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811: ONE-CALL BEFORE YOU DIG

The Development and Future
of Damage Prevention Efforts



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Introduction

Helping make the unseen seen: That is the challenge of the Call Before You Dig program. Because of the proliferation of *undergrounding*, there are well over 20 million miles of pipelines, cables, water and gas mains, wires, and more just beneath America’s surface.^{1, 2, 3} Every day, homeowners, road crews, and construction companies break ground and potentially expose underground facilities to damage. In addition to repair costs and outages, damage incidents can lead to personal injury and death.⁴

To prevent excavation damage, utility companies came together over 50 years ago and devised a system of One-Call centers across the United States and Canada. Before breaking ground, an excavator contacts a One-Call center. Using a “ticket”, the One-Call center notifies the utility companies operating pipelines, cables, or other facilities in the vicinity of the pending excavation. Those facility owners are then responsible for marking the location of their facilities in the proposed dig area. Typically, the facility owner sends third-party *locator* personnel to the area to mark the ground with color-coded spray paint or flags showing the location and type of facility. Once the facilities have been marked, the excavator can begin his work, now “seeing” the underground facilities and avoiding damage.

Beginning with an overview of this mid-20th Century creation, this paper discusses the locate process, touches on technological developments, and raise questions about the trajectory and future improvements of One-Call center efforts.

¹ CGA. (2018, April 2). *Survey reveals nearly 40 percent of homeowners who plan to dig this year will put themselves and others at risk by not calling 811 before starting*. Retrieved from <https://commongroundalliance.com/Resources/survey-reveals-nearly-40-percent-of-homeowners-who-plan-to-dig-this-year-will-put-themselves-and-others-at-risk-by-not-calling-811-before-starting>.

² Office of Pipeline Safety, USDOT. (1999). *Common Ground: Study of One-Call Systems and Damage Prevention Best Practices* (p. 58).

³ Dierker, B. (2020, August 18). *The Longest Running Statistic*. Retrieved August 25, 2020, from <https://www.aii.org/the-longest-running-statistic/>.

⁴ PHMSA. *Pipeline Incident 20 Year Trend*. (2020). Retrieved July 20, 2020, from <https://portal.phmsa.dot.gov/analytics/saw.dll?Portalpages>.

History

In the 1960s, a major effort came underway to reduce the visibility of utility features like telephone and power lines. A combination of national beautification campaigns, public safety reasoning, cost savings, and weather-proofing concerns helped accelerate the undergrounding of power lines and other facilities.^{5, 6} Around the same time, utility companies took note of the new potential for damage and needed a way to protect their facilities from excavation damage.



In the mid-1960s, utility companies began collaborating to protect their underground pipelines, cables, and wires through what would eventually become One-Call centers. These centers began as local efforts with a few operators pooling their resources to form a local clearinghouse that excavators could contact before digging in the area. The first of these organizations to incorporate did so in Michigan in 1970, and centers for most states followed shortly thereafter.^{7, 8}

A call-in line was provided for excavators to notify the center of their intent to dig. From there, a network of call center personnel, utility administrators, and locators passed information down the line to signal whether underground facilities were or were not present at the dig site. Today, these One-Call centers operate in the same way, but they have websites with online portals in addition to call-in lines.

Unfortunately, the basic model and extent of communication and collaboration among excavators, call center personnel, utility operators, and locators has historically been limited.

⁵ Wright, R. (1970, January 01). *The Economics of Aesthetics at Southern California Edison*. Retrieved from <http://eprints.whiterose.ac.uk/129507/>.

⁶ Public Utilities Commission, State of California. (1998). *Rules for Construction of Underground Electric Supply and Communication Systems*. Retrieved from <https://www.sandiego.gov/sites/default/files/legacy/undergrounding/pdf/cpucgo128.pdf>.

⁷ *Our History*. Retrieved from <https://www.missdig.org/about/our-history.html>.

⁸ One Call Concepts. (2016). *The Value of Outsourcing Your One Call Center Operations*. Retrieved from <https://web.archive.org/web/20161017180434/http://www.occinc.com/articles/the-value-of-outsourcing-your-one-call-center-operations>.

New technologies and techniques, however, may soon begin to enable more communication for better clarity and increased safety onsite.

By 1994, 71 regional One-Call centers had been established, each with their own different 10-digit 800 number.⁹ To unify the program and increase awareness, the Federal Communications Commission (FCC), in 2005, designated 8-1-1 as the nationwide ‘Call Before You Dig’ phone number.¹⁰ Since 2007, when the program officially launched, no matter where a person is located, a caller can dial 811 toll-free and provide notification of their intent to dig in a particular location.

In the U.S., One-Call centers now field around 35 million underground utility locate requests annually.¹¹ These requests come from landscapers, fence builders, homeowners, arborists, construction businesses, road crews, and more, many using the website rather than phone line. While the program has become more accessible, each state brings different rules and regulations to bear.



Who Owns One-Call Centers

While the FCC designated 811 as a national phone line, that is largely the extent of the federal government’s involvement today.¹² Each state has its own law requiring a One-Call center, with some large states having two regional centers and some smaller states sharing a single center.^{13,14}

⁹ Wigfield, M. (2005, March 10). *FCC Designates 811 as Nationwide Number to Protect Pipelines, Utilities from Excavation Damage*. Retrieved from <https://www.fcc.gov/document/fcc-designates-811-nationwide-number-protect-pipelines-utilities>.

¹⁰ *Id.*

¹¹ CGA. *One Call Systems International: Starting the Process*. Retrieved from <https://commongroundalliance.com/Membership-Engagement/Committees/One-Call-Systems-International>.

¹² Various federal grants also support the 811 Program.

¹³ Shea, D., & Hartman, K. (2017, March 8). *How States Protect Pipelines from Excavation Damage*. Retrieved from <https://www.ncsl.org/research/energy/how-states-protect-pipelines-from-excavation-damage.aspx>.

¹⁴ CGA. *State Resource & Information Map*. (2019, November 30). Retrieved from <https://commongroundalliance.com/map>.

There are two structures for these centers, with most of the centers in the U.S. being not-for-profit organizations and a few operating as for-profit entities. These structures may lead to different operational approaches, with different motivations on whether to implement new technology or pool resources to purchase or develop software for economies of scale.

The governance of the One-Call centers generally involves a board of directors, with directors elected or appointed from the utilities in the area covered by the One-Call center. Being self-managed by the utilities may impact decisions regarding technological improvements affecting safety, with additional considerations on cost increases or maintaining the status quo. This does not mean they neglect safety; but it may result in the center acting without a strong interest in making changes or advancing practices that may increase costs. Or in some cases, providing the *recommendation* for new practices but not advocating to members, lawmakers, or regulators that they be made mandatory, even when adoption of the recommendation would reduce damage and promote safety and efficiency.

The primary funding for One-Call centers are membership fees and per-notification fees paid by the member facility owners when the center processes a ticket implicating that owner's facilities. When a locate request comes into the center, the One-Call center notifies each utility owner with facilities in the area. These notifications are called *transmissions* and cost the notice-receiving utility approximately one dollar each.¹⁵ There are often five or more transmissions from a single ticket called in by an excavator, with the national average ratio of 6.3 transmissions per locate request in 2019.¹⁶ For example, a single excavation may result in the center notifying the electric utility, cable providers, natural gas companies, water companies, and telephone companies.



¹⁵ *Questions from Underground Utility Owners*. (2020, April 15). Retrieved from <https://va811.com/faq/>.

¹⁶ Independent analysis of each state's statistics.

Behind the Scenes

The One-Call center determines which utilities to notify when a ticket is originated by using its own facility base map technology. The center maintains a digital map of the region it covers, including streets, homes, subdivisions, hospitals, businesses, and other features – often relying on or incorporating Google Maps.^{17, 18, 19} The map is overlaid with a grid, creating a system of quadrants. When a utility operator places new facilities, they access the One-Call center system to activate the quadrants where its facilities are located.

When notice of a dig is provided by the excavator to the One-Call center, either the excavator or the One-Call center personnel draws a shape around the dig area in the system.²⁰ These shapes are known as excavation site *polygons*. Any overlap between active quadrants and the excavation site polygon on the map prompts a transmission to operators with facilities located in the implicated quadrants. Because multiple facilities may be located in the same quadrant, when the quadrant is identified, transmissions are sent to all implicated facility owners. The locators generally do not see the excavation site polygon and must mark the area described on the ticket regardless of its proximity to the actual excavation site.

The One-Call center generally adds a buffer zone to the identified excavation area, expanding the area to be marked by locators and potentially sending transmissions to facility operators with facilities on the outskirts of the actual excavation site. This is an added public safety measure and often means that locators are tasked with identifying facilities *near* but not *at* the specific excavation site.

The approach to sizing the excavation site polygon varies. Some states, like Kansas, recommend limiting the excavation site polygon to the narrowest accurate location in order to spare resources and keep locators from marking unnecessary locations.²¹ Further, a study by the Common Ground Alliance (CGA) found that “the larger the location description and mapping area on

¹⁷ *BOSS811 Facility Mapping*. (n.d.). Retrieved from <https://www.boss-solutions.com/boss811-facility-maping.html>.

¹⁸ Google Map Layer User Guide - MISS DIG System. (n.d.). Retrieved from http://www.missdig.org/cm/dpl/downloads/content/3748/Google_Map_Layer_User_Guide.pdf.

¹⁹ ITIC USER MANUAL - Call Before You Dig. (2014, October). Retrieved from [http://www.callbeforeyoudig.org/montana/downloads/Montana%20ITIC%20Manual%20\(Mapping\).pdf](http://www.callbeforeyoudig.org/montana/downloads/Montana%20ITIC%20Manual%20(Mapping).pdf).

²⁰ Georgia 811. (2013, July 11). *How to Draw a Polygon Dig Site Area on the EDEN Map*. Retrieved from <https://www.youtube.com/watch?v=4iB9vU4MDKQ>.

²¹ OCC Studios. (2013, December 17). *Kansas 811 ITIC Tutorial*. Retrieved from <https://www.youtube.com/watch?v=V4wO7U42VUc&feature=youtu.be>. “When mapping your locate request, it is important to map as small an area as possible while still encompassing your entire dig site.”

tickets, the higher the probability of utility damage.”²² These findings highlight the importance of communication between excavator and locator and the level of information shared among them, especially on larger projects.

With this background in mind, let’s look at the process from the excavator and locator side.

When A Call Is Made

In every state, notification to the One-Call center is required before an excavation begins.²³ Varying by state, the intent-to-dig notice must be made two or three business days before a planned excavation.²⁴ To do so, the excavator calls 811 or uses the online platform provided by the One-Call center’s website. If the excavator calls by phone, the call rings to the appropriate One-Call center based on the caller’s location.

Safe digging requires that the following steps be observed:

1. Make the required “One-Call” before digging;
2. Wait the required time for locations of all buried facilities (including pipelines) to be marked;
3. Respect the location markings when digging; and
4. Dig with care, avoiding contact with these underground hazards.

Basic information regarding the planned excavation is collected by the One-Call center, either through a phone operator or online digital forms. This information typically includes excavator contact information, a description of the location of the excavation site and type of dig, tools to be used, and other relevant facts.

The location described by the excavator is entered into the One-Call center database. If the database indicates that the excavation site polygon overlaps with any active quadrants the One-Call center sends a notification to all operators with facilities in that active quadrant. Upon receipt of a notification, the facility owners do one of two things: (1) send a locator to mark the area or (2) screen the ticket and determine that no facility exists at the excavation site.²⁵

²² USANorth811. (2019). *Two Thousand Nineteen Newsletter*. Retrieved from <https://usanorth811.org/images/2019Newsletter.pdf>.

²³ PHMSA. *Pipeline Safety Stakeholder Communications*. (n.d.). Retrieved from <https://primis.phmsa.dot.gov/comm/cbyd.htm>.

²⁴ Hawaii requires five days-notice, and Alaska requires two days for regular requests and 10 for remote locations.

²⁵ In some cases, notices may go directly to a locator contracted by the utility operator, who may screen the ticket or mark the area. The ticket screening may find that the facilities in that area are aerial as opposed to in the ground and therefore do not need marking prior to excavation.

The excavator may also visit the site and use spray paint or flags to “white line” the area of proposed excavation.²⁶ Approximately half of the states encourage or require pre-marking the location with white paint or flags.²⁷ The process of white lining is primarily intended to help excavation crews and by law is not to be relied on by locators, who must mark facilities at the excavation site described on the ticket regardless of the fact that these markings may indicate a smaller excavation area. States vary in their emphasis of white lining.

While some facility operators have in-house locators, the facility operator generally contracts with a third-party locate company to visit the location and physically mark the ground. The locators receive the ticket information with a description of the proposed dig site. These are sometimes very dated forms with text descriptions rather than photos or digitally integrated maps.²⁸ A more comprehensive approach is for locators to have direct access to digital facility maps and utility archives through Internet-linked devices. In other cases, paper maps are still used.

Using handheld sensors, the locator walks the area and spray paints or plants flags along the path they identify as the route of the underground facility. Locators use a signal-inducing tool to identify a trace wire buried with the facility or the facility lines

themselves. This is done by hooking a transmitter up to a conductive source and following the signal. Some locators use metal detectors to locate buried valves, paved over manhole covers, and other metal indicators of underground facilities.

The field of locating buried facilities has always been referred to as an “Art” rather than an exact “Science.”
- 1999 Common Ground Study

For safety, excavators are required to respect a tolerance zone around the marked location, generally 18 inches to 36 inches.²⁹ In other words the excavator cannot dig within 18 inches of the markings— except by hand or by employing special best practices.³⁰

²⁶ CGA. *Best Practices 5.2 White Lining*. (2017, December 13). Retrieved from <https://bestpractices.commongroundalliance.com/5-Excavation/52-White-Lining>.

²⁷ *Supra* notes 14 & 27.

²⁸ See ticket example in Appendix, Figure 1.

²⁹ The exact zone varies by state law.

³⁰ See Appendix, Figure 2.

The colors play a vital role in public safety. While caution is important no matter the facility identified, additional care is needed for natural gas, represented by yellow markings, which could expose excavators or the public to hazardous, flammable, and even explosive material. Other colors indicate subterranean risks that could cause service disruptions, floods, contamination, or more. Damage prevention regulations often focus more strictly on natural gas pipelines and require reporting to regulators of damages to those facilities that occur during excavation.

The standardized color codes:

Red =	Electric
Blue =	Potable Water
Yellow =	Natural Gas, Oil, Petroleum
Orange =	Telecom, Phone, Internet
Green =	Sewer, Drainage
Purple =	Reclaimed Water
White =	Proposed Excavation
Pink =	Survey Marks

Whether due to outside circumstances or the lapse of time before excavation is complete, repeat locates may be required. Requests may even be for a previously located or excavated area, by law, a call must be made each time a new excavation is planned. In addition, a locate is valid only for a limited period of time after it has been performed, and if that time has elapsed, a new locate must be called in. This is because over time, the previous paint or other markings are likely to have disappeared or are no longer accurate.



As noted, there can be more than one facility at a site. When an excavator visits the site after the prescribed waiting period mandated by law, they may see one or more marks identifying these different facilities. If there are no markings, it could mean there were no facilities at the site or that the locator had a problem locating any facilities or even that the locator never arrived to perform the locate. This is where communication between the parties is vitally important but does not always occur effectively.

How do you know if it is safe to dig?

Every state has a rule on a waiting period from the time of the original notice to the One-Call center to when excavation can begin. This is usually two or three business days, allowing time for the locators to do their job marking the site.

Once the site has been marked, or not marked (if no facilities were found) or if no locate is required due to the absence of facilities, there is not always an established way to communicate so the excavator knows it is safe to dig. Without some form of communication to the excavator to close the communication loop, it may be difficult to discern whether there are no markings because (1) there are no underground facilities, (2) weather disrupted the markings, or (3) there was an oversight by locator who did not visit the site or left no marks despite facilities being present.

Depending on the state, some form of *positive response* by the locator may be required. Positive response is a communication that locators have completed or not completed their task of identifying facilities at the excavation site within the time allotted.

The CGA defines the practice of positive response this way:

The underground facility owner/operator either 1) identifies for the excavator the facility's tolerance zone at the work site by marking, flagging, or other acceptable methods; or 2) notifies the excavator that no conflict situation exists.³¹

A positive response may include one or more of the following: markings or documentation left at the job site, callback, fax, or automated response system. A positive response allows the excavator to know whether all facility owners/operators have marked the requested area prior to the beginning of the excavation.³²

Only 21 states require some form of positive response as described above, and the implementation ranges from a more sophisticated digital portal that can be accessed by the excavator to check ticket status to the least helpful: simply the presence of on-site markings.³³ For some, a communication is required to the excavator directly or to the One-Call center instead. Clearly the industry and CGA have set the bar low for what positive response can mean. This is unfortunate, because improved communication, through the increased use of available technology, should be encouraged if not required.³⁴

As we explored in 2016, at that time only 18 states required effective positive response systems.³⁵ There has been gradual improvement in the last four years. Additionally, in this time, many more One-Call centers have added positive response portals on their websites and recommended their use to operator members.

³¹ CGA. *Best Practices* 5.8. Retrieved from <https://commongroundalliance.com/best-practices/best-practices-guide/58-positive-response>.

³² CGA. *Best Practices* 4.9. Retrieved from <https://commongroundalliance.com/best-practices/best-practices-guide/49-positive-response-locate-request>.

³³ Most commonly, if positive response exists at all, the mere presence of spray paint is the only indication on site.

³⁴ While only 21 require positive response, at least 47 appear to have a voluntary positive response option.

³⁵ Aii. *Damage Prevention Report Card*. (2016). Retrieved from <https://www.aii.org/wp-content/uploads/2016/07/Damage-Prevention.pdf>.

Getting every state up to a strong form of positive response would be an enormous step toward safer excavation. One such method is already in limited use. This approach is known as Enhanced Positive Response (EPR).³⁶ Rather than rely on on-site marks³⁷ or simple positive response codes³⁸ as an indication that the locate has been completed, EPR involves robust modern communication technology between the locator and the excavator. Enhanced Positive Response not only shows the excavator if the locator was sent to the site, but shares the maps, photos, and locate request information the locator used as well. This clears up any uncertainty about the presence or lack of markings, and also reduces error by allowing the excavator to cross-reference markings and other data on site, giving the excavator a more complete picture of the type and location of any underground facilities.

According to the Pipeline and Hazardous Material Safety Administration (PHMSA), a 2014 pilot program in Montgomery County, Maryland found that using EPR reduced damage by 67 percent.^{39, 40} With results this dramatic, EPR represent the communications standard every call center and regulatory body should look to, not only for best practices, but to implement enforceable rules requiring EPR.

CGA adopted Enhanced Positive Response as a best practice in 2017, three years after the successful pilot program.⁴¹ We would hope to see best practices with this potential for damage reduction approved more quickly in the future. EPR continues to be featured most recently in the March 2020 Best Practices guide.⁴² This may be a first step toward eventual standardization, as policymakers and regulators often look to industry best practices to inform new baseline standards.

There is no reason to be content with a system that allows excavators to see an unmarked site and start digging, assuming that the site was located within the allotted time and that there were no facilities at the location.

³⁶ Also referred to as *Enhanced Notification Response* or *Enhanced Positive Notification*. **Note:** this is separate from *Electronic Positive Response*, also sometimes called “EPR” but which only refers to an online portal for positive response notification, not the robust sharing of information between locator and excavator.

³⁷ Like A spray paint “OK” left somewhere on the ground or no marks.

³⁸ *Positive Response Codes*. (2019, September 23). Retrieved from <https://va811.com/positive-response-codes/>.

³⁹ PHMSA, USDOT. (2017, August 3). *A Study on Improving Damage Prevention Technology*. Retrieved from <https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/news/18351/reporttocongressonimprovingdamagepreventiontechnologyaug2017.pdf>.

⁴⁰ CGA. *Best Practices Version 17.0, 3.31 Enhanced Positive Response*. (2017, December 13). Retrieved from <https://commongroundalliance.com/best-practices/best-practices-guide/331-enhanced-positive-response>.

⁴¹ CGA. *Best Practices Version 17.0, End Notes*. Retrieved from <https://bestpractices.commongroundalliance.com/-Appendix-D-Additional-References/End-Notes> (At note 66).

⁴² CGA. (2020, March). *Best Practices: The Definitive Guide for Underground Safety & Damage Prevention*. Retrieved from <https://www.digalert.org/pdfs/bestpractices.pdf>.

We should strive toward a system where excavators are fully informed and able to communicate efficiently with the locator to know that the site has been located for all facilities, to resolve questions about the site, and to provide more complete information about the area and location of underground facilities. The more information the locator can provide the excavator, the less likely a damage incident will occur during the subsequent excavation. This may be especially helpful on bigger jobs or larger excavation sites.

The Cost of Excavation Damage Status Quo

The rise and proliferation of One-Call centers has been an unambiguous improvement for damage prevention and underground facility safety. Over 50 years into this effort, we have seen improvements like digitizing records and implementing One-Call center websites with excavator portals. Yet, despite decades of operation, and collection of numerous best practices, lately we have seen rising trends in excavation damage. According to the most recently available data, 2018 had the most excavation incidents on record: 509,000 estimated events.^{43, 44}

Focusing on practical improvements to the 811 program is critical to reducing this trend. The stated goal of zero damage cannot be achieved with the current processes, nor indeed with the current *rate* of progress in implementing new technology and methods. And simply raising awareness of 811, while important, is not the solution to eliminating damage.

Recognizing how far the system has come is important to identifying what still needs work. It may require looking to new best practices and technologies and exceeding current legal and regulatory requirements. Where best practices are not implemented voluntarily, state and/or federal regulators should consider action.

“Emerging technologies that could enhance the communication between the stakeholders involved in the planning and design of a project, and facilitate the exchange of information in an efficient manner would have an important role in the damage prevention process.”
- 1999 Common Ground Study

⁴³ CGA. (2019, September). *Damage Information Reporting Tool (DIRT) 2018 Analysis & Recommendations*, Vol. 15. Retrieved from https://commongroundalliance.com/Portals/0/Library/2020/DIRT%20Reports/2018%20DIRT%20Report%20Final_100419.pdf?ver=2020-08-12-025832-050.

⁴⁴ See Appendix, Figure 3.

Recommendation for Practical Improvements

Going forward, the most important objective should be getting information flowing and closing the communication loop to eliminate any uncertainties. Not every state even has a form of positive response, and in most, it is not required. But rather than simply getting each One-Call center to develop an online positive response portal, we hope to see each state leapfrog this basic form of communication and implement a higher standard, with demonstrated safety and efficiency outcomes.

Enhanced Positive Response (EPR): EPR is one advancement that has shown significant potential for reducing damage by increasing communication and data sharing between parties. Moreover, we believe implementation of EPR does not require costly investment or systemic changes. Smartphones and tablets, along with other Internet-connected devices can take, send, and receive photos, virtual manifests, facility maps, tickets, and other information. The technology is available, it just is not being used systemically.

As CGA notes, “It is a common practice for utility operators and contract locators to capture the enhanced information about locates that are performed in response to One Call Centers requests.”⁴⁵ It is now only a matter of getting that information to the excavator and One-Call center and standardizing the process.

Interestingly, many goals outlined in the 1999 Common Ground Study have yet to be fully realized.⁴⁶ Over 20 years later, and with a veritable explosion of technological innovation, communication between all parties still takes place by phone calls and spray paint for many. Despite descriptions of one-call centers being able to “provide continuous, seamless communication between all stakeholders involved in the design, placement, location & marking, maintenance, and excavation around underground facilities”⁴⁷ they function today as conduits for information like they did 20 years ago, but in most cases do not provide seamless free-flowing information we would expect of a 21st Century Internet-connected program.

Rather than criticize, this overview and recommendation is intended as a review of the progress made over the years and honest examination of the pace of improvement. We hope states, regulators, and utilities will look to these advancements in technology and communication techniques as necessary baseline standards going forward.

⁴⁵ *Supra* note 41.

⁴⁶ See Appendix, Figure 4.

⁴⁷ *Supra* note 2 at p. 178.

Conclusion

With well over 20 million miles of facilities buried just under the nation's surface, One-Call centers are critical for public safety. When they came onto the scene, these centers represented a dramatic shift. For the first time, a collaborative effort gave excavators a better way to know what they were digging into.

The next 50 years saw some implementation of technology and streamlining of processes to enhance collaboration and communication. But One-Call centers have not matched the pace of technological advancements in recent years. Despite new digital platforms, much of the One-Call process looks virtually indistinguishable from 1990s technology – call a center, notify utilities, spray paint the ground, and begin the dig.

At a time when technology is advancing so rapidly, why has damage prevention progress seemingly stalled? Improvements are certainly achievable. This is not a case of simply wishing for better technology; the technology is here. It is surprising how slowly the process has evolved when you think about how we use technology in every other aspect of our lives. In many states, the 811 system has seemingly not departed from the course of slow, uninspired improvement, while developments like GPS, GIS, Artificial Intelligence, Machine Learning, mobile devices, and more have charted a course seemingly on a different plane in almost every aspect of society.

Starting from the ground up, best practices should be promoted and adhered to. But state regulators have a real part to play. That part includes adopting certain proven best practices as minimum standards and enforcing them consistently while still encouraging innovation and advancement of technology, communication, and more integrated systems.

Appendix:

Figure 1: Locate Ticket

Ticket Search			
VUPSa 02/10/20 16:52:37 A004102118-00A		NORM	
Ticket No: A004102118-00A		NEW GRID NORM LREQ	
Transmit	Date: 02/10/2020 Time: 04:52 PM	Op: MCCOMSTOCK	
Call	Date: 02/10/2020 Time: 04:37 PM		
Due By	Date: 02/13/2020 Time: 07:00 AM		
Update By	Date: 02/28/2020 Time: 11:59 PM		
Expires	Date: 03/04/2020 Time: 07:00 AM		
Old Tkt No: A004102118			
Original Call	Date: 02/10/2020 Time: 04:37 PM	Op: MCCOMSTOCK	
City/Co:	PRINCE WILLIAM	Place:	DUMFRIES
Address:	17961	Street:	MAIN STREET
Cross 1:	GRAHAM PARK ROAD	Lot #	
Type of Work: SOIL BORING AND TESTING			
Location:	PLEASE LOCATE ALL UTILITIES ON SITE. PLEASE LOCATE FROM THE EDGE OF HARLEY DAVIDSON PARKING LOT TO THE EDGE OF THE POST OFFICE PARKING LOT (ROUGHLY 150 FEET) AND FROM THE CURB OF MAIN STREET TO THE CURB OF FRALEY BOULEVARD (TO INCLUDE DR DAVID CLINE LANE) (ROUGHLY 450 FEET).		
Instructions:			
Whitelined:	N	Blasting:	N
Boring:			
Company:	BOHLER ENGINEERING		
Contact Name:	CHRISTINA COMSTOCK		
Field Contact:	ERIC NISKANEN		
Mapbook:	6227H1		
Grids:	3833A7719A-42 3833A7719A-43 3833B7719A-02 3833B7719A-03 3833B7719A-14 3833B7719B-00		
Members:	CGV930 = COLUMBIA GAS OF VIRGINIA DOM400 = DOMINION ENERGY INC PM5902 = PRINCE WILLIAM COUNTY SERVICE VZN703 = VERIZON		
Ticket Info Has Been Condensed			
Response information for A004102118			
Response	Member	Date & Time	
30	COLUMBIA GAS OF VIRGINIA		
No Conflict; utility is outside of stated work area.			
30	COMCAST	CHC502	02/12/2020 09:29 AM
No Conflict; utility is outside of stated work area.			
30	DOMINION ENERGY INC	DOM400	02/12/2020 01:05 PM
No Conflict; utility is outside of stated work area.			
30	PRINCE WILLIAM COUNTY SERVICE AUTHORITY	PM5902	02/11/2020 07:10 AM
No Conflict; utility is outside of stated work area.			
30	PRINCE WILLIAM COUNTY SERVICE AUTHORITY	PM5903	02/11/2020 07:10 AM
No Conflict; utility is outside of stated work area.			
30	VERIZON	VZN703	02/12/2020 01:07 PM
No Conflict; utility is outside of stated work area.			

Figure 2: Tolerance Zones

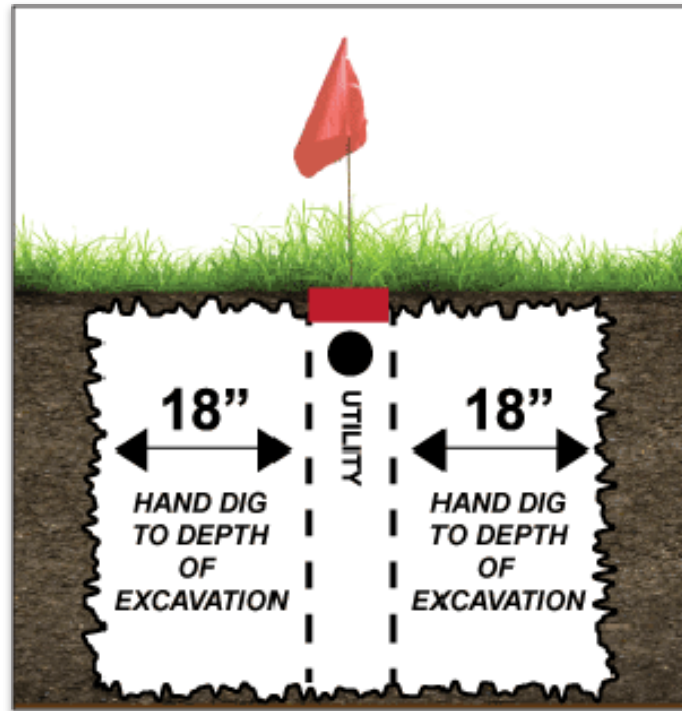


Figure 3: Excavation Damage Trend from DIRT Report for 2018

	2016	2017	2018
Total Estimated Damages	416,000	439,000	509,000
Lower Bound Confidence Interval for Total Estimated Damages	201,000	270,000	230,000
Upper Bound Confidence Interval for Total Estimated Damages	1,159,000	715,000	787,000
Total Estimated Transmissions	221.9 M	234.9 M	244.3 M
Total Estimated Damages per 1,000 Transmissions	1.88	1.87	2.08
Total Estimated Damages per million dollars of construction spending (2018 \$)	0.329	0.339	0.389

Figure 4: Emerging Technologies from 1999 Common Ground Study

Many of the benefits of One-Call centers and their technology outlined in the 1999 Common Ground study remain unfulfilled. With many states still not requiring positive response at all or having minimal paint on the ground standards, visions like the following are curiously unsatisfied despite all the technology being available:

“Automatically and positively respond electronically to the excavator regarding the status of their markings for each and every excavation notification received from the one-call center.”

Other descriptions of digital and electronic communication between locator and excavator and the collection of enhanced information are laid out here. These lines written over 20 years ago naturally beg the question why they have not been achieved in the meantime as technology and best practices have evolved so significantly.

2. Excavator

The ability to utilize the above mentioned system offers the excavator an opportunity to:

- C Control and track one-call notifications by virtually communicating directly with the affected underground facility owner/operator's locators, through the one-call center's database.
- C Provide pertinent job site details, including the attachment of digital files such as voice, job site plans, and digital photographs to assist the facility owner/operator's locate personnel in the determination of which facilities are in conflict and need to be located and marked.
- C Receive pertinent information (e.g., positive responses) directly from the facility owner/operator's locator personnel, through the one-call center's database, without unnecessarily requiring them to spend valuable time meeting on the job site.
- C Process the one-call notifications at any time of the day or night (24 hours a day/7 days a week) that is most convenient to them without having to be dependent on the availability of the one-call center's personnel.

3. Underground Facility Owner/Operator's Locating Personnel:

The ability to utilize the above mentioned system offers the facility owner/operator's locating personnel an opportunity to:

- C Receive, from the excavator through the one-call center's database, pertinent job site details, including the attachment of digital files (voice, job site plans, and photographs), which could assist in the locating and marking of buried facilities.
- C Automatically and positively respond electronically to the excavator regarding the status of their markings for each and every excavation notification received from the one-call center.
- C Control, track, and maintain digital information regarding the geographic area within which they wish to receive notifications from the one-call center. This digital information could include the capability of coordinating with the diverse systems used by various facility owners/operators and cross-referencing or merging data from various systems (i.e., latitude/longitude and/or highway/railroad mile markers).



The Alliance for Innovation and Infrastructure (Aii) consists of two non-profit organizations, The National Infrastructure Safety Foundation (NISF) a 501(c)(4), and the Public Institute for Facility Safety (PIFS) a 501(c)(3). The Foundation and the Institute focus on non-partisan policy issues and are governed by separate volunteer boards working in conjunction with the Alliance's own volunteer Advisory Council.



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About Aii

The Alliance for Innovation and Infrastructure (Aii) is an independent, national research and educational organization that explores the intersection of economics, law, and public policy in the areas of climate, damage prevention, energy, infrastructure, innovation, technology, and transportation.

The Alliance is a think tank consisting of two non-profits: the National Infrastructure Safety Foundation (NISF), a 501(c)(4) social welfare organization, and the Public Institute for Facility Safety (PIFS), a 501(c)(3) educational organization. Both non-profits are legally governed by volunteer boards of directors. These work in conjunction with the Alliance's own volunteer Advisory Council.