

# Unseen Threats to U.S. Infrastructure Reliability

*The importance of damage prevention for the infrastructure we rely upon every day*

## Introduction

The United States is home to over 335 million people and the world's most powerful economic engine. Every day, millions of individuals and businesses rely on the electrical grid and network of buried pipelines, cables, and wires to communicate and to power their lives and activities. Often without thinking, people flip light switches, flush a toilet, log onto the internet, or put a pot to boil on the stove, expecting everything to function properly on demand.

Yet unseen threats can take power and services offline in an instant or even destroy a neighborhood block. As the population grows and new construction projects take shape, we need more pipes, cables, and wires to provide services. In both cases, these developments pose risks to the existing buried infrastructure underfoot – breaking ground for big projects and small ones can result in excavation damage that severs or damages unseen natural gas pipelines, phone and internet cables, power lines, water mains, and more.

## Problem

Every year, over 500,000 excavation incidents occur in which a pipe, cable, or wire is damaged or severed during excavation. While nationally, the leading facility impacted are telecommunications lines, in some areas the top facility at risk are other critical elements of infrastructure. In California, natural gas pipelines are more commonly hit during excavation than any other facility.<sup>1</sup> In Missouri, the latest available data indicates that electrical lines, telecommunication lines, and natural gas pipelines are equally damaged.<sup>2</sup>

Digging is a daily activity in the United States. Whether it is homeowners doing small-scale projects, such as putting in a fence post or planting a tree, or construction crews beginning a commercial development, someone is breaking ground every day. When they do, the buried components of the electrical grid, our pipeline network, and information service lines are put at risk.

The system and process in place to prevent excavation harm to underground facilities is known as *damage prevention*. It is most commonly associated with the “811 – call before you dig” campaign that links state one-call centers with local utility companies, locators, and excavators. But even with this system in place for decades, damages are still on an increasing trend. This puts the reliability of our infrastructure at risk, threatening at any moment to take an individual home, neighborhood, or business offline and creating reliability problems.

The economic harm from this type of damage is estimated to cost the U.S. over \$30 billion every year. Those costs include damage and repair costs for the impacted infrastructure, but also the harm caused by the loss of power and services to businesses and individuals. When cable

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<sup>1</sup> Common Ground Alliance. *Damage Information Reporting Tool*. DIRT Explorer. <https://commongroundalliance.com/DIRT-Dashboard>.

<sup>2</sup> *Id.*

services, water, and power are not available to homes and businesses, they cannot be productive. Infrastructure reliability in a developed country like the United States is of paramount importance. We cannot maintain economic growth and community wellbeing if the system powering our lives is damaged. Given the trend of increasing damages, a more robust process must be adopted to reduce the risk of harm, protect the underground infrastructure, and ensure reliability of these critical systems. If every dig in our growing and dynamic economy creates this risk, our citizens could lose power, water, gas, and more at any moment, with rippling impacts to the broader community from emergency response to traffic and economic disruptions.

## **Potential Improvement**

The act of calling 811 to notify one-call centers about a pending excavation project is critically important. This is how underground infrastructure is protected and how workers are kept safe. But this system has not evolved at the same pace that available technology and best practices have. While the first step is simply to improve compliance and use of the 811 system, the second step must be to improve and reform that system.

While calling 811 puts utility companies on notice that digging is expected to take place near their infrastructure, it still leaves opportunities for miscommunication and error. Notification made directly on the one-call center website – rather than by phone through the middleman of a one-call center – may help improve the precision of excavation notices. Web-entry tickets have been shown to reduce damages by half relative to notice made by phone when excavators are able to draw their dig site on a map.<sup>3</sup> And when it comes to infrastructure reliability, halving potential damages translates into fewer interruptions for critical services provided through underground infrastructure.

In addition to a potential shift toward web-entry tickets, the process of electronic white-lining, or pre-marking of the dig site on a virtual map is a proven and available enhancement. Electronic white-lining gives excavators the opportunity to draw the exact parameters of their excavation project on an overhead visual representation of the site rather than describing it over the phone. This improves communication and enables more accurate site marking that reduces the risk to buried infrastructure.

For infrastructure reliability, web-entry tickets with electronic white-lining can ensure that the 811 system functions most effectively for all parties. Excavators planning a dig can utilize this system virtually from their respective locations rather than visiting the site multiple times in advance of digging. It also affords excavators the ability to precisely designate the dig site themselves – which gives utility companies and locators clear and exact boundaries to know whether critical infrastructure components are buried in those locations. This collaborative use of technology lowers the risk that the excavator will disrupt critical services lines because locators can mark potential facilities with greater clarity in and around the proposed dig site.

This potential improvement is valuable because it takes place before any shovel or excavation equipment goes into the ground. Improving the 811 system on the front end can ensure

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<sup>3</sup> Dierker, B. (2022). *Safer Digging Part 2: Click don't Call*. Alliance for Innovation and Infrastructure. <https://www.aii.org/safer-digging-part-2-click-dont-call/>.

infrastructure reliability be reducing the chance that any excavation incident will happen before the dig even takes place.

While many other technologies and best practices exist that can protect infrastructure and ensure continued access and reliability, web-entry locate requests and electronic white-lining are the very first improvements in need of systemic adoption. Trade groups like the Common Ground Alliance and federal agencies like the Pipeline and Hazardous Materials Safety Administration<sup>4,5</sup> agree that the ideal dig of the future<sup>6</sup> will feature electronic white-lining as the very first step to help ensure no damage is done to underground facilities at a work site.

The best way to secure our infrastructure reliability as the nation increases its electrification and infrastructure build-out is to incorporate proven technologies and best practices into the damage prevention process so that the underground portions of our grid, our pipes, and other buried utilities are not under threat just because they are unseen.

## Conclusion

Ensuring access and reliability of our country's infrastructure, including electric lines, natural gas pipelines, water and sewer lines, telecommunications lines, and supporting infrastructure are top priorities for the nation. Unfortunately, much of this infrastructure is underground and therefore out of sight and out of mind, and construction activity leads to damages that threaten their reliability. The positive news is that damages can be prevented, and reliability ensured with greater adherence to proven technologies and best practices in the excavation and locating industries. When the proper reforms are implemented, individuals can confidently flip the switch, use their gas stove, and access the internet in their home, because the excavation activity all around the country can safely avoid damaging the tens of millions of miles of buried infrastructure we rely upon every day.

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<sup>4</sup> Pipeline and Hazardous Materials Safety Administration. (2017). *Report to Congress on Improving Damage Prevention Technology*. U.S. Department of Transportation. <https://www.phmsa.dot.gov/news/report-congress-improving-damage-prevention-technology>.

<sup>5</sup> Pipeline and Hazardous Materials Safety Administration. (2007). *Virginia Pilot Project for Incorporating GPS Technology to Enhance One-Call Damage Prevention Phase I – Electronic White Lining*. [https://primis.phmsa.dot.gov/comm/publications/Virginia\\_Pilot\\_Project\\_Report\\_Phase\\_I.pdf](https://primis.phmsa.dot.gov/comm/publications/Virginia_Pilot_Project_Report_Phase_I.pdf)

<sup>6</sup> Technology Advancements & Gaps in Underground Safety Volume 4. ©2021 Common Ground Alliance. <https://commongroundalliance.com/Portals/0/2021%20Technology%20Report.pdf?ver=2021-05-27-165320-157>



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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.

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