnout, reducing the chance of worker injury and liability. With the change of culture, we can finally embrace the idea of true fatigue management.

We need to follow the motto of, "If we talk the talk, we need to walk the walk." ●



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# PROFESSIONAL LOCATORS ARE CRITICAL TO A SUCCESSFUL GROUND DISTURBANCE PROJECT

By Adam Grossberndt, Regional Manager, Alberta Hot Line Inc.

**W**hen I started my locating career, I was led to believe, like most other people, that a locator's job is easy. With only a couple weeks training from my employer, including shadowing a "senior" locator, I was sent out for duty on my own. Over my 15-year career in subsurface utility locating, I have completed tens of thousands of locates, and I've supervised, managed and overseen many other major projects. I've learned that for a ground disturbance to

be successful, industry, and contractors need to recognize two critical components:

1. Choosing a professional locating company that has educated, trained, and assessed their locators to the highest standard is vital; and
2. Locating is part art and part science, that not just anyone can comprehend, or learn without the right training and on going mentoring.

A professional locator will understand the underground infrastructure and use the ideal locating equipment for the job at hand. They need to understand the constant changes of the underground infrastructure and keep up with the advancements in utility locating equipment. Locators must understand that they are a critical component to the safety of our society and thus must approach each locate with the right attitude. For locators to be successful in their careers, they need to have a belief that "excellence is doing ordinary things extraordinarily well."

Accurately pinpointing the location of a target-buried facility requires a very high level of skill and interpretation by the locator. The locator not only has to be trained to understand the locate equipment being used, but to also understand the limitations of their equipment. They may have to choose different tools from their tool box to accurately complete the locate on a given site. Electromagnetic (EM) equipment and other locate technology will all have pros and cons depending on the task at hand. Almost every locate will consist of using multiple tools, frequencies, and locating methods. What works on one site may

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not work on the next. Professional locators need to be trained to adjust, re-think, and tackle the many ongoing obstacles on the fly.

The science behind locating is to understand how the frequencies and current react to all the different conductors buried in the ground. As the “Golden Rule” of locating states, “Always use the lowest frequency that will produce a traceable signal over the distance that is needed to cover.” Professional locators will know that a thorough locate requires the use of multiple tools, frequency selections, and locating methods. Locators need to learn what frequencies and locate methods work best with certain buried facilities and varying site conditions. All frequencies have a certain resistance on each facility that can change from one site to the next.

As the ground under our feet continues to be more congested with buried facilities every day, locating will continue to be more of a challenge. To mitigate these risks and ensure the safety of both the workers and the public, locators need advanced locating training, as well as ongoing mentoring and continued education throughout their locating career. Safety is a shared responsibility, and as such, industry, contractors, and employers must take the critical steps necessary to have a safe and successful ground disturbance project. This means understanding the benefits, as well as the limitations, of the one-call system (notification process).

A locator’s negligence or lack of training could lead to mis-locates which may result in severe consequences, including facility and property damage, injuries, or loss of life. If a locator skips a step, rushes

a locate, or makes an incorrect assumption, there will be a domino effect on everyone else in the ground-disturbance process.

Ensuring the safety of workers, preventing damages, avoiding construction downtime, investigations, redesigns, and eliminating unnecessary hydrovac costs are all good reasons why industry, employers and contractors need to be educated on the value of a second, independent locate. Contractors must do their due diligence to select a competent, professional locator for their ground disturbance projects to ensure thorough locates and accurate information for their projects. Ultimately, contractors need to realize the cost savings and other benefits provided by professional locators, and employers must ensure that their locating crews are competent. ●

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# THE TRUTH ABOUT LOCATING

By Paul Richard, Locate Management

Locators are faced with huge obstacles when trying to locate, mark, and identify buried facilities. Obstacles include technology limitations, inaccurate records, congestion, and various facility materials, sizes, compositions, shapes, and depths.

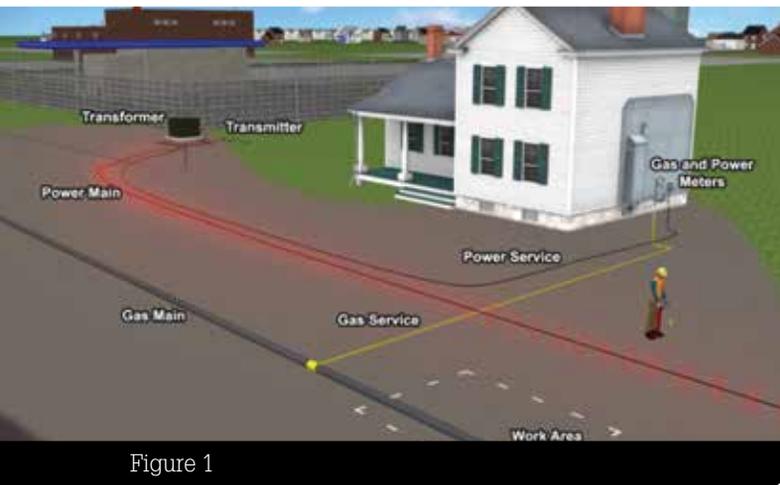


Figure 1

In Figure 1, the transmitter is directly connected to a well-grounded transformer housing (electrical systems in general require suitable grounds for their safe operation).

Because the primary cable is a very conductive material, and because there are no other more conductive facilities near the primary cable, the electromagnetic signal tends to follow the cable with very little bleed off.

This is an ideal situation for direct connection.

Locators also face many locating myths and theories which are hard to dispel. In this article, I will tackle the myth of “direct connection is better than inductive locating.”

Prior to debunking the myth, you need to understand that electromagnetic locators do not locate buried pipes and cables; rather they detect the electromagnetic field or signal generated by an alternating current moving back and forth along buried conductive facilities.

Electromagnetic signals follow the path of least resistance and can (and often will) jump from the target facility to a non-target facility. This is known as unwanted coupling.

Unwanted coupling (aka line jumping or bleed-off) is the most common signal problem. Unwanted coupling can occur where facilities share a common ground, are connected, or are near other conductive facilities. If the signal doesn't follow the intended

target, they will mislead you down the wrong path. This will cause confusion and lead to mis-locates. Unwanted coupling is almost always inevitable; however, the amount of bleed-off can vary significantly.



Figure 2

In Figure 2, the transmitter is directly connected to the gas service. Because the gas and electrical services are both grounded at the house, much of the signal bleeds off onto the electrical service to the transformer and follows the path of least resistance down the shallower, more conductive primary cable. In this situation, the locator mistakenly locates and marks the gas line in the same trench as the primary cable. The Myth: Locators are often told that “you can't perform inductive locates because you will bleed-off onto non-targeted facilities.” Most publications support this premise; for example, the CCGA Best Practices manual states, “the least preferred method is induction... this usually results in a weak signal that will spill to any conductor in the area.”

Even experienced locators have found out the hard way that the “preferred method of actively applying a signal onto a facility is to use direct connection” is not always the best method. Using this method only has led to mis-locates resulting in facility damages far too often. During damage investigations, locators commonly respond to questions regarding mismarked lines with “I must have jumped onto another line.”

**Fact:** When directly connected to a target line, you may not know if you are marking the target line. One thing is true: the signal will always follow the path of least resistance. Shallower, more conductive facilities bonded, sharing a common ground, or near a target facility, will undoubtedly cause bleed-off to non-

targeted facilities regardless of the frequency or output power generated from the transmitter. Although utilizing a low-frequency and low-output power is a good approach, these may not be best for every locate. In fact, each locate will have an ideal frequency and output power.

Although direct connection is an important locating method, locators need to understand that it may not necessarily be the best method in every locate situation. Tracing a signal continuously from the point of signal application does not constitute an accurate locate.

**Truth:** The most important aspect to the success of any locate is to control the signal, which in turn minimizes unwanted coupling. The key to an accurate locate has more to do with the placement of the transmitted signal and not how the signal is applied.

**Fact:** There are limited access points for any direct connection locate; however, there are an infinite number of locations where the transmitter can be placed when performing an inductive locate. To be successful with the inductive method, you must understand the best locations to place transmitter in order to avoid unwanted coupling and to ensure the optimal signal has been applied to the target facility.

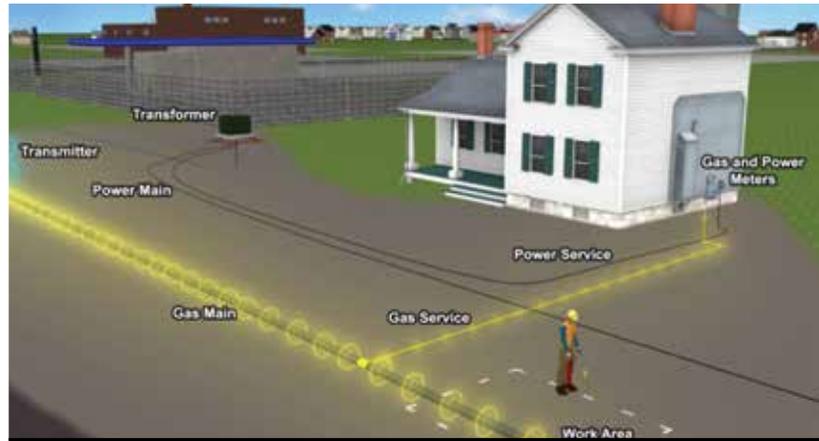


Figure 3

In Figure 3, the transmitter is set to induction and placed on the ground above the gas main. Because there are no other conductive facilities nearby, the signal transfers onto the gas main with very little bleed-off onto any other facilities.

**Conclusion:** With the inductive signal applied away from other conductive facilities, the path of least resistance changes, resulting in less bleed-off, which leads to more accurate locates. This is only one of dozens of locate myths that need to be debunked. Locators need to be adequately educated and trained to have necessary knowledge and skills to succeed in this mythical profession. ●

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# INNOVATIONS IN MAPPING UNDERGROUND INFRASTRUCTURE ON LIGHT RAIL TRANSIT (LRT) PROJECTS UTILIZING NEW INNOVATIVE TECHNOLOGIES IN SUBSURFACE UTILITY ENGINEERING (SUE) ALLOWING FOR ENGINEERS TO PLAN APPROPRIATE INSTALLATION TECHNOLOGIES

By Ophir Wainer and Steve Murphy

## INTRODUCTION

Managing utility relocations typically presents one of the largest risks associated with delivering major capital infrastructure projects. Understanding the locations of all utilities, both above ground and subsurface, using an efficient utility coordination process is the essential first step in managing utility risks. The above-ground utility infrastructure can be quite easily and accurately located and mapped through a topographical survey of the project area. However, accurately locating and mapping subsurface utilities poses a greater challenge. Over the past couple of decades, Subsurface utility engineering (SUE), a discipline of civil engineering, has developed ways to tackle the challenges associated with locating and mapping underground utility infrastructure. SUE can utilize technical means (i.e. geophysical technology) and non-technical means (i.e. historical drawings and records) to gather the subsurface infrastructure information. To ensure consistency and transparency in the SUE industry the American Society of Civil Engineers (ASCE) developed the “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data” (ASCE 38-02), which describes a dependable system to classify the quality of the subsurface utilities mapped on engineering drawings. Based on the importance of accurate utility mapping, this article will briefly highlight the conventional SUE technologies (i.e. electro-magnetic (EM) locating equipment, ground-penetrating radar (GPR) and closed-circuit television (CCTV)) and specifically discuss the innovative SUE technologies (i.e. PANORAMO® manhole scanner, light detection and ranging (LIDAR), closed-circuit television (CCTV) with side launch camera, stream multi-channel ground-penetrating radar (MCGPR) and 3D Modelling). These innovative technologies were employed to gather utility data and then map the subsurface information on two large current Metrolinx transit projects: In addition, this article will delve into the utilization of the SUE information to create accurate 2D maps and 3D models of the subsurface infrastructure and the application of the SUE information to manage the utility

risk through effective utility coordination during the planning and design phases of the LRT projects.

## THE LRT PROJECTS

In September 2008, Metrolinx launched a regional transportation plan, “The Big Move”, which is a 25-year, \$50 billion plan for a coordinated, integrated transportation and transit system in the Greater Toronto and Hamilton Area (GTHA). Two projects that formed part of The Big Move were the Hurontario (HuLRT) and Hamilton (HaLRT) LRTs. The proposed HuLRT project will be a 22-kilometre, north/south LRT line that will be located along Hurontario Street between Brampton’s Gateway Terminal in the north and the Port Credit Go Terminal in the City of Mississauga in the south. It will feature 22 stops throughout the 22-kilometre LRT line. The proposed HaLRT project will be a 14-kilometre, east/west, LRT line that will travel along Main Street, King Street and Queenston Road. It will feature 17 stations from Eastgate Station in the east, through downtown Hamilton to McMaster University in the west. Both the proposed HuLRT and HaLRT routes will be located on existing utility-congested road corridors. The proposed routes required a progressive Subsurface Utility Engineering (SUE) program to accurately locate and map the subsurface infrastructure. To accomplish this locating and mapping challenge a progressive SUE program was implemented utilizing standard and innovative SUE technologies.

## SUE INVESTIGATION

The Technical advisory team hired T2 Utility Engineers (T2ue) as part of the team for the 2 projects. T2ue used a progressive SUE investigation and followed the ASCE 38-02 principles on both the projects. Historical utility drawings and conventional geophysical technologies (i.e. electromagnetic pipe and cable locators, CCTV, GPR) were used as the initial tools in determining the horizontal and vertical alignments of the subsurface utilities along both proposed routes. To augment the conventional SUE geophysical technologies T2ue implemented innovative SUE technologies to give greater certainty to the horizontal and vertical locations of



the subsurface utility infrastructure. These technologies included PANORAMO® manhole scanner, LIDAR, CCTV with side launch camera, MCGPR and 3D modelling. All utility alignments were surveyed, and the information was extrapolated into a composite utility drawing that showed the existing utilities at the appropriate Quality Levels in accordance with ASCE 38-02, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data”. Test holes were conducted at critical locations using vacuum excavation equipment and allowed for precise x, y, z coordinates on key infrastructure.

### **INNOVATIVE SUE TECHNOLOGIES**

Each of the innovative SUE technologies that were implemented, (i.e. PANORAMO® manhole scanner, LIDAR, CCTV with side launch camera, MCGPR and 3D modelling) were chosen for specific reasons for locating and mapping the subsurface utility infrastructure. The following will describe the new technologies, why they were selected and their benefits to the SUE investigation.

#### **PANORAMO® MANHOLE SCANNER**

Both projects contained hundreds of chambers (i.e. manholes). The equipment used to perform the chamber inspections on the two LRT Projects was the IBAK PANORAMO® SI 3D optical manhole scanner. This equipment provided a 360-degree view of the manhole after the inspection. The 3D Optoscanner used two high-resolution cameras with wide-angle lenses, which enabled the scanning of the entire inside of a chamber in one single vertical run. This allowed for both condition assessment as well as identification of chamber dimensions. The 3D point cloud deliverable will allow the end user to measure nearly any feature within the chamber. There were approximately 295 chambers inspected on one and 540 chambers on the second

project.

#### **LIGHT DETECTION AND RANGING (LIDAR)**

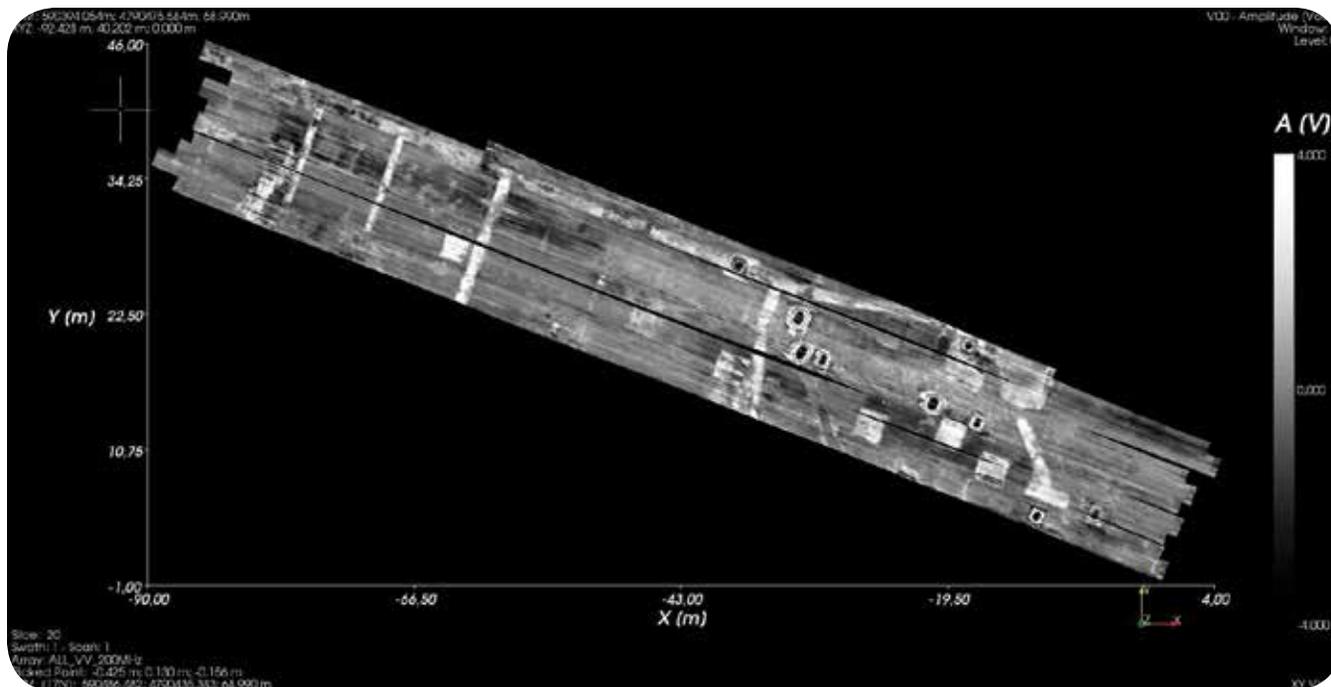
The LIDAR technology optimizes light image objects. This technology acquires 3D point clouds from which realistic 3D models are produced. The data collected with the laser scanner was at survey grade when processed. This data was incorporated directly into the 3D CAD software. The advanced technique of laser scanning was used to survey critical chambers within the projects. This technique gave the project accurate information on the actual size and location of each chamber, which improved the utility coordination analysis of utility impacts on the projects.

#### **CLOSED-CIRCUIT TELEVISION (CCTV)**

CCTV technology has been around for several decades; therefore, it is not considered an innovation. However, in this case it was not the actual technology that was innovative but rather the utilization of the CCTV with side launch camera technology that was the innovative approach. Prior to selecting the locations of the numerous boreholes that were required for the design of the LRT projects, T2ue first used CCTV to locate each sewer lateral then launched the CCTV side camera to map the location of the sewer laterals within the boulevard. After this critical sewer lateral information was identified, the non-conflicting borehole locations were then selected.

#### **STREAM MULTI-CHANNEL GROUND PENETRATION RADAR (MCGPR)**

MCGPR technology is a multi-sensor GPR array that allows for the collection of a large quantity of GPR data both simultaneously parallel and perpendicular to the direction of data collection. For the two LRT projects, an IDS STREAM EM and C MCGPR were used. The STREAM EM utilizes 40 separate channels, with



double-polarized (VV and HH) antennas operating at dual 200 and 600 megahertz (MHz) to cover wide surfaces in a single path. While attached to a vehicle, the STREAM EM can be towed along the road and can be used to pick up large quantities of data with little to no disruption to traffic. The data can then be post processed in the office and used to create 3D models of the subsurface infrastructure. The smaller MCGPR unit, a STREAM C, was utilized for the collection of GPR data in the boulevards. The use of this technology helped to provide additional information regarding not only just utilities, but also some additional hidden anomalies that would have been an unknown with conventional geophysical technologies. Examples of these hidden gems were basements that extended underground into a public right-of-way, and a buried rail line under the roadway. A unique feature of the STREAM EM and C is that a 3D model can be created from the output with minimal data processing. Figure 1 is an example of an output model.

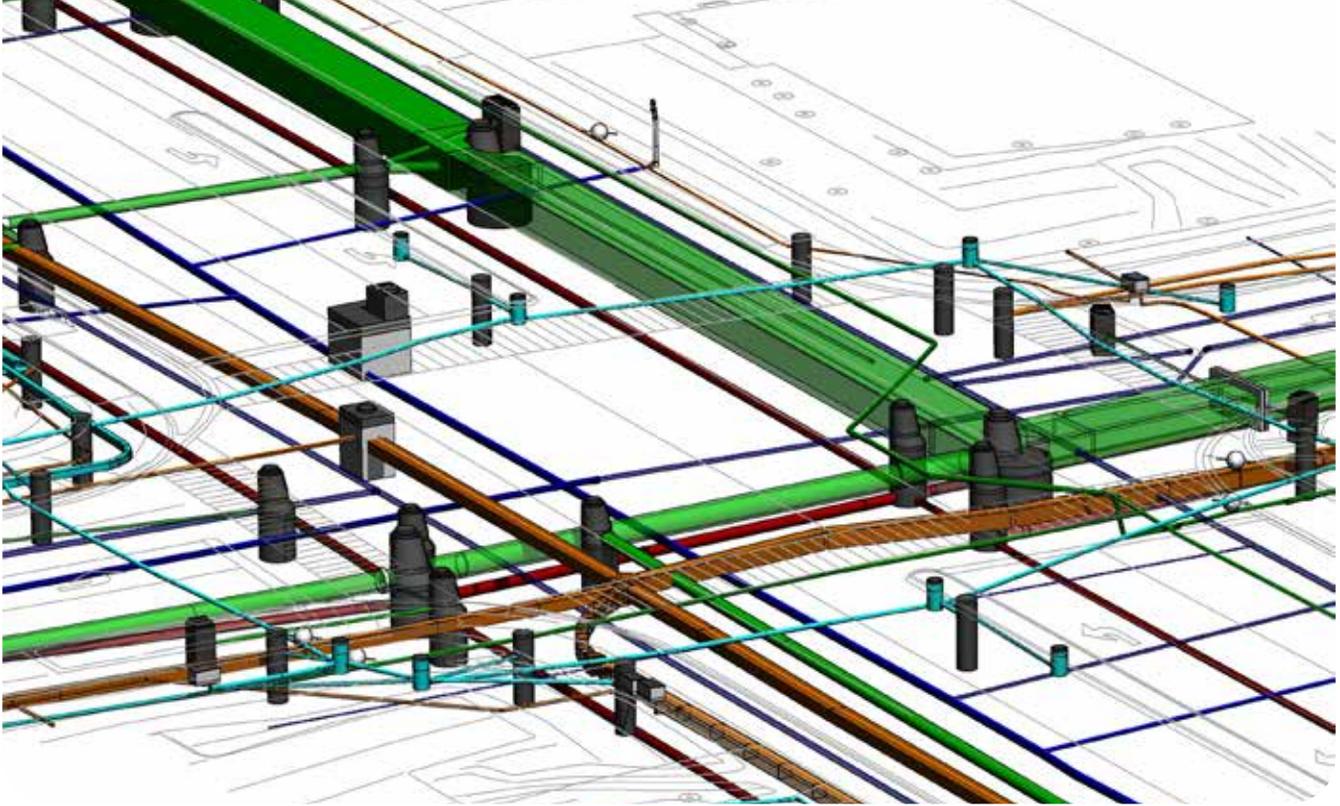
### 3D MODELLING

After compiling the SUE data, T2ue used a Bentley Power Geopak Subsurface Utility software product to generate the 3D models of the existing subsurface utilities for the two LRT projects. The 3D model used various textures and colour transparencies on each of the utility alignments to depict the quality of the SUE data in accordance with ASCE 38-02 (See Figure 2 – sample of 3D model). Some features of the 3D software, which are key to improved utility coordination on the two LRT projects, are a) its utility conflict detection feature, b) its compatibility with the Microstation and InRoads softwares utilized by the Technical

Advisor Consultant, c) its ability to create 3-D interactive PDFs of the model. Firstly, the “utility conflict-detection feature” not only identifies intersecting conflicts but can also flag sub-minimum clearance (parallel) conflicts. This feature aids the utility coordinators in the performance of the utility conflict analysis. Secondly, the software’s “compatibility” with Microstation and InRoads was mandatory as these software programs were utilized on the two LRT projects. Thirdly, the 3D software can create interactive PDFs. This ability allows everyone associated with the project access to the 3D model without having the software installed on their digital devices. Not only staff in the office, but also staff in the field can have a 3D plan of the project that enhances their ability to perceive the utility impacts in the real 3D construction world.

### UTILITY COORDINATION

The 2D composite plans and 3D composite utility model created from the SUE data for the projects were utilized by the project utility coordinators to create detailed conflict matrices. The matrices allowed the team to wisely select strategic test holes at critical locations to improve the accuracy of the subsurface utility infrastructure locations. Once all the test hole information was gathered utilizing a hydro vac methodology the composite utility plans/models were updated. Armed with accurate composite utility plans/models the utility coordinators performed utility impact analyses that resulted in updated, reliable utility conflict matrices. This utility impact analysis is an iterative process as the project design progresses through the Alternative Finance Project process. Having a utility information with greater accuracy was beneficial in the determination of the following:



- Utility relocation tasks required to be completed prior to the procurement of the successful proponent (Project Co.),
- Utility relocations tasks that could not be completed prior to the procurement of the Project Co. but are critical path tasks, and
- Utility relocations tasks that could not be completed prior to the procurement of the Project Co. but are not critical path tasks.

## CONCLUSION

The management of utility relocations is one of the biggest risks on the projects. The creation of accurate subsurface utility drawings using a progressive SUE program following a creditable system of collecting and depicting subsurface utility data, such as ASCE 38-02, is fundamental in the proper management of the utility risk on these two projects. The use of innovative SUE technologies such as PANORAMO® manhole scanning, LIDAR, CCTV with side launch camera, MCGPR and 3D modelling, further enhanced the accuracy of the SUE data used to create SUE drawings and 3D models. Equipped with subsurface utility information acquired with the best SUE technologies, utility coordinators and the design team produced reliable utility documents for the projects' contracts and will have a greater understanding of the true utility impacts on these large transit projects as they progress through the project phases. In light of the proposed large LRT projects across Canada the implementation a progressive SUE program described in this article is crucial in the management of the utility risk and ability to include all factors of design.



*Ophir Wainer is responsible for developing new business and leading the strategic direction for T2ue in major markets across Canada. Ophir has over 20 years of experience in utilities and subsurface utility engineering. He is a member of the CSCE, a board member of the NASTT BC chapter, a member of CATT committees and involved in CERIU. He is an experienced speaker on both subsurface utility engineering and damage prevention and has presented and moderated at various conferences and training seminars.*



*Steve Murphy is a certified engineering technologist with over 28 years of municipal experience. He has been the utility coordination lead on numerous major municipal and transit projects. In his current role at T2 Utility Engineers, he manages our Utility Coordination and Design team. Steve has extensive experience in federal, provincial, and municipal legislations/regulations/by-laws and how the acts/by-laws affect utility construction and operations.*

*He is highly regarded across the country and is currently a member of the OPWA Directors Board and Chair of the OPWA ROW Management Committee. He is also a member of Transportation Association of Canada's Public Utilities Management Sub-committee and a past member of the CSA Z247 – Damage Prevention for the Protection of Underground Infrastructure Technical Committee and the ORCGA Best Practices Committee. ●*



# PREDICTING THE FUTURE

## ATCO uses new risk map to predict where hit lines could happen

By Jenny Le, ATCO

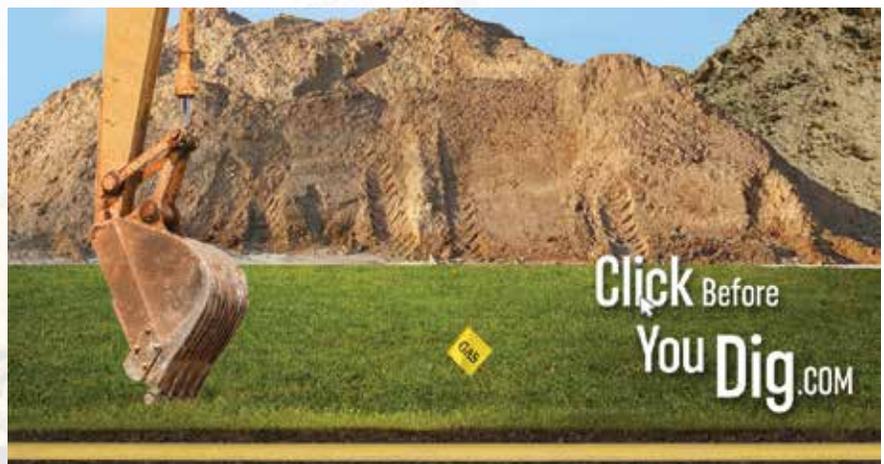
**P**roject delays, outages, extra repair costs, extensive property damage and serious, even fatal, injuries – these are all possible consequences when a natural gas line is hit.

Reducing hit lines remains a top priority at ATCO. In 2017, there were more than 600 underground natural gas hit lines in Alberta. The causes for the hits include lines that were not properly hand exposed (37 per cent) and locates that were not requested (32 per cent). Of the total number of hits lines that occurred, contractors were responsible for 67 per cent.

“Hitting an underground natural gas line is 100 per cent preventable,” said Iain Stables, Supervisor, Damage Prevention at ATCO. “We have a dedicated team that focuses on preventing damage to our underground natural gas lines. We encourage excavators to contact us if they have questions about their locates or want a safety presentation. We’re here to help.”

To help focus our efforts in preventing hit lines, we’ve created a Predictive Hit Lines Risk Map which displays the details of upcoming digging activity next to our facilities. It highlights the potential risk of third-party damage, which allows us to focus on the digging activity that poses the highest threat to our operations. We’re able to reach out to the contractor before they start excavating to educate them on best digging practices and provide answers to any questions they may have. This has helped us build and strengthen our relationships with contractors and focus our efforts on mitigating high-risk damages to our underground natural gas pipelines.

“We receive thousands of locate requests a day for our natural gas distribution facilities,” Stables adds. “It’s important we find ways to focus our efforts on digging activities that have a higher risk of a hit line. This Predictive Hit Lines Risk Map allows us to do that.” ●



# THE TOP FIVE REASONS TO HIRE A PRIVATE LOCATOR (aka Why Frontier?)

Submitted by Kevin Galley, Senior Damage Prevention Technician, Frontier Utility Locating Services Inc., and Stuart Zaltz, President, Frontier Utility Locating Services Inc.

If I've heard it once, I've heard it a thousand times!

"Why do I need a private locator? I've called One-call, and they are coming out to mark my utilities."

Well, the fact is, there is a huge difference in public and private locates. Public locates are completed on behalf of the owner of the utility by the owner's representative in the field. They locate and mark their "owned" utilities on public property and usually mark up to what is known as the "dissemination point." The dissemination point is often a meter, pedestal or large transformer that you may have noticed on your lawn.

On the other hand, private utilities are located and marked by private locators like Frontier. These utilities are most often found after the dissemination point. For example, if there's a pool in a backyard, any electrical or gas lines that are heating that pool are the homeowner's responsibility, as they are on private property. Public locators will not enter your back yard to mark these utilities.

## 1. Unknown location of a known service or privately-owned line.

As an example, you may know of some underground utility on your property – such as a gas line to a barbeque or an electrical line to an out building – that has not been marked by the utility provider but is on private property. A public locator will not mark these lines on private property. Without records, it will go unnoticed unless a private locator is called in to investigate.

## 2. Private locators will enter buildings in attempts to identify and trace all utilities (not accessible from outside).

As private locators, it is incumbent on us to account for all utilities going in and out of buildings. Since buildings are generally private property, a public locator will not enter the premises to trace utilities.

## 3. We utilize specialized equipment/systems to aid in the detection of underground assets.

Simply put, we have specialized equipment at our disposal, such as ground-penetrating radar and electromagnetic and magnetic surveys to help us find subsurface features such as buried tanks, barrels, contamination plumes, septic systems, and foundation remnants.

## 4. We perform exterior and interior locates and scans.

Depending on the type of work being completed and the features a client wants, we have

scanning equipment that enables us to find conduit, rebar, concrete slab thickness, etc. underneath floors or even on walls.

## 5. Our employees have seen it all!

As private locators, it is general practice to locate all private utilities when on a site. If it's buried or overhead, we've probably located it. Our locators are trained to identify all utilities. And in our case, we are always on a path to zero damages.

At Frontier, our mission is to make sure that our staff, our clients and their field staff, and anyone working with us, go home safely every day; that what we deliver to our clients is second to none; that our clients will want to work with us as much as we want to work with them; and most importantly, that we treat everyone with the same measure of respect that each of us deserves. ●

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# MOTION CANADA: YOUR #1 SOURCE FOR AERVOE INVERTED MARKING PAINT – CANADA WIDE!

By Burk Urmetzer, Product Manager, Motion Canada



**M**otion Industries (Canada) Inc. is a proud distributor of Aervoe Inverted Paint products. Our vast network of branches throughout Canada is comprised of 55 locations in Canada, from Vancouver Island to the Maritimes.

Our extensive network across Canada allows large inventory volumes, so that we can ship product daily to most regions in the country for next-day delivery. Our network brings the product closer to you, our customer, so you can deal directly with your local branch, thus avoiding lengthy delivery times and costly freight charges. See our location chart for a branch near you.

Aervoe Survey-Grade Solvent-Based Inverted Paint is a superior upside-down marking paint designed for survey marking. It provides the best quality paint in terms of color visibility, retention, and durability.

- Mark will last up to six months
- Non-freezing
- Operational to 14°F (-10°C)
- H.D. = high-delivery (30 per cent greater than other colors)
- Colors meet standards set by OSHA and APWA/One Call Systems

Aervoe Survey Marking Paint is the best marking paint of its kind. It is packaged in a can that is operated only in an upside-down position. It provides exceptional quality in terms of initial color brightness, color retention, adhesion, durability, and color consistency. It's formulated with superior-quality raw materials to meet the requirements of the most demanding professional.

Although the optimum operating temperature

range is 50°F to 90°F (10°C to 30°), the product contains a freeze-point depressant that allows it to function with a reduced delivery rate down to 15°F (-10°C).

**Benefits:** Colors meet standards set by OSHA and APWA/One Call Systems. It is not affected by moisture or water and it will not wash away once dry. It may be used with the cap on in Aervoe applicators #244/245. The spray-through cap eliminates accidental discharge. Each can is non-clogging and empties completely. The high-delivery (HD) tip-and-valve system offers expeditious product delivery, which saves time and provides better coverage than regular delivery products. Regular colors will last up to six months, and fluorescent colors will last three to six months, depending on traffic and exposure.

**Uses:** Designed to adhere to most surfaces, including pavement, gravel, and soil. It's ideal for use in surveying, utility identification, and other long-term marking applications. This product is not recommended for use on short-cut grass such as golf course greens.

Motion Canada can also supply you with a full line of field, safety, and industrial equipment, along with a variety of value-added services. But our primary focus in the field-supply segment of our business is to become the premier Canadian supplier of inverted paint, stake flags, and lath to the underground line-locating industry. Visit [MotionIndustries.com](http://MotionIndustries.com) and see our vast offerings.

Motion Canada is a proud member and supporter of CAPULC, and we look forward to working with our line-locating customers.

Motion Canada: your one-stop source for paint, stake flags and lath! ●

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# MAKING YOUR MARK

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**E**xciting times we are in today, where safety is more than a word, it's a practice we're all vested in. The concerns we have in today's market and workplace can be costly if we aren't educated in new ways to apply safe practices. More important is that we need to take steps to ensure that our crews, employees, and customers are equipped properly and effectively to be safe and efficient.

In our last article, we shared the five steps to the best lath, so why now are we talking safety? We believe that quality lath goes hand in hand with workers' safety.

As your lath manufacturer, our focus is to provide you, our customer, with the best material for you and your staff. Our goal is to over serve you, to build relations with you, to deliver our products to you wherever you are, whenever you need it, and with an easy to order system. Let us work hard to earn your money that you are working hard for.

Safety starts with us! We at Dan the Stickman have set up safety procedures within our manufacturing process, as we value safety for all our employees. This is something our whole team are conscious of to make sure that safe workplace practice is implemented for your workers.

The quality of our product is at the highest standard, with several controls in place to ensure that our product sets the standard in the lath industry. We have a established a Quality Control team that tests the product at all points of the manufacturing process. We understand that it's important to have a strong lath to reduce the need to go back to get more sticks due to breakage and, more importantly, that your staff are not getting hurt due to low-quality lath. We believe it is our responsibility to give you the best stick to make your mark in the safest way possible.

We have a variety of products available at different price points, so before you make a purchase, we have set up a customized qualifier to ensure that we will provide you with the stick that will take the hit for the right job. We aim to understand how our lath can best serve your project at a price point that works for you.



At Dan the Stickman, we've received feedback on common injuries to the hand and have created a tool that will improve the safety for your teams. We call it a DTS (Dan the Stickman) Hammer. It's a slide hammer that fits over your lath, and with the kinetic energy of the downward thrust, it will hammer your lath safely and effectively down into the ground with a metal sheath that protects the worker. (See photo) Look for a video on our website ([www.danthestickman.com](http://www.danthestickman.com)) and on our Facebook (Dan the Stickman Ltd) explaining and demonstrating the DTS Hammer and how to use it. Orders of four or more pallets of lath will receive a complimentary DTS Hammer. [CODE: DTS Hammer. Valid until April 30, 2019.]

Here is a summary of five main things to look for in the right lath for your project:

1. Moisture: moderate, not wet to the touch, but not dry enough to be brittle.
2. Colour: white wood is a healthy colour with spruce, mature and tight straight grains.
3. Width: Less than ½ inch diameter knots to no knots.
4. Straight and solid stick, no bowing or twisting.
5. No cracks or splits.

The Dan the Stickman team is here to serve you. We are honoured to serve those who change the world one stick at a time, as you make your mark in the world.

So, let's work together safely and go make your mark! ●

# Your All-In-One Solution

By Lance Norman, President,  
LN Land Development Technologies Inc.

LN Land Development Technologies Inc. (LN) is a surveying, engineering, and locating company with offices across Alberta, from Fort McMurray to Edmonton, Lacombe and Calgary.

Starting out as a construction surveying company in Fort McMurray, Alberta, LN has grown and acquired other long-serving land surveying businesses in Edmonton, Lacombe and Calgary. Through this growth, LN has greatly benefitted from the knowledge and experience gained from new offices and team members. LN has been able to expand our service lines to include legal land surveying, underground facility locating, inspection services, 3D scanning, and machine control support to offer an all-in-one combined solution to our customers.

Since conception, LN has maintained its company vision of striving to be the easiest to work with and the most progressive company it can be. Thirteen per cent of LN's business comes from locating services, making it an integral part of what makes LN a full-services company. To support our wide range of clients, LN has invested heavily into the latest locating equipment and technology.

Locating services vary greatly based on the geographical location and surrounding industry, but the most common variance is client preference. Locates can be provided as field sketches, digital sketches, GPS tie-ins, or any combination of the three. Having the experience allows us to switch easily between client requests, from the simple one-project locates to providing cm tie-in accuracies for ground disturbance program projects.

Providing a comprehensive, start-to-finish list of services is how we ensure LN completes the project on time and efficiently. LN is continuously adding new services to our team roster, and LN has added new services – ground-penetrating radar (GPR services) and concrete scanning – to our integral Locating Division.

With the continuous development of our services line-up, LN's is working hard to provide our clients with the top technical services for surveying, engineering, locating, inspections and 3D-scanning services. Staying relevant with technology can be challenging, which is why LN believes in developing innovative work strategies and investing in employee's in-depth knowledge of the industry's most advanced equipment. Working with the right employees builds an environment for growth and progress, and LN is proud to employ over 200 technical employees across Alberta. ●



LN Field crew sketching his locate in the field.



LN concrete scan of a concrete building floor



LN on an industrial site in Northern Alberta providing Ground Penetrating Radar services



LN providing GPR services on a concrete floor looking for Waterlines & conduits

# INDEX TO ADVERTISERS

Alberta Hot Line.....	25	Key Point Resources Ltd.....	22
Alberta One-Call Corporation .....	14	Lawson Consulting & Surveying Ltd. ....	10
Canadian Common Ground Alliance .....	8	LN Land Development Technologies Inc.....	OBC
Canadian Locators Inc. ....	13	Locate Management .....	27
Cansel.....	4	Motion Industries (Canada) Inc. ....	35
CCGA Damage Prevention Symposium .....	21	Northern Lights Locating / Blohm Contracting Ltd.....	20
CGA 811 Excavation Safety Conference & Expo.....	15	Quest Line Locators Ltd. ....	6
Elite Line Locating Ltd. ....	5	Schonstedt Instrument Company.....	11
First Alert Locating.....	19	T2 Utility Engineers .....	24
Frontier Utility Locating Services Inc.....	33	Tierra Geomatic Services Inc. ....	13
Fuji Pipe Locators.....	16	True North Damage Prevention Services.....	23
Guye's Backhoe Service Inc.....	7	Vivax Canada Inc.....	17
IVIS Construction .....	IFC		



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