

THE LOCATOR

2020



**CAPULC'S FIRST ANNUAL
LOCATE RODEO IS
A BIG SUCCESS**

**HIGHLIGHTS FROM
THE 2019 AGM AND
SAFETY CONFERENCE**

**THE MYSTERY OF THE
"NON-LOCATABLE" PIPE**

**WHAT IS THE
COST OF SAFETY?**



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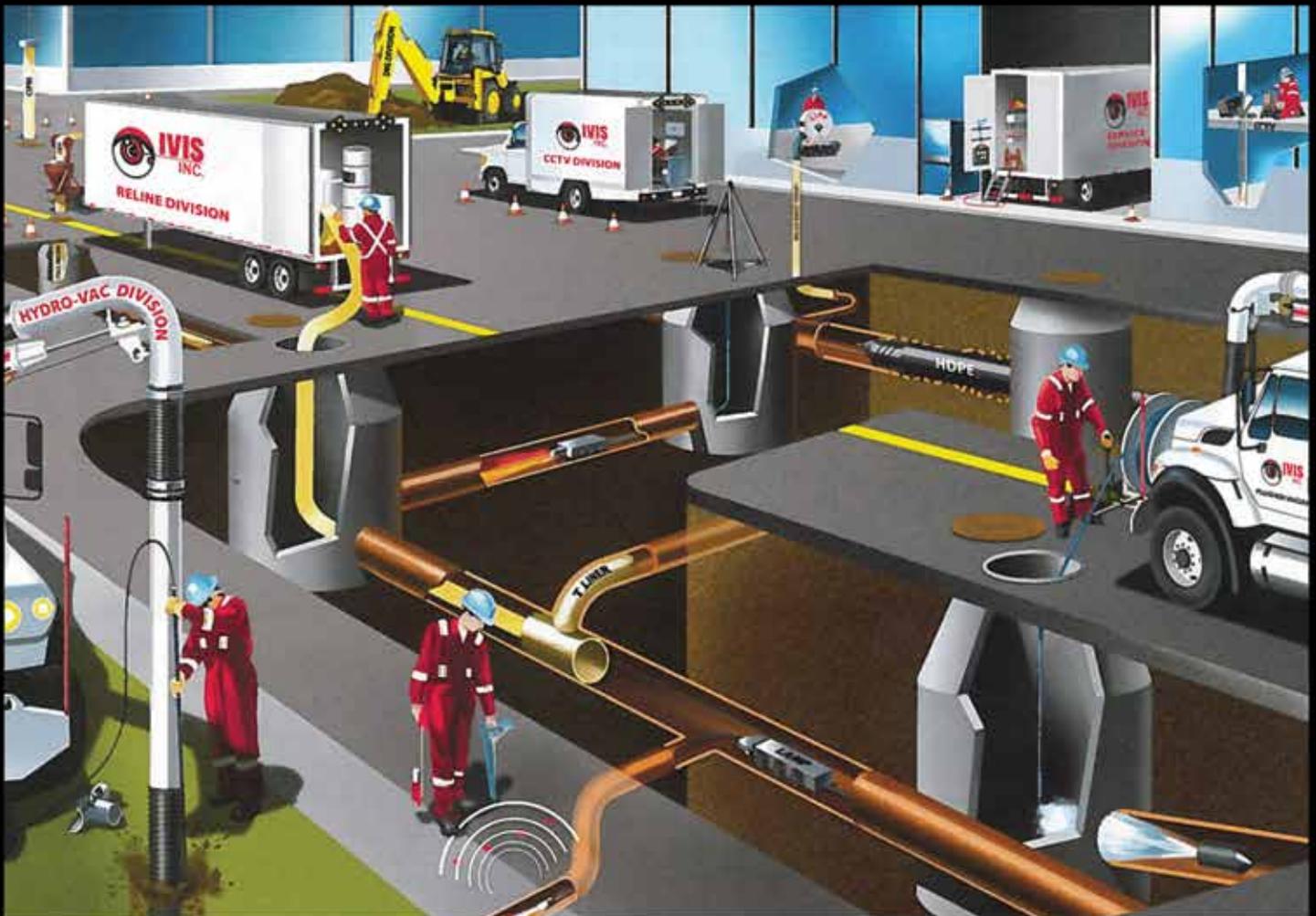
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Message from the president of CAPULC

RANDY PALANIUK



Good day to all friends in the line locating and damage prevention field. Throughout this issue of *The Locator*, you will find many useful topics at your fingertips. We hope you find the content useful, and interesting.

AGM

Our 2019 Annual General Meeting, Safety Conference, and inaugural Locate Rodeo was held April 17th and April 18th at Festival Place in Sherwood Park, Alberta. The event was a big success, and we had great attendance from a diverse group of people in the industry throughout Canada.

Special thanks go to our Gold, Silver, and Bronze Sponsors, as well as all our event sponsors; your support and contribution helped make the conference and rodeo a fun and successful event. We hope you found value in your sponsorship and hope you'll join us next year!

I'd also like to thank all the exhibitors who showcased their products and answered questions from attendees. I appreciate it very much your sharing your time with us.

Thank you everyone for a successful conference – from the facility staff to the guest speaker and workshop presenters, from the exhibitors to the band. I hope you all had a chance to make and renew connections and have some fun. I look forward to seeing you all at next year's AGM in Red Deer, April 24th.

LOCATE RODEO

Our very first Locate Rodeo was held in conjunction with the AGM, and it was a great success. It was a chance for everyone to showcase their knowledge and skills, have a good time and learn a little something.

We had many entries for the Rodeo that represented the Contractor Locators and the Third Party/Private Locators in our competition. Congratulations to the winners! Your names will go on our trophy as the "First Rodeo Winners of 2019", and it will be posted on our website for the world to see. Thank you to all participants.

Thanks to the Locate Rodeo Committee for doing an outstanding job. I appreciate everyone's time and effort in planning and organizing our first event.

Many individuals and companies gave their time and resources behind the scenes – including the numerous volunteers, judges, marshals, scorekeepers, companies that prepared event site, and St. John's Ambulance for their first aide attendants (thank goodness we didn't need them!). The payoff was huge.

The Rodeo was a big success, and I'm already looking forward to our next one!

MEMBERSHIP

With each year, our membership is growing as we are making great strides to "provide leadership, promote safety, and work to enhance the value and reputation of the underground facility locating industry in Canada".

With nearly 100 members who support us, CAPULC is continuing our work as the Canadian voice of the industry. We are always looking for opportunities to expand our membership – through our website and this magazine, for example – and your ongoing support and feedback are always welcome.

On that note, I'd like to thank everyone for their contributions to *The Locator*. We aim to give readers the answers and information they need with each issue, and we hope you enjoy reading them.

I'd also like to welcome Wendy Gibbons, who recently joined CAPULC as Administrator on November 1st. Wendy comes to us with a degree in Communications and extensive administration experience. I'm sure you'll hear her friendly voice or see her face soon, so feel free to say hi.

We hope you enjoy reading this publication and that you can apply the content to your locating and/or otherwise damage prevention responsibilities.

Stay safe out there! ●

Randy Palaniuk, NCSO
CAPULC President

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

Thank you for the invitation to once again contribute a message to *The Locator*. As Canada's Minister of Infrastructure and Communities, I am honoured to be able to speak directly to – and hear from – our partners who work so hard to help make our country's infrastructure strong and resilient.

The work you do is crucial to ensuring Canada's locating industry remains among the safest, most efficient, and most respected in the world. The important role you play in keeping Canadians safe cannot be understated, as it is the

foundation of our current and future communities.

Infrastructure is truly the backbone of our country. It supports Canadians in getting to and from home, work, school, and their loved ones safely; provides clean drinking water; and, facilitates trade through safe and modern roads, ports and bridges. In addition, the development of responsible social infrastructure supports our urban, rural, and indigenous communities.

That is why our government continues to work closely with our provincial, ter-

ritorial, municipal, and other partners to invest more than \$180 billion in communities across the country through the *Investing in Canada* plan. I am pleased to report that communities big and small have already benefited from more than 48,000 projects representing approximately \$42.3 billion in federal investments from coast to coast to coast.

Some of the gains Canadians have realized through the plan include accessible, efficient public transit, which gives more Canadians even more opportunities to learn new skills, start new jobs, or grow their businesses. Better housing and cleaner drinking water are improving the lives and health of all Canadians, including Indigenous peoples, rural Canadians, and new Canadians young and old. As work begins on some of the larger, longer-term projects, we will be looking to you, our pipeline and utility locating contractors, for your valuable expertise in delivering high-quality infrastructure to ensure Canada remains competitive in the 21st century and beyond.

I have had the pleasure of hearing from many Canadians from all walks of life, and one message continues to resonate loud and clear: communities know what modern infrastructure they need to succeed, and it is our job to help them build it. We cannot do that without your help.

So let me take this opportunity to thank you for your continued support, and here's to another very successful year of working together as we continue to implement the *Investing in Canada* plan. ●

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L'honorable

FRANÇOIS-PHILIPPE CHAMPAGNE, C.P.,

député Ministre de l'Infrastructure et des Collectivités

Merci de m'avoir invité à contribuer de nouveau au magazine *The Locator*. En tant que ministre de l'Infrastructure et des Collectivités du Canada, je suis honoré de pouvoir m'adresser directement à nos partenaires et d'entendre ce qu'ils ont à dire. Ils travaillent très fort pour rendre les infrastructures de notre pays solides et résilientes.

Votre travail est essentiel pour faire en sorte que l'industrie canadienne de la localisation de canalisations et de services publics demeure l'une des plus sûres, des plus efficaces et des plus respectées dans le monde. Le rôle important que vous jouez pour assurer la sécurité des Canadiens ne peut être sous-estimé, car il constitue le fondement de nos collectivités actuelles et futures.

Les infrastructures sont vraiment l'épine dorsale de notre pays. Elles aident les Canadiens à se rendre à la maison, au travail et à l'école, à rendre visite à leurs proches et à rentrer à la maison en toute sécurité; elles fournissent de l'eau potable propre et facilitent le commerce

grâce à des routes, des ports et des ponts sûrs et modernes. De plus, le développement d'infrastructures sociales responsables soutient nos communautés urbaines, rurales et autochtones.

C'est pourquoi notre gouvernement continue de collaborer étroitement avec nos partenaires provinciaux, territoriaux et municipaux, ainsi qu'avec nos autres partenaires, pour investir plus de 180 milliards de dollars dans les collectivités du pays dans le cadre du plan *Investir dans le Canada*. Je suis heureux d'annoncer que les collectivités, grandes et petites, ont déjà bénéficié de plus de 48 000 projets représentant des investissements fédéraux d'environ 42,3 milliards de dollars d'un océan à l'autre.

Profiter d'un transport en commun accessible et efficace figure parmi les gains réalisés par les Canadiens grâce à ce plan. Cela donne à un plus grand nombre de Canadiens encore plus d'occasions d'acquérir de nouvelles compétences, de commencer un nouvel emploi ou de faire croître leur entreprise. Disposer de meilleurs logements et d'une eau potable plus propre améliore la qualité de vie et

la santé de tous les Canadiens, y compris les peuples autochtones, les Canadiens des régions rurales et les Néo-Canadiens, jeunes et moins jeunes. À mesure que les travaux commenceront dans le cadre de certains des grands projets à long terme, nous nous tournerons vers vous, nos entrepreneurs en localisation de canalisations et de services publics, pour tirer parti de votre précieuse expertise dans la mise en place d'infrastructures de haute qualité afin que le Canada demeure concurrentiel au XXI^e siècle et au-delà.

J'ai eu le plaisir d'entendre de nombreux Canadiens de tous les horizons, et un message continue de résonner haut et fort : les collectivités savent de quelles infrastructures modernes elles ont besoin pour réussir, et notre devoir est de les aider à les construire. Nous ne pouvons y arriver sans votre aide.

Permettez-moi donc de profiter de l'occasion pour vous remercier de votre soutien continu. Souhaitons-nous une autre année de collaboration très fructueuse alors que nous poursuivons la mise en œuvre du plan *Investir dans le Canada*. ●



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HI EVERYONE

I want to take this opportunity to introduce myself. My name is Wendy, I started with CAPULC on November 1, 2019, and I cannot believe how quickly the month flew. I am very excited to work in this capacity challenging my technical skills with our website, being given marketing opportunities to build our membership and sponsorship, and to help facilitate the next and upcoming AGM conference and rodeo event in 2021. I'm looking forward to working with the association's board of directors, but I consider all of the association's members and sponsors as part of my larger team, and everyone plays an integral role in our success. Please reach out to me if you have any questions or just want to maximize your membership with CAPULC. I can answer your questions and guide you to utilize the tools and find the information you may be looking for. We are always open to suggestions and ideas too!

A little about myself... I was born and raised in Saskatoon, moving west like the majority of those who are now Albertans. I love

Alberta and the opportunities it offers – like being close to the lakes and mountains. Being an avid hiker and kayaker, I plan to be on the various lakes around Calgary most weekends once the ice starts to melt. In the colder weather, I try to urge on my creative side by designing jewelry from semi-precious earth stones. You will also find me walking down every aisle of every craft fair that takes place within a 100-mile radius. During my career, I have worn many hats and have extensive administration experience honing my skills and assets. I consider myself to be a lifelong learner, and I'm presently working on my bachelor's degree in communications. Why communications, you ask? My kids tell me it's because I like to talk, but I think it is because I enjoy meeting individuals from all walks of life and hearing their stories; we all have one.

Please do not hesitate to call and introduce yourself or just call to chat!

Wendy Gibbons ●

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CAPULC's 2019 AGM and Safety Conference

Featuring Informational Workshops and Our First National Locate Rodeo!

CAPULC has had a very successful and exciting past year. Along with our AGM Safety Conference, we included our inaugural Locate Rodeo. The association represents organizations involved in the gas distribution, petroleum, telecommunication, electric, transmission and city utility fields as well as the locating, surveying, and ground disturbance industry sectors – this event was the place to be heard, network, learn, and collaborate with over 200 attendees and 21 exhibitors! Through the hard work and help of our sponsors, members, administration, and the board of directors, we were able to offer presentations touching on the importance of health and wellness, as well as workshops challenging us to learn about the latest technologies and new and exciting products available within our industry. It didn't end there: 21 trade show exhibits demonstrated leadership and highlighted commitment to advancing the locating and digging industry, bringing suppliers and clients closer together. There was also the rodeo competition that showcased the underground facility locating profession and the outstanding professionalism, knowledge, and skill required to do the job. Of course, we have to mention the delicious food and toe-tapping entertainment provided over the two full days. Our networking event was set off by a live performance from one of Edmonton's newest party bands – Stiletto.



LET'S TALK BUSINESS

The 2019 Annual General Meeting was held on April 17, 2019 at Festival Place in Sherwood Park, Alberta. At this year's AGM, we welcomed two new directors, Brad Gowen from Oakville Enterprises Corporation (OEC) and Lance Norman from LN Land Development Technologies, who join current board members Randy Palaniuk (President), Jamie Anderson (Vice-president), Cody Stocks (Treasurer), Iain Stables (Secretary), Paul Richard (Director), and Dave Cook (Director). Log in to your membership profile to see the minutes on the CAPULC website at www.capulc.ca. This information is proprietary to the association and its membership. Applications and information to become a member can be found at www.capulc.ca.

SPEAKER PRESENTATIONS

This year's event was extended into two days and focused on the worker – the most valuable asset in the locating industry. This topic started with the opening presentation "JUST Stay Safe" with Mona Bartsoff, Corporate Communications Advisor with FortisAlberta and Chair of the Joint Utility Safety Team (JUST). JUST is a joint endeavor between Alberta's electric utilities FortisAlberta, EPCOR, ENMAX, ATCO, and AltaLink, with contributions from local municipalities committed to providing the locating industry education, safety awareness, and resources to keep Albertans safe and "in the know" by promoting power line safety. You can find more information on JUST at wherestheline.ca.

Important messages were delivered by all the presenters on the first day of the conference: Jeff Bradshaw with Cannabis Learning Series; Neil Harris with Alberta Health Services; Peter Sun with Sensors & Software Inc.; and Kassi Zaba with Alberta One Call. We are grateful they were able to be with us for this event.

John Brix, health and safety executive and this year's keynote guest speaker, delivered his philosophy of "Worker Fatigue – why it is a leading contributor of workplace accidents." Coming from a career as a police officer who was with the services training department and who gained training and instructor certification from the FBI, John gave us an in-depth look at the three categories of fatigue and how each relates to injuries in the workplace.



INFORMATIONAL WORKSHOPS

The second full day of the conference featured new and updated technology that was brought into the workshops. Many of our guest speakers have traveled all over Canada and some of them have travelled the world to deliver seminars and field training. There were five workshops offered throughout the day, including “Locating Obstacles and Problem Solving”, “Locating Plastic Underground Utility Lines without Tracer Wire”, “Mapping and GIS”, “Locating Utilities with GPR”, and “New Technology and Trends in the Locating Industry”. All of the topics contained prudent information and hands on demonstrations for all attendees. The topics were incredibly relevant to the audience, and positive remarks were heard while attendees had the opportunity to question the speakers afterward.



NATIONAL LOCATE RODEO

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. The rodeo took place on the second day of the conference, where locators competed showing their competency and skill. All competitors had a great time exhibiting the dedication and efficiencies required by the industry. The awards were categorized into two classifications: Facility/Contract Locators Competition Event and Third-party Locators Competition Event. Plaques were awarded for 1st, 2nd and 3rd places, and the winners are to be engraved into our event trophy.



Facility/Contract Locators Event

- 1st Place - Joey Proud, Promark-Telecon
- 2nd Place - Jason Gollert, Consolidated Utility Services
- 3rd Place - Nicole Caisse, D A Hassall Inspection Services

Third-Party Locators Events

- 1st Place - Danny Dupont, Tierra Geomatics
- 2nd Place - Jennifer Hewison, DGC Contracting Inc.
- 3rd Place - Frank Breen, IVIS Construction Inc.



This event required a number of volunteer judges, marshals, scorekeepers, and working committee members to operate such a busy event. St. John’s Ambulance was even able to assist us and provide two first aid attendants to ensure safety on the grounds. We appreciated the time everyone contributed.

EVENT SPONSORS

Sponsorship is one of the most effective ways to brand your organization as a leader and to highlight your commitment to advancing the locating and digging industry. The support we received through exhibitors and event sponsors, members and non-members was overwhelming, and we would like to send out accolades to all who contributed to the success of this year's conference. Thank you!

This year's event supporters included:

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This was a huge endeavour, and everyone deserves a big pat on the back for making this conference and rodeo a big success! The feedback and positive comments we received will definitely ensure that our future events work to enhance the value and reputation of the underground facility locating and ground disturbance industry! Stay tuned for our AGM announcement, already in the works for April 2020, and keep an eye out for possible Locate Rodeo plans in 2021! ●



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Upcoming Events - Mark Your Calendar!

WHAT: CAPULC'S 2020 AGM AND SAFETY CONFERENCE

WHEN: April 24, 2020

WHERE: TBA

WHAT: CAPULC'S FALL MEMBER MEETING

WHEN: October TDA, 2020

WHERE: TBA

WHAT: OCEANIA DAMAGE PREVENTION CONFERENCE

WHEN: November 18-20, 2020

WHERE: Sydney, Australia

WHAT: ORCGA DAMAGE PREVENTION SYMPOSIUM

WHEN: February 11-13, 2020

WHERE: Blue Mountain, Ontario

WHAT: EAPUOC SAFETY SEMINAR AND TRADE FAIR

WHEN: TBA, 2021

WHERE: Edmonton, Alberta

WHAT: NAOSH SAFETY SEMINAR AND TRADE FAIR – NAOSH WEEK 2020, MAY 3, 2020 - MAY 9, 2020

WHEN: TBA, 2020

WHERE: Grand Prairie, Alberta



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CCGA DIRT Report Estimates Damage to Buried Utilities Continues to Cost Canada at Least \$1 Billion Every Year

Mike Sullivan, President, Canadian Common Ground Alliance

In October, the Canadian Common Ground Alliance (CCGA) released the 2018 Damage Information Reporting Tool (DIRT) Report in Niagara Falls, Ontario during its annual National Damage Prevention Symposium. This report presents characteristics, themes and contributing factors leading to damages in Canada as reported via the DIRT system.

In 2018, there were 11,693 damages reported via DIRT for Canada – on average, 47 reported damages per workday (assuming 254 workdays per year). The societal cost of these damages to underground infrastructure in Canada continues to be estimated at least \$1 billion per year.

Among all damage reports with an identified and known root cause, 22 per cent occurred because no locate request was made to a One Call Centre, and 38 per cent were the result of insufficient excavation practices.

While reporting damages in DIRT is voluntary, the data is critical for the CCGA to determine root causes and develop mitigating measures to reduce and eliminate them.

HIGHLIGHTS:

- 11,693 damages voluntarily reported in 2018 – 2.6 per cent higher than 2017.
- 47 damages occurred per workday.

- 22 per cent of damages are the direct result of not making a locate request to a One Call Centre.
- Damages cost Canadians \$1 billion annually

The complete 2018 DIRT Report is available to download at www.canadiancga.com. Stakeholders interested in submitting data to the 2019 report, or establish a Virtual Private Dirt account, should visit the DIRT website at www.cga-dirt.com.

The Canadian Common Ground Alliance (CCGA) is a non-profit organization dedicated to enhancing public safety and increasing the integrity and reliability of Canada's underground utility infrastructure through the development and imple-

mentation of effective and efficient damage prevention practices across Canada. As Canada's unified voice on damage prevention, the CCGA attracts members from all Canadian national organizations and associations who share common damage prevention and public safety solutions. The CCGA and its regional partners welcome all stakeholders who wish to be part of the identification and promotion of best practices that reduce damage to buried utilities. ●



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Locating Plastic Underground Utility Lines without Tracer Wire

By Gary Mason, Underground Damage Prevention Specialist, Linestar Utility Supply Inc.

This business of locating is tough...sometimes it's downright impossible. Anyone who has picked up a locator has figured out that we're looking for magnetic fields that emanate from around a conductor that has some kind of signal introduced to it, whether it's passive (60Hz., radio frequency and cathodic) or active (locatable frequency from a transmitter). For any of this to work, when we apply a signal to something, it has to be conductive. A conductor is a material which gives very little resistance to the flow of a current. For example, copper is a great conductor. Plastic is not conductive at all. This is why a good number of utility providers will install copper wires (or tracer wires) with their plastic pipes. So we're locating the electromagnetic field coming off the tracer wire, and if it's buried close to the plastic pipe, we can infer that we know where the utility is. Easy, right?

What if there is no tracer wire buried with the plastic utility? Not so easy.

There have been some great advancements in regard to non-conductive pipe locating. This article explores only a few of the methods.

1. WITCHING

For the purpose of science, let's just acknowledge that the art of witching (or dowsing, diving, rhabdomancy, etc.) is just that: an art. It is a pseudoscience. It works for some people, but not all. Yours truly, for example, doesn't have "the mojo". I'm not going to discount it, but when I ask locators that do claim to have the mojo, the welding rods are never the first tools out of the truck. So I'm not going to discuss it any further in this article.

2. ACOUSTIC METHODS:

Long ago, when everything was metal, to locate sewer or water pipes, they used to bang on a fire hydrant with a hammer, creating a vibration that was audible and could be traced for a considerable distance, depending on soil conditions and depth, etc. Today, there are manufactures that mimic that vibration by introducing a tapping pulse, either into or up against the pipe wall. The locator then



uses very sensitive listening devices that detect that particular sound. However, that signal is greatly affected by ambient noise, such as traffic or even footsteps. Some customers have also complained that this pulse has shaken the pipe joints loose and actually created leaks. As you might have guessed, there are better ways to locate pipes.

3. GROUND PENETRATING RADAR (GPR)



A GPR unit sends radar signals into the earth and measures, in microseconds, how long it takes to rebound off something and return to the unit. It looks a bit like a lawn mower that the operators work back and forth in a crisscross pattern. The image it produces is a two-dimensional cross section of subsurface items. In short, it's displaying any changes in density, including PVC pipes or other objects. In the past, these images were very difficult to read, but newer software can convert the raw field data into 3D images, making analysis much easier. The GPR signal doesn't work in all soil conditions though. The radar signal gets absorbed by wet soils (like sand or clay) and won't reflect at all in standing water. Some of these units can cost \$50,000, which could make them cost-prohibitive.

4. ULTRA-HIGH RADIO FREQUENCIES

Much like the above mentioned GPR, this sends signal into the soil and measures how long it takes to get back to the surface, only it uses ultra-high radio frequencies. Unlike the GPR, this technology functions well in wet soil, snow, clay, and standing water. The operator slowly sweeps a hand-held locator over the ground and reads lights that indicate an edge or a change in density, like a trench, pipe, or objects such as roots, rocks, concrete, fibre-optic cables, etc. This requires some unique processes, and the learning curve could be extremely high.

A conductor is a material which gives very little resistance to the flow of a current. For example, copper is a great conductor. Plastic is not conductive at all. This is why a good number of utility providers will install copper wires (or tracer wires) with their plastic pipes.

5. ELECTROMAGNETIC CONDUCTIVITY (EM)

EM locators detect electromagnetic signals radiating from metallic cables and pipes, not PVC. Some manufacturers have developed a fiberglass rodder with a copper wire at its core that then gets fished inside a pressurized PVC pipe through a coupling with a neoprene washer. Once this rod has been pushed out, a signal from a transmitter is applied to this copper wire, energizing the rod inside the pipe, where a receiver set to the same frequency can detect it on the surface. If the rodder is big enough, the entire pipe can be traced and marker continuously from above ground by one person without the need to disrupt service. This system is good up to 125 psi and is relatively cost-effective for locating plastic water and/or gas lines. Its limitations lie within the rods length and if there is a viable entry point.



5.1 SONDE:

A *sonde* is a French word for probe or beacon. They come in various sizes depending on pipe diameter and depth and can be pushed/pulled through a pipe. It works in tandem with an EM locator. A sonde will emit a specific frequency that can be traced above ground as it moves through the pipe. This is usually a two-person job but might be the most cost-effective method.

Once you have successfully located your PVC pipe, now what? Most utilities either have or are moving toward implementing a GIS mapping system. As technology surges forward, so do

the advancements in accurate and reliable GPS maps. These maps are scalable in dimension using satellite maps, local photos and reference notes that indicate locations in relation to surrounding objects. Most modern locating manufacturers integrate some form of Bluetooth connectivity to a stand-alone GPS unit.



Combining these features with RF marker ball technology finishes the project up nicely. The addition of the new marker balls installed during, or after construction, provides additional functionality by enabling facility data to be stored in the marker ball to ensure positive identification of pipes. The pre-programmed, unique serial number integrates with back office mapping and GIS systems when used for mapping new and legacy assets, and points of special interest for construction and maintenance applications.

Once the pipes are in the ground, they rarely ever move again. And if they're properly located, identified, marked, and plotted, the world is a much safer place for everyone. The key is finding the right mix of technology and equipment to make your job easier and with better results. ●

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Mystery Solved: The “Non-Locatable” Pipe Located

GPR locates a PVC water pipe

By Greg Johnston, Product Manager, Sensors & Software Inc.

It's no secret that there's a tremendous amount of infrastructure buried under our feet. Knowing where services are located is an ongoing challenge given the rapid rate at which installations are taking place.

Ground-penetrating radar (GPR) is a proven, cost-effective solution to help locate buried utilities. GPR excels at locating not only metallic but also non-metallic utilities that cannot be found using traditional electromagnetic (EM) methods; these utilities are often referred to as “non-locatables.”

For years, a building manager at a company headquarters in Germany had known that a water pipe was running into their facility but hadn't been able to locate its exact whereabouts.

Locators using traditional EM technology tracked the pipe to a certain point, where it then appeared to end abruptly. A valve had reportedly been installed to allow for the pipe to be drained; however, none of the locators could find it. They concluded that the original

contractor had switched from metal pipe to PVC pipe during the installation. Since EM technology relies on objects being metal to trace them, the PVC section of pipe was not locatable. The building manager recognized that it was a maintenance concern and made one final effort to locate the pipe and valve by calling in a GPR expert.

The contractor used an LMX200™ GPR system for this project. As the operators were surveying the area with the GPR (Figure 1), they encountered several different utilities, each appearing as the classic hyperbolic-shaped GPR response. To ensure they were indeed tracking the water pipe, they moved to the area where the pipe was found using EM methods and crossed it using GPR. On the screen, they noted the depth of the pipe and how the hyperbola appeared in the GPR data. They proceeded to search the area, focusing on responses at that approximate depth and for hyperbolas that looked similar.



Figure 1: When utilities can not be located through traditional means, locating professionals bring in the LMX200™ to get the job done.



Figure 2: Survey path of the GPR as it crossed the pipe, shown as pink dots.

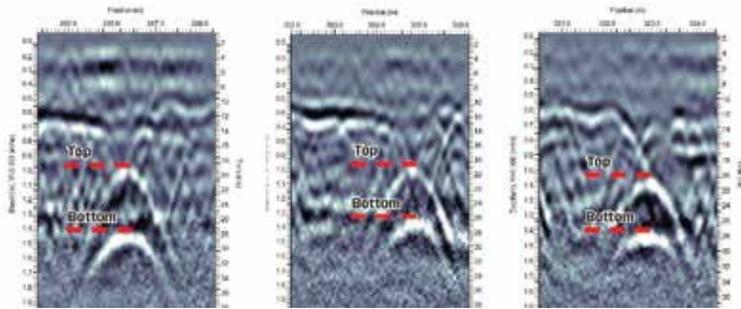


Figure 3: Each crossing of the pipe shows two hyperbolic responses, aligned vertically. This indicates the pipe is non-metallic.

Data was collected in a zig-zag pattern crossing over the buried pipe (Figure 2), with lines about one metre apart. As the pipe was identified in the data, the locations were marked on the ground using flags. The path of the pipe was determined by “connecting these dots.”

The Line Scan data is shown in Figure 3. Each image is a traverse crossing the pipe at 90 degrees.

There are some features worth noting in the data:

- The pipe is at approximately one metre (3.2 feet) deep.
- There are two hyperbolas, one above the other. The top hyperbola is caused by the GPR reflection from the top of the plastic pipe; the lower one is from the bottom of the plastic pipe. (Note

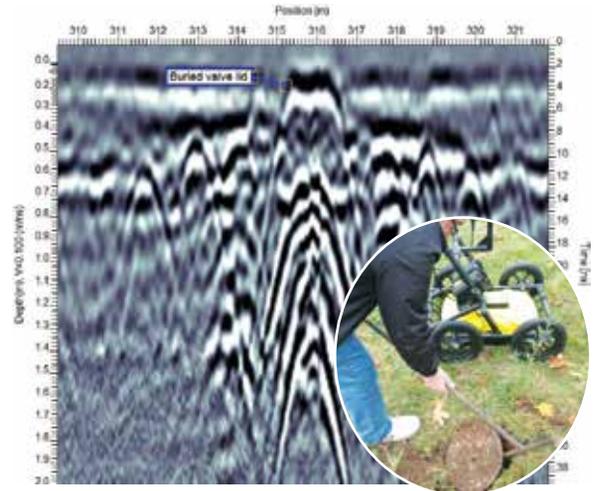


Figure 4: The LMX200™ located the buried water valve, which was subsequently uncovered to drain the pipe.

that the bottom of the pipe is clearly visible because the pipe is non-metallic and water-filled, creating a distinct pipe-bottom response).

After tracking the pipe, the GPR arrived at the valve and showed exactly where they needed to excavate.

GPR was able to successfully locate and map the entire path of the water pipe – both the metallic and the PVC sections – right to the buried water valve lid, enabling them to drain the water pipe.

The building manager was pleased to have located the route of the pipe and the position of the valve. GPR provided valuable information to allow for scheduled maintenance on the pipe and to ensure this pipe is avoided during future upgrades to the facility. ●

Empowering safe construction and sound design

What you need to know about Subsurface Utility Engineering (SUE)

By Kevin Vine, President, multiVIEW Locates Inc.



More and more, medium-large scale construction projects are implementing the practice of Subsurface Utility Engineering (SUE) at the design phase to reduce risk and save on long term costs. SUE is an engineering practice that makes it possible to more accurately establish the location of buried utilities within a project area. This provides a foundation for decision-making around construction design, allowing a designer to make important decisions related to utility coordination, utility accommodation and utility relocation at the outset.

And the gains are real – the Ontario Sewer and Watermain Contractors Association, in collaboration with the University of Toronto, commissioned a study that determined for each dollar spent on SUE for construction projects, \$3.41 was saved.

WHY SHOULD I INCORPORATE SUE INTO MY PROJECT?

Simply put, Subsurface Utility Engineering cuts project risk and eliminates surprises at later stages of a project. It also saves

money. However, not all SUE programs are created equal, and there are key considerations involved to ensure that risk is effectively managed and a return on investment is realized. To help you achieve success on your next project, we've rounded up these considerations:

WHAT EXACTLY COMPRISES A SUE PROGRAM?

SUE is based on the CI/ASCE 38-02 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, which provides a framework for evaluating the integrity of data based on four Quality Levels:

Quality Level D (QL-D): Information derived from existing records or oral recollections.

Quality Level C (QL-C): Information obtained by surveying and plotting visible above-ground utility features and using professional judgment to correlate this information with the results of QL-D.

Quality Level B (QL-B): The application of surface geophysical methods to determine the existence and horizontal position of subsurface utilities within a project's limits. Non-destructive technologies including ground-penetrating radar (GPR) and electromagnetic (EM) tools are leveraged at this stage to accurately detect conductive and non-conductive underground assets.

Quality Level A (QL-A): Also known as daylighting, QL-A provides the precise horizontal and vertical location of utilities along with type, size, condition and material, obtained by exposing the utility, usually through vacuum excavation.

DO I NEED TO APPLY ALL FOUR QUALITY LEVELS?

Where a topographic survey exists that was recently completed by an engineer or Ontario Land Surveyor (OLS), QL-C can typically be considered complete as surface utility data is captured during the topographic survey. Topographic surveys and base plans should always be supplied to the SUE service provider at the project kick off meeting. The service provider will then correlate the topographic survey with information collected at the QL-D stage, to develop a starting point for the field investigation. Insights gleaned from combining these two datasets will allow the investigation to be targeted and precise.

What is most important is that Quality Levels be carried out in their prescribed order – QL-D, QL-C, QL-B, QL-A. This is the most effective strategy for minimizing risk and avoiding rework. QL-D and QL-C should be applied to the entire project area including areas not expected to be affected by future construction, (e.g., temporary staging areas) whereas QL-B can be targeted to the impacted area. QL-A investigations are required when depth data or precise horizontal location must be obtained to achieve project goals. QL-A should also be considered when the results of a QL-B investigation appear to be conflicting with existing utility records in key project areas.

HOW DO I CUSTOMIZE A SUE PROGRAM FOR MY SPECIFIC REQUIREMENTS?

The SUE scope of work can vary greatly from project to project, and there are some key considerations for defining the scope of work. Ask these questions at the outset, and you'll be able to tailor a SUE program to your project-specific requirements:

1. What are the potential project risks associated with utility location information? Will utilities be involved directly or indirectly with the project?
2. What level of utility information should be obtained to adequately manage risks such as project cost overruns, construction and design delays, stakeholder impact, etc.?



3. At a project level, is there evidence to suggest the presence of buried objects or subsurface infrastructure?
4. Do the existing records contain inconsistencies? Is there evidence of additional utilities or buried structures not on record?
5. If utilities are not in the exact location as shown on the records, what risk might this pose to the project?
6. Will the project involve excavation and if so, what is the depth?
7. Is information on the vertical position (depth) of subsurface utilities or buried structures required to minimize risk or will information on the horizontal position suffice?
8. Is the project high risk for utility conflicts with existing or future utilities? e.g., new bridge construction or bridge widenings where footings are placed; projects involving daylighted utilities that will clearly conflict and require rework; excavation projects, particularly tunnel/grade separations where there is a conflict.

WHAT SHOULD I THINK ABOUT IN TERMS OF SCHEDULE?

There are several factors that can affect the SUE schedule which should be considered in relation to your project's overall timeline. Examples of these factors include:

- Requesting data acquisition activities that reside outside the scope of SUE which may result in project delays. For example, chamber investigations may require traffic control, night work, special permits and on-duty police scheduling and fees.
- Other activities occurring on the project site, for example, topographical surveying, geotechnical or environmental assessments. Be sure to assess subcontractor project schedules for potential site access conflicts.



- The location of the SUE investigation. If the investigation occurs within a rail or congested vehicle corridor, traffic control and closures may be required. If, however, the investigation is related to a boulevard or private construction land, there will be far fewer time constraints.
- The time required to review QL-B data and schedule test pits. Determining the necessity, quantity and location of test pits usually occurs after reviewing the completed QL-B investigation and subsequent CAD utility drawing.

WHAT TECHNOLOGY SHOULD BE APPLIED?

The CI/ASCE 38-02 Standard stipulates that “appropriate geophysical methods” be leveraged to carry out the Quality Level B

aspect of a SUE program. As this is a generic statement, there is room for interpretation. The geophysical method that is primarily leveraged to carry out the Quality Level B aspect of a SUE program is Electromagnetic (EM) Induction – otherwise known as pipe and cable locating. This technique is extremely effective at locating utilities comprised of electrically conductive material or those that contain an intact tracer wire.

When data collected at the QL-D and QL-C stages of a SUE program reveals a likeliness that non-conductive utilities reside on the project site, such as concrete or plastic pipes, buried trunk sewers, etc., other methods can be leveraged to supplement the SUE scope of work such as Ground Penetrating Radar (GPR) which is highly effective at locating non-conductive buried assets.

WHAT DELIVERABLES SHOULD I EXPECT?

SUE deliverable formats can vary greatly based on project specifications. Municipalities, for example, each have their own CAD standards, and CAD drawings are submitted through the municipality’s quality checker: a software tool that scans the submitted drawings to ensure they comply with the requirements of these standards.

Considerations for deliverables will include: whether data is to be reflected on separate layers or a single layer, labelling con-

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ventions, CAD software format (MicroStation or AutoCAD), digital submissions vs. hard copy, colour conventions, etc. The SUE report format may also vary based on whether the Project Manager desires photographs of test pits, test pit sketches, field sketches of utility locations, etc. When it comes to SUE deliverables, there's a lot of room for customization to meet the unique needs of the project. Having said that, deliverables should always be overseen and stamped by a Professional Engineer.

WHAT SHOULD I LOOK FOR IN A SUE SERVICE PROVIDER?

The right certifications. SUE service providers must have a Certificate of Authorization from the Association of Professional Engineers of Ontario (PEO). As SUE involves geophysical activities, it is recommended, but not mandatory, that the service provider also have a Certificate of Authorization from the Association of Professional Geoscientists of Ontario (APGO). A Professional Engineer is required to approve, sign and seal SUE deliverables and a Professional Geoscientist oversees geophysical activities that comprise the SUE scope of work, for example, the application of Ground Penetrating Radar (GPR) and subsequent analysis of GPR data.

Relevant experience. SUE service providers should have experience locating all utility types required within the impacted area and also have verifiable experience completing projects

of similar size and scope. Expertise in a range of technologies is required – electromagnetic induction, ground-penetrating radar (GPR), sonding, surveying, Global Positioning Systems (GPS), geographic information systems (GIS), etc. Certifications to look out for include Damage Prevention Technician (DPT) certification, and relevant safety certifications, including First Aid, WHMIS, Confined Space Entry (CSE), Confined Space Rescue, and Working at Heights, to name a few.

Advanced experience with Ground Penetrating Radar and related technologies. Where non-conductive utilities and features are believed to be within the project area, such as plastic, fiber optic, cable TV lines, water and concrete sewer lines, foundations, ducts, and chambers, expertise in the application of GPR is key. GPR data can yield a cross section of subsurface utilities and can also be depicted three dimensionally, providing data on the actual depth of utilities.

The ability to innovate when challenges arise. As SUE projects vary greatly in size and scope, unique and unexpected challenges can arise. Many variables can affect the ability to collect data such as broken tracer wires, soil conductivity, or the presence of water that makes it difficult to achieve a signal. It's important to partner with a service provider that has experienced these challenges before and can innovate to overcome them. ●



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Underground infrastructure protection ... Make the difference!

Preventing damage to underground infrastructure begins with clear and precise planning and coordination. Project owners and project engineers therefore play a major role in protecting these critical infrastructures

Provided by Info-Excavation

In recent years in Quebec, more than *five breaks per day* have been listed! Of this number, year-round, around 30 per cent was attributable to the lack of localization requests made to Info-Excavation.

Nearly 70 per cent of the breakdowns are connected to sewer/aqueduct and street/road works. Despite being major work, 15 per cent had not been the subject of a location request. These breakages are easily preventable!

In Quebec, according to an estimate by the CIRANO research group^[1], the breakdown of underground infrastructure has an annual socio-economic cost of over \$120 million. Major impacts for all Quebecers and the various municipalities.

PLANNING THAT MAKES THE DIFFERENCE

The prevention of damage to underground infrastructure is of interest to all concerned stakeholders, from the client to the excavator. However, work planning, done according to the rules of the art, will always be the best way to avoid breakage.

PLAN REQUEST

A request for a plan from Info-Excavation is a simple, quick, and free way to know the location of the underground infrastructures of the different network owners who are members of the site of future works. This information should be available from the outset for tenderers. In addition, this would avoid additional costs and delays.

AVOID THE SURPRISES OF THE UNDERGROUND

The planning of the works very often goes through clear calls for tenders specifying from the outset what is hidden under the ground. All project owners and municipalities should include clauses that help prevent damage and reduce risks to

the safety of workers and the public. Among these clauses, it should be required of the contractor:

- a location request is made to Info-Excavation, and
- that exploration wells be made in order to properly locate the underground infrastructure before mechanically digging on either side of them.

Info-Excavation has designed – in collaboration with many professionals and experts related to the protection of underground infrastructure – the *Guide for tender writers including excavation work*, which can be downloaded free from <https://www.info-ex.com/en/>.

THE IMPORTANCE OF BEING WELL EQUIPPED

Damage prevention also involves a well-trained workforce that is aware of the reality of underground infrastructure. Info-Excavation offers free 3.5-hour training recognized by the Ordre des ingénieurs du Québec and Emploi-Québec for planners, municipal employees and contractors. A clause requiring this training should be included in the call for tenders.

INFO-RTU, A PLANNING TOOL OF CHOICE

Newly accessible for the entire province, the Info-RTU platform aims to optimize planning and coordination of work between different users of the public right-of-way. As a municipality, you know the planned projects in your area. How is this information presented to you today? Do not settle for partial, incomplete information or from various sources – demand Info-RTU! This is an opportunity for you to know and announce new projects. In 2019, Info-Excavation will deploy new features on Info-RTU to facilitate the transmission of information between users.

WORK RESPONSIBLY AND SAFELY

From the beginning of the excavation work, many measures

can be put in place to reduce any risk to the safety of workers and citizens in addition to avoiding damage to underground infrastructure.

A LOCALIZATION REQUEST AVOIDS MANY HEADACHES

A simple, free and essential step in the chain of damage prevention is to make a location request with Info-Excavation before the execution of the work. In planning mode, this step should be included as a requirement with contractors who will do your work.

BREAKS EASILY AVOIDED

Each year, nearly 50 per cent of the damage is caused by poor excavation practices. This confirms the importance of using safe and gentle excavation techniques in the work zone near the underground infrastructure. These techniques include, among others, vacuum excavation and hydro-excavation. In addition, exploration wells (also known as exploratory cuts or test cuts) should be made to visually identify underground infrastructure.

ACT AS OWNER OF RESPONSIBLE INFRASTRUCTURE

Municipalities also have important underground infrastructure that must be protected. It is therefore essential that they

have up-to-date mapping of their network and in accordance with recognized standards (*CSA S250-F11, Mapping of Utility Underground Infrastructure*). Up-to-date mapping minimizes the risk of damage and provides planners/designers and contractors with accurate and accurate information.

DAMAGE PREVENTION, A SHARED RESPONSIBILITY

In summary, the design and planning of the project, the call for tenders, the consultation with Info-Excavation, the respect of safe digging practices, the development of an appropriate cartography as well as an effective awareness are as many inter-related steps essential to the damage prevention process.

Municipalities, by virtue of their roles as project owners, excavators, and infrastructure owners, have the power to make a difference in the risk of damage in Quebec. Info-Excavation is your partner in preventing damage to your infrastructure. ●

^[1] CIRANO: Interuniversity Center for Research in Analysis of Organizations

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What is the cost of safety?



By Adam Blanchard, President & Founder, Safe Locate Solutions; and Dean Paquette, Vice President, Safe Locate Solutions

Three weeks. It took three weeks, 21 days on a six-day-a-week work schedule. Twelve hours a day with a crew of over a dozen workers and a bill for equipment and Hydrovac services that was growing exponentially. It took all that to find a line that wasn't where it should have been, where we were told it was.

"Three weeks."

That's what was said when we finally found the live, high-pressure gas line we had been searching for.

We had followed the rules, procedures and our respective companies' policies.

We went with what we had, and what we had was obsolete.

Paper locates from a pipe set soil 15 years ago in an area with renown movement.

We used the most up to date (for its time) technology and the accepted method to

locate buried facilities, and still it took three weeks.

We were embarrassed and more so shockingly frightened.

We weren't frightened at the possibility of losing our jobs due to the time it took. No – we were frightened by the harsh reality. When we did finally locate the line, it was nowhere near where the historic documentation that was provided to us dictated it to be.

It was nowhere near where the ground-penetrating locating wand said it was numerous times. It was nowhere near where any locate company, client, or government-regulated association believed it to be.

It was located inches, not feet, but mere inches away from a farmer's fence post. A post that a farmer followed the same exact procedures as we did to ensure that the ground beneath him was clear of any lines.

Clearly it was not.

It took us three weeks on that job to realize someone, a very real person with friends, family, and loved ones, almost lost their lives by following the accepted and only method of procedures for locating underground buried facilities.

All for a fence post.

Three weeks.

Welcome to Safe Locate Solutions.

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of safety for workers and quality of information accessible to frontline field personnel.

The current accuracy of survey within millimetres is well-established; however, the sum of all the time and money spent on survey programs still equates to painted marks on the ground. A simple spray-painted mark on the ground is all that is left for field excavation personnel when arriving to new sites. It's time for a paradigm shift.

Safe Locate Solutions ensures our clients are efficiently investing resources while keeping their workforce safer and more informed than ever before.

Our product can be placed on new and existing facilities. A pipeline or facility captured with our service will provide a significant return on investment for our clients offering dividend returns in the way of safety and cost savings for the service life of the facility. In addition, we offer not only a product, but a full-range of services aimed at designing seamless deployment packages to suit our clients' organizations.

Safe Locate Solutions can provide on-the-ground and on-location training – a service to show your company representatives and employees on how to get the most out of our service.

Whether you are exposing for an inspection or excavating for a repair, no longer will you have to rely on the uncertainty of outdated methods. No longer will your company have to margin expenses for days, if not weeks, of water wash excavating. Above all, no longer will you be compromising the integrity of your company, the environment and most importantly the safety of your workforce. You will be setting the bar for safety by leading

the way with a proactive approach and doing so with integrity.

We have the solution for your future needs. We have the solution to your future corrective actions.

Do not be the centre of a reactive conversation; be the approach to the proactive lead.

What is the cost of safety?

I often wonder what that farmer would think – three weeks or three inches?

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Mandatory Web Locate Requests for Contractors and Members

Mike Sullivan, President, Alberta One-Call Corporation

As of September 16, 2019, all Contractor and Member locate requests must be submitted online. Following a three-month grace period, this mandate will be enforced January 1, 2020.

BACKGROUND

Locate requests submitted by phone are more likely to result in damage to underground infrastructure due to challenges associated with verbally relaying the precise location of proposed excavations. When a locate request is placed online through the web portal, however, precise dig site information is drawn on a map by the excavating

party and relayed directly from them to the utility owner and/or their locating crew eliminating verbal description and interpretation challenges. In relation to this, Alberta One-Call Corporation examined all damages to underground infrastructure in Calgary and Edmonton between June 2017 and May 2018 and concluded a significantly higher rate of damage, respectively in those cities, when locate requests were submitted by phone rather than the web.

EXCEPTIONS

Emergency and homeowner locate requests, and locate requests placed by

satellite phone for ground disturbances in locations where there is no cellular service, are exempt from this rule.

SHIFTING FROM "CALL" TO CLICKBEFOREYOUDIG

The majority of contractors and members have already shifted the locate request process to the web. In June 2019, 90 per cent of all locate requests from contractors and 93 per cent of all locate requests from Alberta One-Call members were submitted online.

If you have any questions about the changes, please send them to info@albertaonecall.com. ●



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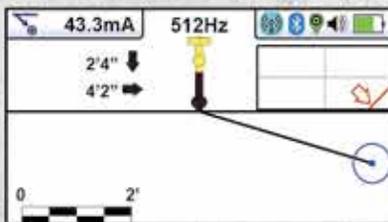
vLoc3-Pro Receiver

- Color-coded EM distortion warnings
- Offset vector locate mode
- Optional receiver/transmitter link
- Cloud-based data warehousing
- Internal data logging
- Optional Bluetooth connectivity



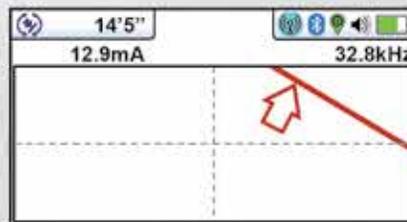
vLoc3-5000 Receiver

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- Distortion Alert assist in recognizing signal bleed-over
- Offset vector locate mode
- Optional receiver/transmitter link
- Cloud-based data warehousing



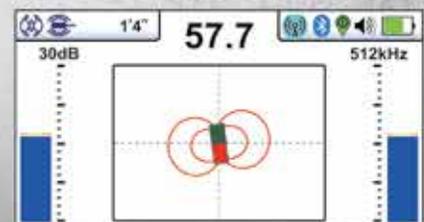
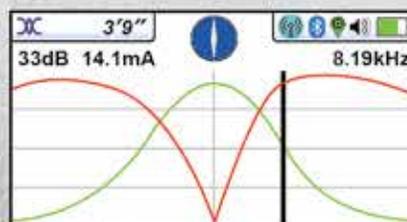
^ **Vector Locate** - shows orientation, line position, and distance relative to the locator in 3D

> **Transverse Plot Screen** - is used to display the peak and null to compare distortion shape



< **Plan View Screen** - displays the theoretical line in 2D from above ground in omnidirectional mode

∇ **Sonde Screen** - arrow guidance showing direction to the sonde and depth of cover



Call us for your no obligation on-site demonstration!