DIRT
Damage Information Reporting Tool

2023 ANALYSIS AND RECOMMENDATIONS

CGA

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VOL. 20

Dear Damage Prevention Stakeholders,

The 2023 DIRT Report and **Interactive Dashboard** introduce an important new tool in our industry's ongoing efforts to enhance excavation safety: the CGA Index. Much like other indices that measure economic or industry trends, the CGA Index serves as a benchmarking tool for year-over-year progress in U.S. damage prevention.

In its debut year, the CGA Index model shows a six-point reduction in damages from our 2022 baseline. While this initial decline is encouraging, it also underscores the considerable work ahead to reach our goal of reducing damages by 50% over five years. The Index will be instrumental in establishing new areas of damage analysis, measuring progress and focusing our work in the coming years.

The 2023 DIRT data tells a story of both persistent challenges and emerging solutions. The top six damage root causes have remained stubbornly consistent, accounting for 76% of incidents for the third consecutive year. Examining late locate data from 811 centers confirmed a troubling finding: In 2023, excavators faced 50/50 odds as to whether they were able to begin work on time – essentially a coin toss. This hampers efficiency, erodes trust in the entire 811 system and puts lives at risk. Addressing this challenge head-on must be a priority for every stakeholder in the coming year.

Yet amidst these challenges, stakeholders are establishing innovative methods to address some of the most significant obstacles. In **Georgia**, new "excavation readiness" metric provides a model for measuring locating timeliness. **New Mexico**'s unique enforcement mechanism, including "warning locate requests," is creating real accountability in the locating process. In **Minnesota**, a pilot program providing GPS-enabled utility locating devices is demonstrating how we can leverage technology to improve facility mapping and locating efficiency.

- **Georgia's 811's Excavation Readiness Metric**
- **New Mexico and Massachusetts' Creative Approaches to Locating Enforcement**
- **Minnesota Leverages Locating Activity to Improve Facility Maps**
- **North Carolina Leads Collaborative and Data-Driven Locating Analysis**
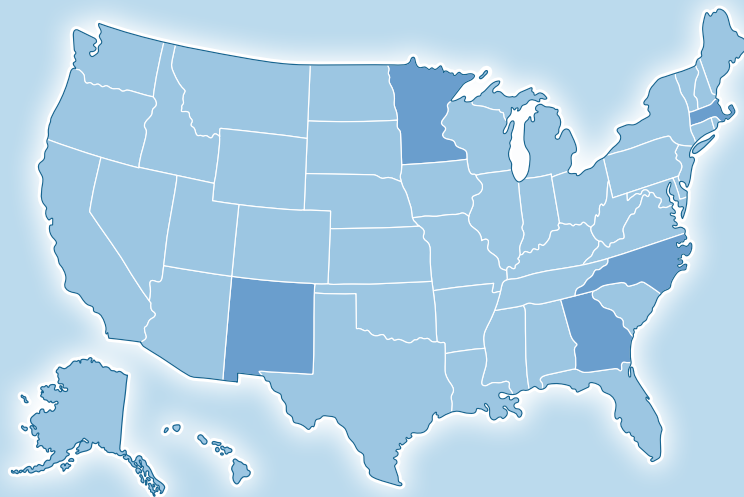
These and the other case studies found on the following pages are not just interesting anecdotes — they are blueprints for industry-wide transformation. They show us that innovative leaders who embrace innovation, vision and change are making progress right now across the country.

The launch of the Damage Prevention Institute (DPI) in January 2023 represented a significant leap in our ability to collect, analyze and act on data. By requiring monthly DIRT reporting and establishing consistent performance metrics, the DPI is fostering an environment of shared accountability that will be crucial to achieving our damage reduction goals.

As we look ahead, the urgency of our mission is clear. The continued increase in excavation activities driven by federal and state infrastructure investments present both obstacles and opportunities. It is pushing the limits of our current systems, and also providing us with a chance to demonstrate the transformative power of data-driven decision-making and cross-industry collaboration.

I challenge each of you to see yourself not just as a stakeholder, but as a change agent in this critical mission. Commit to helping us move closer to our 50-in-5 goal by improving your organization's data quality, developing targeted programs to reduce top damage drivers, forging deeper collaborations across stakeholder groups, participating in the DPI and being an innovator.

Be safe,

Sarah K. Magruder Lyle

Sarah K. Magruder Lyle | President & CEO | Common Ground Alliance

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Executive Summary

CGA Index Indicates Damages Declined in 2023

- The CGA Index, developed in partnership with Hanover Research, employs a methodology that models annual damages and tracks progress toward the goal of reducing underground utility damages by 50% over five years.

- For 2023, the Index score of 94 represents a six-point decline from the 2022 baseline of 100, **indicating progress but underscoring the significant effort still required** to reach the target score of 50.

Spotlight on 2023 Data

- The 2023 data reveals consistent trends with 2022, particularly in facilities damaged and the type of work causing damages. **Telecommunications facilities accounted for nearly half of reported damages,** followed by natural gas at about 40%.

- By separating the previously combined "energy" work type into distinct natural gas and electric categories, **water/sewer work emerged as the top contributor to damages**, followed by telecom and construction/development.

- These persistent trends are significant given the expected surge in excavation activities driven by federal infrastructure investments, including $85.4 billion for broadband expansion and $55 billion for water infrastructure improvements.

- Excavation/construction stakeholders remained the top source of damage reports for the second consecutive year.

TOP 6 Damage Root Causes

1. Failure to notify 811
2. Excavator failed to maintain clearance
3. Facility not marked due to locator error
4. Improper excavation practice not listed elsewhere
5. Marked inaccurately due to locator error
6. Excavator dug prior to verifying marks by potholing

Root Cause Analysis Underscores Persistent Challenges

- The persistent dominance of the top six root causes, accounting for nearly 76% of damages and spanning all three major root cause groups (No Locate Request, Excavation Practices, and Locating Practices), indicates **deeply entrenched issues across the damage prevention process**.

- Slight fluctuations in root cause groups from 2021-2023 can be attributed to expanded reporting from the excavator stakeholder group, driven by the growth of the Damage Prevention Institute (DPI).

- **Improving the quality of data submitted to DIRT** – particularly refining damage root causes – is necessary to driving progress.

Late Locates: An Ongoing Challenge

- Analysis of 2023 data from 12 state 811 centers corroborated an important finding from the **2022 DIRT Report**: **Excavators face significant unpredictability in beginning work due to late or missing locates**. Across the states examined, locates (or work site clearance) were delivered on-time for only 30-70% of tickets, with most hovering around 50%.

- **Two significant factors complicate analysis of late locates**: the absence of a standardized metric for evaluation and the diverse array of data architectures employed across 811 centers. These inconsistencies hinder comprehensive and comparative assessments of locating timeliness across regions.

- To address these challenges, several innovative approaches have been implemented at the state level:

  - **Georgia** 811's "excavation readiness" metric, which could serve as a guide for standardized locating evaluation across 811 centers.

  - **New Mexico**'s unique enforcement mechanism, including "warning locate requests" and financial protections for excavators.

  - **Massachusetts** Department of Public Utilities' collaborative approach to enforcing locating timeliness through targeted improvement plans.

  - **Minnesota**'s pilot program providing GPS-enabled utility locating devices to improve facility mapping and locating efficiency.

  - **North Carolina**'s data-driven analysis of ticket screening effects and collaborative stakeholder coordination for broadband deployments.

Enhancing Data Quality and Collaboration

- **The impact of "unknown" categories in DIRT data analysis is significant** and may be masking important trends – particularly around key data points like root cause and work performed, where a lack of clear or accurate information hamstrings our ability to focus on areas that would result in meaningful damage reductions.

- North Carolina 811's success story demonstrates how **focused improvement efforts can enhance Data Quality Index (DQI) scores** and reduce unknown root causes.

- CGA's Data Reporting and Evaluation Committee is leading several initiatives to improve data quality and consistency:

  - Development of a root cause analysis flow chart to guide users in selecting more specific root causes and reduce reliance on catch-all categories.

  - Collaboration with CGA's One Call Systems International (OCSI) Committee to create a comprehensive list of common work types from 811 tickets, aiming to standardize the mapping of work type classifications.

  - Classification and clarification of various state damage reporting requirements and their relationship to DIRT reporting.

DPI's Role in Developing Next-Generation Metrics and Rapid Data Analysis

- DPI strengthens CGA's data collection and standardization efforts through mandatory monthly DIRT and metrics reporting, **fostering shared accountability among stakeholders**.

- Enhanced reporting drives higher DQI from DPI participants and by extension,

raises the DQI across the DIRT ecosystem, enabling quicker reactions to damage trends.

- Through accreditation, peer reviews and data quality initiatives, the **DPI supports continuous improvement in damage prevention**.

- Preliminary findings from DPI participants suggest that **companies with 10-49 employees have higher damage rates than organizations that are smaller and larger**. Insights like these help inform targeted support initiatives, while forthcoming interactive dashboards will enable anonymous performance comparisons.

Data-Driven Recommendations to Guide the Damage Prevention Industry

As we confront the challenge of significantly reducing damages to underground utilities, addressing the persistent top root causes demands a transformative mindset across the industry. While the **2022 DIRT Report** provides detailed, root cause-specific recommendations that remain relevant, the 2023 Report calls for even more decisive steps towards industry-wide improvement.

The following recommendations build upon previous insights while introducing new, data-driven strategies to tackle our most pressing challenges. We recommend the following actions to achieve our aggressive **50-in-5 industry challenge**: enhance **data quality and reporting**, target **top damage drivers** and **improve locating** practices.

Enhancing Data Quality and Reporting

- **FACILITY OWNERS** ◼, **LOCATORS** ◎, **EXCAVATORS** ●**:** Participate in the Damage Prevention Institute and submit damage data and metrics on a monthly basis to accelerate industry insights and improvements.

- **811 CENTERS** ⬠**:** Implement a standardized metric for measuring locate timeliness or "excavation readiness."

- **811 CENTERS** ⬠**:** Establish a consistent process for mapping 811 center ticket data to standard DIRT field options such as work type.

- **ALL STAKEHOLDERS**⭐**:**
  - Regularly assess organizational data collection policies and DIRT DQI score, and develop strategies to reduce the percentage of "unknown" entries in critical data fields like root cause and work type.
  - Utilize the DIRT root cause flow chart to guide more actionable root cause selection and the Common Work Types tool to map free text to DIRT work types – both are tools developed by CGA Committees.
  - Become familiar with your state's damage reporting requirements by reviewing regulations and 811 center guidelines, ensure all relevant staff are trained on reporting procedures and implement internal processes to meet or exceed state reporting standards.
  - Bookmark the **DIRT Interactive Dashboard** and explore it regularly to guide your damage prevention outreach and programs.

Targeting Top Damage Drivers

- **FACILITY OWNERS** ■**, EXCAVATORS** ●**, 811 CENTERS** ⬟**:** Implement tailored education and outreach programs for water/sewer, telecom and construction/development excavators, which are the leading types of work involved in damages.

- **ALL STAKEHOLDERS**⭐**:**
  - Develop tiered education approaches based on the urban-rural continuum, recognizing that each geography poses unique challenges.
  - Strengthen media and outreach materials for use following extreme weather to reduce damages in the wake of increased precipitation, natural disasters and other extreme events.
  - Establish coordination mechanisms between government agencies/regulators, facility owners, excavators, locators and other industry stakeholders to manage the impact of increased infrastructure investments and reduce the incidence of utility-on-utility damage.

- **FACILITY OWNERS** ■**, LOCATORS** ◉**, EXCAVATORS** ●**, 811 CENTERS** ⬟**:** Develop scalable damage prevention strategies to accommodate the expected surge in excavation activities and arrival of out-of-state excavators who may be unfamiliar with local damage prevention regulations.

Improving Locating Practices

- **ALL STAKEHOLDERS ⭐:** Develop enforcement mechanisms for timely locating, considering both monetary (e.g., New Mexico) and collaborative (e.g., Massachusetts) approaches.

- **FACILITY OWNERS 🟩:** Improve contracts with third-party locators to ensure there are not financial, temporal or other barriers to on-time and accurate delivery of locates. Consider implementing **best value contracts**, which prioritize quality and overall value over the lowest price, as one potential approach to achieve this goal. Regularly meet with third-party locators to facilitate collaboration and information-sharing, regardless of the contract type in place.

- **FACILITY OWNERS 🟩:** Invest in GPS-enabled locating devices and develop a protocol for locators to update facility maps in the field, ensuring that new or revised asset information is more immediately available to excavators and locators who need it. Implement a quality control process to verify and approve map updates before they are finalized.

- **FACILITY OWNERS 🟩, LOCATORS ◉, 811 CENTERS ⬠:** Conduct thorough analysis of 811 ticket screening effects on damage rates and Locating Practice root causes.

Introduction

As the damage prevention industry strives to reduce damages by 50% over five years, access to high-quality data is crucial for driving effective decision-making. The 2023 DIRT Report stands as the premier resource for the industry, offering the only comprehensive national accounting and analysis of damages to buried infrastructure.

This year's report introduces a new tool: the CGA Index. Developed with our 50-in-5 goal in mind, the Index model provides us with a useful benchmark for evaluating our collective year-over-year progress in reducing damages across the United States.

As in previous years, the 2023 **Interactive Dashboard** and Report draw from voluntarily and confidentially submitted data from a wide range of stakeholders, including facility operators, contractors, locators, 811 centers, and state and federal agencies. While this Report focuses on new insights and actionable data, we encourage readers to explore the full breadth of information on the **Interactive Dashboard**, which includes annual data dating back to 2021.

By leveraging these powerful tools and insights, stakeholders from industry, policy and media can better understand why damages occur, make more informed decisions, develop targeted strategies, and ultimately contribute to our shared goal of significantly reducing damages to underground infrastructure.

Additional Resources

- **Past DIRT Reports**
- **How We Handle Multiple Reports of the Same Event**
- **Near-Miss Analysis**
- **Next Practices Reports**
- **Technology Reports**
- **CGA White Papers**

The CGA Index Defined

The CGA Index was developed to track the industry's progress toward the goal of reducing underground utility damages by 50% over five years. The Index aims to provide a more comprehensive national measure of underground utility damage trends in the United States, addressing constraints in the voluntary reporting system. Employing a methodology based on analysis of several years' of DIRT submissions and other publicly available data, the Index observed a 6-point decline from 2022-2023 following a 16-point increase from 2021-2022.

Index and Three-Year Trending Highlights

- The CGA Index provides a **resilient, comprehensive year-over-year model** for evaluating damage prevention progress in the U.S.

- Utilizing county-level analysis and predictor variables, the Index methodology **provides a consistent approach to estimating damage levels across the country.**

- Analysis identified **three predictor variables that strongly correlate to county-level damages:** concentration of industry-relevant companies, degree of urbanicity, and precipitation levels.

- The 2023 Index score of 94 marks a 6-point decline from 2022 (Year Zero of 50-in-5), indicating some initial progress while underscoring the **substantial effort still required to achieve the target score of 50.**

Modeling U.S. Damages

CGA partnered with Hanover Research to develop a methodology that leverages submitted DIRT damage information and publicly available data to **model underground utility damages across the U.S.**

The analysis team established a model to estimate the total impact of damages in the U.S. based on the DIRT dataset. The methodology utilizes county-level data and predictor variables to overcome the limitations of incomplete information. The result is the ability to look at the **total landscape of potential damages based on the data submitted into DIRT.**
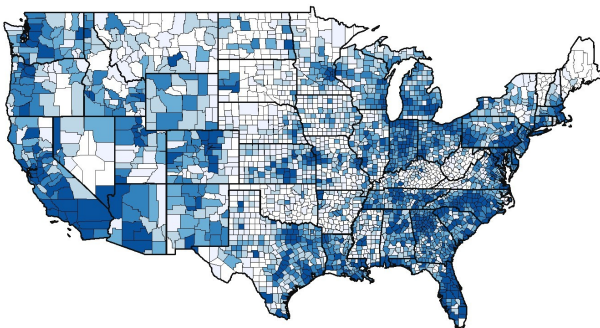
Left: 2023 unique reported DIRT damages by county
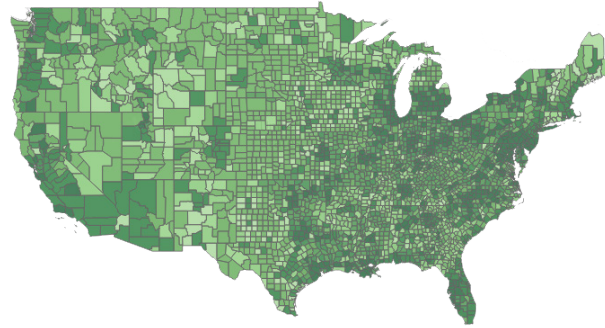
Right: Modeled 2023 scaled damages by county using CGA Index methodology

Consider the contrast between the map of unique reported damages in 2023 (previous page, left) versus the map of the modeled damages for 2023 (previous page, right). Leveraging what we know from reported damages in a given year to build a more complete and robust model of U.S. damages provides us with a **better tool to understand opportunities and challenges within the damage prevention process**.

Model Methodology

Armed with several years' worth of DIRT data, the research team examined the relationship of damages to more than 25 variables, including 811 center transmission data, economic indicators, government expenditures, housing data, weather patterns, demographic information and more. **The methodology focuses on estimating damages at the county level** which aligns with relevant public data and provides a more consistent model than state-level or regional analysis, particularly because applied datasets are reliably available at the county level.

The combined presence of three variables emerged as the most reliable predictors of underground utility damages at the county level: number of industry-relevant companies, degree of urbanicity, and amount of precipitation. The variables were selected for their **strong statistical significance in relation to damages and their ability to explain a substantial portion of the variation in damage reports**.

To model annual damages, **Hanover Research worked with CGA to classify U.S. counties and parishes based on the key Index variables for 2021-2023**, creating 27 classification groups for each year based on the assumption that counties within a specified group are likely to have similar damage levels (see table on **page 12**).

Hanover then extrapolated DIRT-reported unique damages by county for each year. For each county classification group, an 80th percentile value was identified and applied as the modeled number of damages for all counties within that group.

This approach serves two purposes: First, it addresses potential underreporting by providing a **data-informed methodology for modeling damages in areas without complete or consistent DIRT**

Variables Indicating Damages

Together, these variables are the strongest indicators of likely damage levels in a county:

Number of relevant companies: U.S. Census Bureau data indicates the county-level presence of companies relevant to damage prevention, including utilities, construction, landscaping, engineering and others.

Degree of urbanicity: Scale of one (most urban) to nine (most rural) utilized by the United States Department of Agriculture's (USDA) Economic Research Service to classify counties using population size and adjacency to metro areas.

Amount of precipitation: County-level data sourced from the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center.

submissions. Secondly, using the 80th percentile rather than the maximum helps eliminate outliers while still providing a conservative estimate. This method is particularly suitable for our industry, where overreporting of damages is not a concern.

Modeling U.S. damages provides a comprehensive view of the underground utility damage landscape, enabling stakeholders to make informed decisions and target prevention efforts more effectively.

Index Analysis and Trending: Uneven Damage Prevention Progress from 2021-2023

The goal of the CGA Index is to confidently trend damages over time and gauge progress toward reductions. In order to confidently benchmark year-over-year using voluntarily submitted data, the inputs used for the Index calculation were narrowed to the dataset contributed by organizations who have submitted consistently for three or more years. Utilizing this subset of consistently reporting companies provides a reliable trend indicator.

Consistent Reporters Dataset & The CGA Index

Estimating the total impact of damages for a single year using the modeling methodology provides us with a way to look at the potential number of damages for a given year.

This becomes more complicated when comparing the modeled data year-over-year because submitters fluctuate over time.

Consistent with the last several annual DIRT Reports' trend analysis, the annual Index calculation utilizes a dataset of reports from companies who have submitted for **three or more consecutive years**.

It is important to note that the Index is a predictive model rather than an actual representation of damage counts – and as with any model, the results are based on the inputs and assumptions used to develop it. The Index uses the best industry data and inputs available, resulting in a methodology that is robust, statistically valid and repeatable, **ensuring its reliability and effectiveness for evaluating progress despite annual fluctuations in voluntary reporting**.

The Index has been scaled by setting 2022 as Year Zero with a value of 100 – reducing the Index to 50 will mark success in reaching our 50-in-5 goal. The table on the next page provides an overview of county group demographics, modeled damages **(consistent reporter dataset)** and the 2023 Index score for each of the 27 county classification categories.

CGA Index County Classifications
The table below shows 2023 modeled damages and Index scores for the 27 county classification groups, in order from most damages to fewest.

Urbanicity	Companies	Precipitation	Number of Counties	Modeled Damages Consistent Reporting Companies	CGA Index by County	Group Number
Urban	More than 150	Moderate	453	113,930	110	10
Urban	More than 150	Heavy	164	48,905	70	1
Urban	More than 150	Little	170	25,517	80	19
Less Urban	51-150	Moderate	202	5,656	97	14
Urban	51-150	Moderate	139	5,449	123	13
Less Urban	More than 150	Moderate	91	4,131	87	11
Rural	50 or fewer	Moderate	364	4,004	130	18
Rural	51-150	Moderate	120	2,400	113	15
Less Urban	More than 150	Heavy	59	2,395	138	2
Less Urban	More than 150	Little	67	2,037	104	20
Less Urban	51-150	Heavy	39	1,950	75	5
Rural	50 or fewer	Little	478	1,912	82	27
Urban	51-150	Heavy	23	1,794	92	4
Rural	50 or fewer	Heavy	119	1,785	96	9
Rural	51-150	Heavy	44	1,716	107	6
Less Urban	51-150	Little	77	1,448	119	23
Urban	50 or fewer	Moderate	108	1,339	70	16
Less Urban	50 or fewer	Moderate	65	1,300	152	17
Rural	51-150	Little	122	1,220	139	24
Urban	50 or fewer	Heavy	38	1,125	187	7
Urban	51-150	Little	51	867	140	22
Rural	More than 150	Little	23	704	118	21
Rural	More than 150	Moderate	16	528	114	12
Less Urban	50 or fewer	Heavy	17	320	59	8
Less Urban	50 or fewer	Little	37	296	98	26
Urban	50 or fewer	Little	34	245	142	25
Rural	More than 150	Heavy	16	186	73	3

When applied at the national level from 2021-2023, the Index shows the industry made initial progress in 2023 by reducing the Index score from 100 to 94. But more broadly, **three-year trending shows uneven performance in damage prevention**: A modest reduction from 2022-2023 followed a more than 16-point rise in the Index between 2021 and 2022.
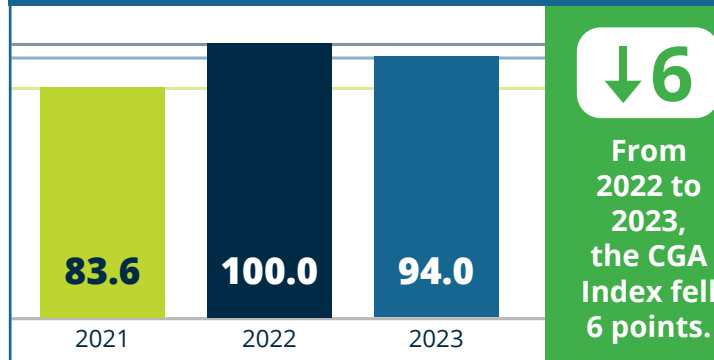
While preliminary momentum represents a step toward our objective, it also underscores the considerable work still ahead. The shifting trends from 2021 to 2023 highlight that **progress may be non-linear, with both advances and setbacks**. To achieve our ambitious target of halving damages, we need to reduce the Index to 50 – a goal that demands aggressive actions, innovation and collaboration across all sectors of the industry.

Industry Insights

The creation of the Index's methodology for modeling damages across the U.S. and the identification of the top three Index variables enhance our predictive capabilities and provide strategic direction for damage prevention efforts.

The strong correlation between these factors and underground utility damages at the county level offers valuable new insights for looking at the likelihood of damages across the U.S. For instance, we can **adjust outreach programs depending on how variables align** in specific locations. By focusing on areas of high correlation with damages, we can develop more effective tools and strategies to mitigate risks and drive meaningful progress.

County-level analysis also opens doors to **more granular and effective examination of differentiators at the local level** that can help us reduce damages. In coming years, it gives us the ability to compare counties within Index

CGA Index YoY *(2021-2023)*

2021	2022	2023
83.6	100.0	94.0

↓6

From 2022 to 2023, the CGA Index fell 6 points.

Annual CGA Index Score

Generating the annual CGA Index score:

- Classify U.S. counties based on urbanicity, number of relevant companies, amount of precipitation for a given year.

- Establish consistent reporting company dataset for trending.

- Determine 80th percentile of DIRT-reported damages for each county classification group for a given year.

- Calculate modeled damages for each group by applying the 80th percentile value to each county in the group.

- Add 80th percentile values from all county groups and divide by the same value from 2022 (Year Zero), then multiply by 100.

*For more detailed information about the CGA Index methodology, visit the **Online Appendix**.*
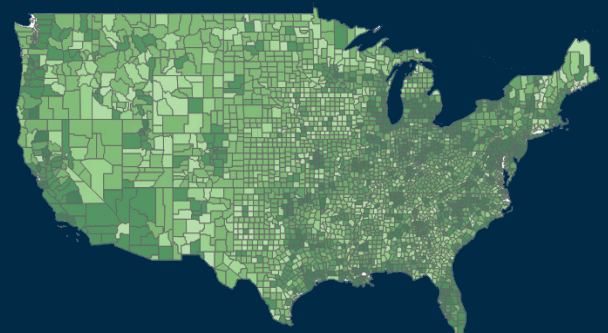
categories, including the distribution of the top six damage root causes, to better target reductions.

The CGA Index, like 811 center data or economic indicators, serves as one data point in the increasingly rich ecosystem of damage prevention data. While the Index is a powerful tool for the industry, providing comprehensive year-over-year trending critical to understanding our progress in damage prevention, it is part of a larger analytical approach: We will continue to examine other datasets related to damage prevention, like construction and infrastructure spending in addition to other key metrics, for deeper analysis and insights.

By leveraging this multi-faceted, data-driven approach, stakeholders can make informed decisions, allocate resources more efficiently and collaboratively work towards a safer excavation environment across the United States.

For additional information on the CGA Index methodology, visit the **Online Appendix**.

Opportunities for Additional Analysis on Damage Rates

- **Construction spending**
- **Governmental infrastructure projects** *(Infrastructure Investment and Jobs Act, Rural Digital Opportunity Fund, etc.)*
- **County-level comparisons**
- **Impact of regulations**
- **Top root causes**

Spotlight on 2023 Data

Our analysis of 2023 data integrates damage reports entered into DIRT with 811 center information collected through CGA's One Call Systems International (OCSI) committee. For comprehensive breakdowns of facility types affected, work performed, equipment used, event sources, root causes and more, please refer to the **DIRT Interactive Dashboard**, which includes data from 2021 onward. The **811 Center Dashboard** offers detailed information on ticket volumes, trends, and state-specific regulations and exemptions.

811 Center Ticket Type
2023 Compared to 2022

Total Incoming	↓	**-0.85%**
Electronic	↑	**1.04%**
Voice	↓	**-6.91%**
Fax	↓	**-32.44%**
Total Transmissions	↓	**-3.75%**
Transmissions Incoming	↓	**-2.91%**

2023 Damage Data Highlights

- **Excavation/construction stakeholders** remained the top source of damage reports for the second consecutive year.

- **Natural gas and telecommunications facilities were most frequently damaged** once again in 2023, with telecom and water/sewer work as top drivers of damage incidents to these facilities.

- **Contractors** were involved in 83% of natural gas-related damages and 92% of telecom-related damages.

- Overall, **water/sewer was the leading type of work involved in damages, followed by telecom**, construction/development and then natural gas work.

- **There were 189,549 unique reported damages for 2023**. Unless otherwise noted, these unique reported events are the basis for the full 2023 dataset.

- Electronic tickets constituted 77% of notices to 811 centers, **up 4% from the year prior**.

Total and Unique Damages and Near Misses in Canada and the United States

COUNTRY	Total Damage Reports	Unique Damages	Total Near Miss Reports	Unique Near Misses
UNITED STATES	**211,887**	**180,471**	**2,724**	**2,592**
CANADA	**9,660**	**9,078**	**443**	**439**
TOTAL	**221,547**	**189,549**	**3,167**	**3,031**

Incoming Locate Requests / Outgoing Transmissions

	🇺🇸	🇨🇦
Total Incoming	**42,343,097**	**2,374,606**
Electronic	31,254,957	2,132,590
Voice	11,080,405	242,016
Fax	7,735	0
Total Transmissions	**263,553,858**	**9,888,023**
Transmissions/ Incoming	**6.22**	**4.16**

🇺🇸 — 73% Electronic, 26% Voice

Incoming
- Electronic
- Voice
- Fax

🇨🇦 — 90% Electronic, 10% Voice
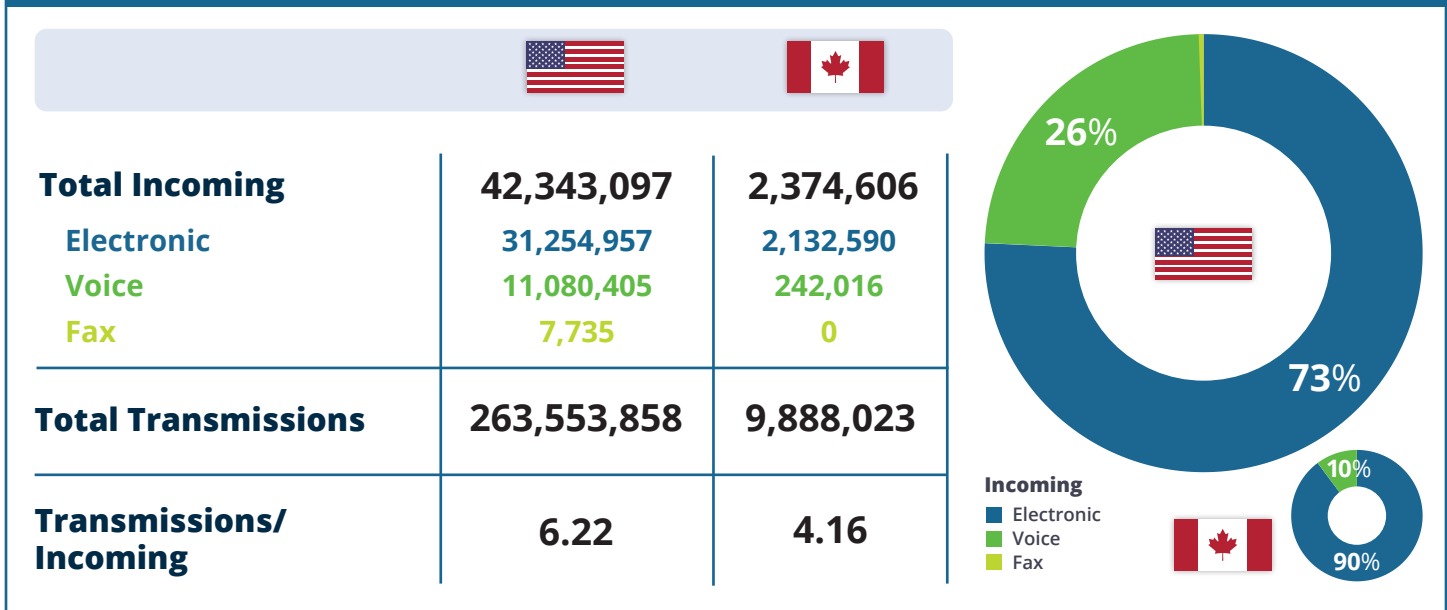
Throughout this Report, we have consolidated the myriad options for "work performed" within DIRT into groups for broader analysis. The chart below details those groupings.

Work Performed Group	Work Performed Types*
Agriculture	Agriculture, Irrigation
Construction/Development	Construction, Demolition, Drainage, Driveway, Engineering, Grading, Railroad, Site Development, Waterway
Electric	Electric
Fencing/Landscaping	Fencing, Landscaping
Natural Gas	Natural Gas
Street/Roadway	Curb/Sidewalk, Milling, Pole, Public Transit Authority, Roadwork, Storm Drainage, Streetlight, Traffic Sign, Traffic Signal
Telecom/CATV	Cable TV, Telecommunications
Water/Sewer	Water, Sewer

* Liquid Pipeline and Steam were negligible.

Reported damages in 2023 remained consistent with 2022, with telecommunications facilities accounting for nearly half of reported incidents and natural gas for about 40%. The breakdown of work types causing damages also stayed largely unchanged, although for this Report we have separated the previously aggregated "energy" category into natural gas and electric. This disaggregation highlights **water/sewer work as significant contributors to damages, followed by telecommunications work and construction/development.**

These consistent trends are particularly noteworthy given the expected impending surge in excavation activities driven by state and federal infrastructure investments. The Infrastructure Investment and Jobs Act (IIJA) has allocated $65 billion for broadband expansion[1] and $55 billion for water infrastructure improvements,[2] while the Rural Digital Opportunity Fund (RDOF) is committing an additional $20.4 billion to connect underserved areas.[3]

While this funding has already impacted damage trends, it is also set to intensify excavation work, especially for fiber broadband deployment and water system upgrades. The telecom sector's Fiber to the Home (FTTH) initiative will require extensive excavation, particularly in rural areas. Concurrently, water infrastructure projects, including lead pipe replacement and system upgrades, will necessitate significant digging. **Peak excavation activity is expected between 2024 and 2026.**

Given that some of the top damage-causing work types are set to increase in coming years, targeted efforts to reduce incidents in these areas will be crucial for achieving the 50-in-5 goal.

Facilities Damaged by Work Performed & Top Work Performed

Facility Damaged

- Water/Sewer 5%
- Electric 8%
- Telecom/CATV 47%
- Natural Gas 40%

Work Performed (All Damages)

- Water/Sewer 24%
- Telecom/CATV 22%
- Construction/Development 13%
- Natural Gas 11%
- Electric 10%
- Fencing/Landscaping 9%
- Street/Roadway 9%
- Agriculture 2%
- Other <1%

Damages to Natural Gas by Work Performed

| 27% | 19% | 16% | 12% | 9% | 8% | 6% | 2% |

Damages to Telecom/CATV by Work Performed

| 25% | 23% | 14% | 12% | 10% | 9% | 6% | 2% |

Legend: Telecom/CATV, Natural Gas, Electric, Water/Sewer, Street/Roadway, Construction/Development, Fencing/Landscaping, Agriculture

2023 Full Dataset

[1] U.S. National Telecommunications and Information Administration **press release**
[2] U.S. Environmental Protection Agency **fact sheet**
[3] U.S. Federal Communications Commission **fact sheet**

Top Event Report Sources

Excavator, Road Builder and Engineer | 55,976

Natural Gas | 53,956

Telecom/Cable TV | 39,388

Locator | 22,862

Electric | 5,257

Regulator | 4,638

Public Works/Private Water | 2,895

Pie chart values: 30.2%, 29.1%, 21.3%, 12.4%, 2.8%, 2.5%, 1.5%

2023 Full Dataset
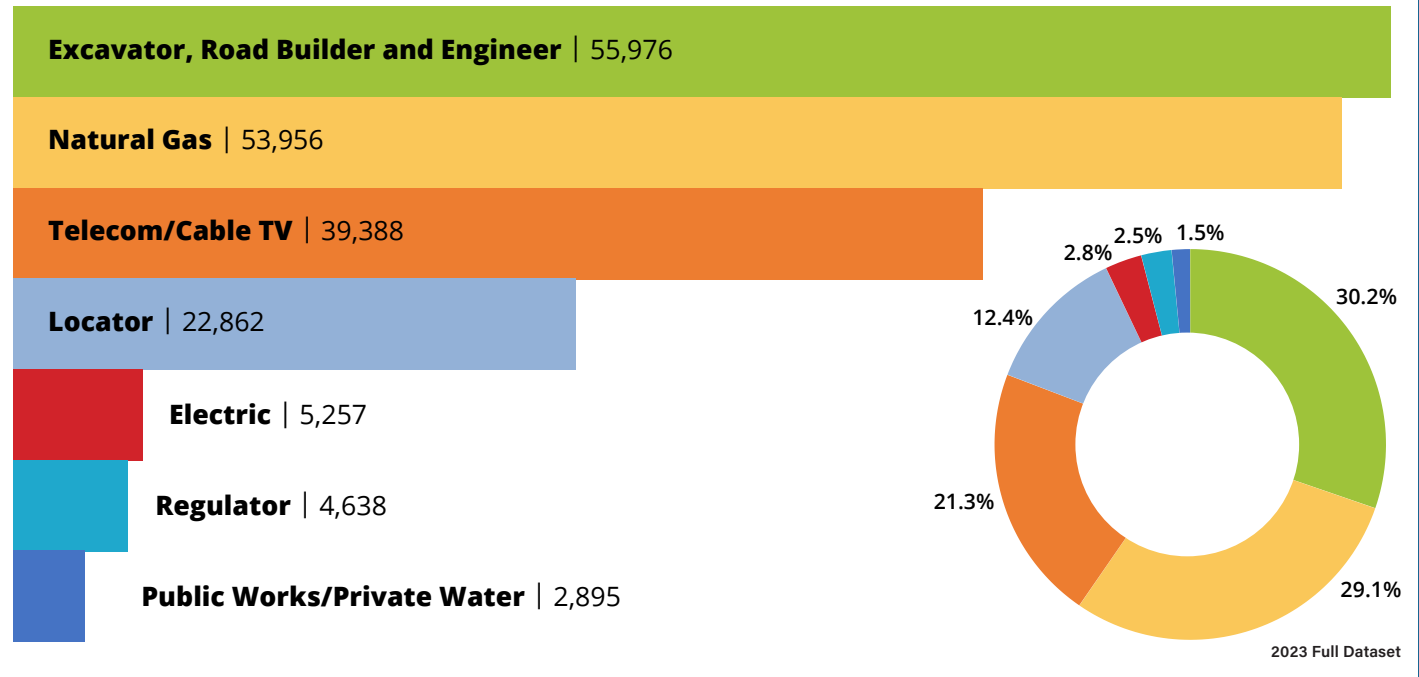
Root Cause Analysis Underscores Persistent Challenges

DIRT collects specific root cause data across 25 (known) categories, plus an "unknown/other" option. CGA's Data Committee also consolidates related causes into higher-level groups for macro trend analysis. Filtering out "unknown/other" focuses insights on identifiable failure points within the damage prevention system.

In this section of the Report, we present 2023 data as well as data from the three-year **consistent reporters dataset**. The consistent reporters dataset includes a representative sample of DIRT contributors from 2021-2023, including facility owners/operators, 811 centers, locators, excavators, public and private water utilities, and regulatory agencies. By focusing on consistent reporters, we can provide a more accurate and meaningful assessment of root cause trends over time, minimizing the impact of fluctuations in reporting patterns.

Click here to view definitions of damage root causes.

Root Cause Analysis Highlights

- As is most clearly demonstrated by observing the percent change between 2022-2023 in the individual root cause chart, **root causes remain remarkably consistent year-over-year**.

- For the third consecutive year, **the top six root causes made up nearly 76% of damages**, underscoring the need for targeted, urgent action to address these persistent challenges.

- The presence of all three major root cause groups within the top six individual root causes suggests that **comprehensive progress throughout the damage prevention process is required** to continue driving down damages.

- **Landscaping work** was most frequently associated with the top damage root cause: failure to notify the 811 center. For the other five leading root causes, **telecom work** was the most common type of work being performed when damages occurred.

- **Expanded reporting in recent years from the excavator stakeholder group** has driven what small fluctuations exist between root cause groups from 2021-2023.

Telecom and Landscaping Work Dominate Top 6 Root Causes

1   **No notification**   TOP WORK PERFORMED: **LANDSCAPING**

2   **Excavator failed to maintain clearance after verifying marks**   TOP WORK PERFORMED: **TELECOM**

3   **Facility not marked due to locator error**   TOP WORK PERFORMED: **TELECOM**

4   **Improper excavation practice not listed elsewhere**   TOP WORK PERFORMED: **TELECOM**

5   **Marked inaccurately due to locator error**   TOP WORK PERFORMED: **TELECOM**

6   **Excavator dug prior to verifying marks by potholing**   TOP WORK PERFORMED: **TELECOM**

Landscaping work was most frequently associated with the top damage root cause: failure to notify the 811 center.

2023 Individual Damage Root Causes *(Excluding Unknown)*

| ROOT CAUSE	2023 Reports	% of total	2022 Comparison
● No notification made to 811 center	35,825	26.23%	↑ 1.42%
● Excavator failed to maintain clearance after verifying marks	20,655	15.12%	↑ 1.66%
● Facility not marked due to locator error	19,712	14.43%	↓ -0.76%
● Improper excavation practice not listed elsewhere	11,201	8.20%	↑ 0.01%
● Marked inaccurately due to locator error	9,869	7.23%	↓ -1.11%
● Excavator dug prior to verifying marks by potholing	6,298	4.61%	↓ -0.90%
● Facility not marked due to no response from operator/ contract locator	4,566	3.34%	↑ 0.27%
● Excavator failed to shore excavation/support facilities	3,944	2.89%	↓ -0.63%
● Marks faded, lost or not maintained	3,168	2.32%	↑ 0.18%
● Excavator dug outside area described on ticket	2,730	2.00%	↑ 0.57%
● Site marked but incomplete at damage location	2,691	1.97%	↑ 0.11%
● Facility not marked due to incorrect facility record/map	2,677	1.96%	↓ -0.50%
● Excavator dug after valid ticket expired	2,592	1.90%	↓ -0.06%
● Excavator dug prior to valid start date/time	2,162	1.58%	↓ -0.44%
● Facility marked inaccurately due to incorrect facility record/map	2,055	1.50%	↑ 0.30%
● Facility not marked due to unlocateable facility	1,966	1.44%	↓ -0.08%
● Facility not marked due to abandoned facility	961	0.70%	↑ 0.37%
● Excavator provided incorrect notification information	923	0.68%	↑ 0.06%
● Facility marked inaccurately due to abandoned facility	708	0.52%	↓ -0.28%
● Facility marked inaccurately due to tracer wire issue	631	0.46%	↑ 0.15%
● Previous damage	381	0.28%	↓ -0.10%
● Facility not marked due to tracer wire issue	329	0.24%	↓ -0.07%
● Deteriorated facility	264	0.19%	↓ -0.13%
● 811 center error	174	0.13%	↓ -0.01%
● Improper backfilling	110	0.08%	↓ -0.02%

Total Reports
136,591

■ Excavation Practices   ■ Invalid Use of Request by Excavator   ■ Locating Practices   ■ Miscellaneous   ■ No Locate Request

Growth of the DPI Drives Fluctuations in Root Cause Groups

The changes in root cause groups over time can be explained by expanded excavator reporting, which in turn can be explained by the growth of the Damage Prevention Institute (DPI). In the three-year **consistent reporters dataset**, Locating Practices edge up while the Excavation Practices group declined as No Locate Request held steady.

The three-year trends of the individual root causes within each group were examined and no remarkable shifts were noted. To explore root causes in more detail, visit the **Interactive Dashboard**.

Damages by Root Cause Group

Invalid Use of Request by Excavator 6%

No Locate Request 26%

Locating Practices 34%

2023 Full Dataset

Excavation Practices 33%
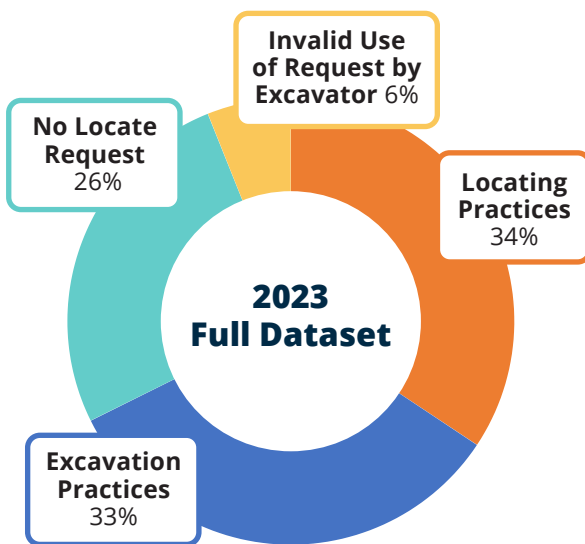
ROOT CAUSE	2021*	2022*	2023*
Locating Practices	28%	30%	31%
Excavation Practices	36%	36%	34%
No Locate Request	30%	28%	28%
Invalid Use of Request by Excavator	6%	6%	6%

* Consistent reporters dataset

Late Locates: An Ongoing Challenge

The 2022 DIRT Report analyzed data from seven states to conclude that as often as 56% of the time, excavators were unable to legally begin work due to late or missing locates, or lack of positive response that the site is clear of buried facilities. In reviewing 2023 data, **we broadened to include information gathered from 12 states and corroborated this finding**: The results suggest that excavators face what amounts to a coin toss in expecting to be able to begin work by the ticket start date, highlighting a significant inefficiency in the 811 process and a safety concern.

Late Locate Analysis Highlights

- Because of late or missing locates, **excavators have little predictability as to whether they will legally be able to begin work** on their planned start dates.

- Improved data tracking and reporting is necessary for the industry's ability to analyze and correct locating issues, and **811 centers can play key roles in working toward a standard metric**.

- State case studies in data analysis, enforcement and collaboration **underscore innovative methods for increasing the timely delivery of accurate locates**.

To assess the state of locating in 2023, we analyzed 811 center data from states with varying requirements around positive response, including states with and without a positive response system. Across 12 states, reported data on the percentage of tickets where all locates were delivered on time ranged from 30-70%, **with most hovering around 50%**. Unpredictability contributes to excavators' failure of confidence in the 811 system, and needs to be addressed – particularly in order to make progress on reducing the top damage root cause year after year: failure to notify 811.

Can Excavators Start Jobs On Time?

It's a coin toss.

Measuring On-Time Locates

States have a range of barriers inhibiting apples-to-apples analysis of locating performance:

- Some 811 center members handle multiple facilities on the same ticket, such as a municipality that provides water and sewer.

- Responses in the positive response system are not always equal to transmissions. One transmission could require two or three responses.

- Positive responses in some software systems are posted to the ticket rather than each transmission.

- The excavator and locator may negotiate a marking schedule without the positive response system being updated.

- There are degrees of lateness – a few hours versus days or weeks.

- Legitimate reasons for a locate to be late, but still legal, exist.

Georgia 811's Excavation Readiness Metric

Complicating analysis on this issue is the lack of a consistent method for tracking the timely delivery of locates across states and 811 center software systems. **Georgia 811 has developed an "excavation readiness" metric that could serve as a guide** for other 811 centers in creating an industry standard for evaluating locating.

Using expired tickets as a monthly denominator value, Georgia 811 queries its positive response system to produce figures for tickets that have disputed responses, no responses and incomplete responses ("Not Ready"), as well as those that have complete and "Excavation Ready" positive responses, to generate an excavation readiness score.

Through adoption of similarly-structured positive response system queries or other data infrastructure manipulation, **811 centers across the U.S. must evolve toward a consistent methodology for tracking locating timeliness.** CGA's One Call Systems International (OCSI) Committee and Damage Prevention Institute (DPI) are both examining mechanisms for establishing, generating and collecting this data on a regular basis to improve the industry's ability to correct this troubling trend.

Excavation Readiness (January)	
Tickets Expired	69,797
Not Ready	30,836
Tickets with Disputed Responses	1,441
Excavations with a No Response	276
Excavations Ready	38,961
Percent Disputed	2.1%
Percent No Response	0.4%
Normal Excavation Readiness	**55.8%**

New Mexico and Massachusetts' Creative Approaches to Locating Enforcement

New Mexico's damage prevention law has a unique enforcement mechanism for improving utility locating practices and reducing damages to underground facilities. The state's regulations require excavators to submit "warning locate requests" via New Mexico 811 (NM811) when underground facilities haven't been marked and positive responses haven't been provided. This process **creates accountability and establishes a clear procedure for addressing delays in the locating process**.

Under these regulations, facility operators are required to respond promptly to warning locate requests, ideally within two hours. NM811 is required to make positive response records available to the state's Public Regulatory Commission's Pipeline Safety Bureau (PSB) for investigating alleged violations. To ensure compliance, the New Mexico PSB began issuing fines to facility operators in 2020. These fines, set at a minimum of $811, are issued on a monthly basis.

The regulations also offer financial protection to excavators. In cases where facility owners fail to mark or provide a timely positive response, excavators can recover reasonable

New Mexico's Warning Locate Requests

| Year	Tickets With One or More Facility Owner Warnings	Warning Transmissions to Facility Owners
2018	914	6,277
2019	1,297	8,587
2020	592	3,265
2021	760	3,816
2022	935	4,954
2023	1,494	14,837

"downtime" costs. This provision safeguards excavators from undue financial burden and also serves as a powerful incentive for facility owners to complete locates promptly.

While the data to the left provides important information about the state's efforts to improve locating timeliness, it does not give us a clear picture of excavation readiness in New Mexico over time. However, the state's multi-faceted approach, combining clear regulations, strict enforcement and ongoing education, could serve as a model for others looking for enforcement mechanisms for timely utility locating.

For another model of creative locating enforcement, we can look to a case study from the Massachusetts Department of Public Utilities (MA DPU) featured in CGA's recently published **DIRT Special Report: Uncovering Contributing Factors to Locating Practice Errors**. The MA DPU's Pipeline Safety Division, Damage Prevention Program (Division) oversees the enforcement of the state's dig laws. While analyzing utility damage data, the Division identified two non-gas operators that were failing to complete locate markouts within the required timeframes. Further review revealed critical gaps in the locating and marking process, particularly including communication between the operators and third-party locators.

Rather than immediately impose significant financial penalties, **the Division worked with the non-gas operators on an improvement plan**, which included an increase of daily locate audits, an extended training program, additional staffing resources and improved frequency of reporting with other parties. As a result of the plan's implementation, the Division has seen the **rate of on-time locates improve to nearly 100%** for the two operators. This example of collaborative problem-solving by regulators with facility operators to improve locating timeliness is a model that could be employed across the country to enforce locating timeliness.
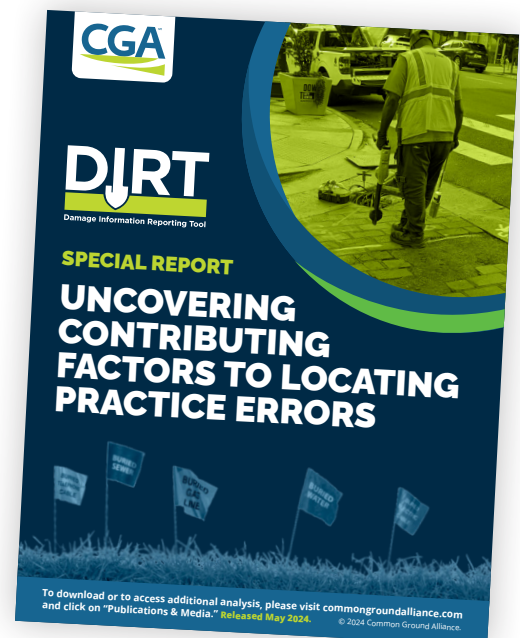
Minnesota Leverages Locating Activity to Improve Facility Maps

In an effort to leverage high locating demand to improve facility maps and ultimately make locating more efficient, Gopher State One Call (GSOC), the 811 center serving Minnesota, launched an innovative pilot program to **provide GPS-enabled utility locating devices to municipalities and other stakeholders**. The program provides free trials of locating devices

with real-time kinematic (RTK) Global Navigation Satellite System (GNSS) accuracy available to damage prevention stakeholders across the state, including municipalities, engineering/design firms, contractors, universities and facility owners.

The pilot enables field staff to seamlessly feed highly accurate facility location data back into mapping software, addressing the time and expense of updating legacy maps. By providing free trials of the GPS-enabled locators, the program has empowered participants to demonstrate the value of this technology and justify its implementation. Participants have reported significant improvements, including 50% reductions in field time for engineers and the ability for public works departments to produce more accurate maps while performing locates.

The success of this program highlights the potential for leveraging GPS data collected during the locating process to create and update facility maps in real-time. This approach can lead to improved locating efficiency, reduced damages and better asset management across the industry. CGA's **Next Practices Initiative** has published a detailed case study about this pilot program, which is **available online**.

North Carolina Leads Collaborative and Data-Driven Locating Analysis

North Carolina has emerged as a leader in collaborative and data-driven approaches to improve locating efficiency and safety. As documented in the **DIRT Special Report on Locating Practice Errors**, North Carolina 811 (NC811) conducted an in-depth analysis of ticket screening effects, focusing on "cleared" tickets that were later re-issued because the excavator found evidence of unmarked facilities at the work site. The study revealed that **damages occurring after re-issuance had significantly higher percentages of locating practice-related root causes (45%) compared to the national average for all damages** (with and without tickets).

Additionally, damage-per-ticket ratios were notably higher for re-issued tickets compared to overall damage data. While systemic issues like outdated facility maps, business practices and/or aggressive policies aimed at reducing workloads despite risks may contribute to improper screening, NC811's findings identify screening as an issue needing further analysis and solutions from operators. As an industry, we must **consider the impact that improper ticket screening can have on both damage rates and excavators' confidence in the 811 system** going forward.

Broadband deployments in the state have also benefited from NC811's collaborative role in facilitating stakeholder coordination: Another case study from the **DIRT Special Report on**

Locating Practice Errors details Google Fiber's (GFiber) 39% decrease in locate-related project delays, with the largest improvements occurring in North Carolina, where several large-scale deployments are underway. This improved efficiency was gained by **reducing short-notice locates and remarks, fostering increased trust and a safer work environment**.

Upon conducting an end-to-end review of projects across 10 states, GFiber found that the greatest opportunity to minimize locate-related delays included early and improved coordination with locators for peer utilities; implementing enhancements that focused on providing rolling forecasts of buildouts and collecting ongoing feedback; and the inclusion of locate companies in preconstruction meetings.

Both case studies underscore the importance of data-informed, collaborative approaches to addressing our significant challenges with locating across the U.S.

Enhancing Data Quality and Collaboration

CGA's Data Reporting and Evaluation Committee is spearheading several initiatives to enhance data quality and consistency, enabling stakeholders to focus corrective actions where they can have the most substantial impact. These efforts are crucial for reaching our 50-in-5 goal. Without detailed information on root causes, work types and other key data, the industry's ability to target improvements effectively is limited. Conversely, when organizations have access to robust, high-quality data, they can more effectively allocate resources to improvement efforts and track progress over time.

Data Improvement Highlights

- The **impact of "unknown" categories in data analysis is significant** and may be masking important trends.

- North Carolina 811's success story demonstrates how **focused improvement efforts can significantly enhance Data Quality Index (DQI) scores**, reduce unknown root causes and drive actionable damage insights.

- CGA's Data Committee has developed a **new root cause analysis flow chart to guide users in selecting more specific root causes**, aiming to reduce reliance on catch-all categories and uncover deeper issues.

- While work type represents the largest category of "unknown" data in DIRT, classification even of known work types is also a challenge, **with efforts underway to standardize mapping of information to this critical data point**.

- CGA is reviewing and documenting the complexities of mandatory reporting across states through a comprehensive survey of 811 centers and state regulators, aiming to **clarify requirements and improve data analysis**.

A Model for Data Quality Index (DQI) Improvement

On a foundational level, it is critical for every organization to not only submit damage and near-miss data to DIRT, but also to **regularly assess and improve the quality of data**. DIRT provides a **Data Quality Index (DQI)** score that gives submitters actionable information about the completeness of their reports, and where it's most important to improve quality.

DQI enhancements can drive our ability to test hypotheses and develop insights – for example, NC811's intentional DQI improvement enabled the 811 center to analyze damages associated with locating practice errors as described in the preceding section of this Report. State regulations require excavators to report damages to NC811, which then uses an API to enter the information into DIRT.

In 2021, NC811 began a focused effort to improve its data quality. Initially, its average DQI was in the low 50s, largely due to the frequent reporting of "other" instead of specific root causes. By implementing a process change that included a dropdown menu of DIRT root causes and training customer service representatives to capture this information, **NC811 dramatically improved its DQI to 79.5 in 2023, with unknown root causes dropping from nearly 100% to around 8%**.

Refining Root Cause Analysis

To further improve root cause data and enable DQI improvements, the **Data Committee developed a flow chart to guide users through selecting the most appropriate root cause**. This tool aims to reduce reliance on catch-all categories like "Locator Error" and "Improper Excavation" by encouraging consideration of more specific root causes before defaulting to these broader categories. While these catch-all categories are preferable to "Unknown/Other," they can mask deeper issues that need to be addressed.

The development of this flow chart raised important questions about how to handle situations where an area was marked but the 811 ticket was invalid. While many organizations might draw from repair-claims or enforcement-based data to categorize these incidents as No Locate Request or one of the Invalid Use of Ticket by Excavator root causes, the Data Committee's approach encourages a more nuanced analysis. **By focusing on the true root cause** – defined as the point where a change in behavior could reasonably lead to a different outcome – **this method can help facility operators identify internal issues they can control, even in cases of invalid tickets**.

Root Cause: The predominant reason that the event occurred. (Best Practices) For purposes of the DIRT, the point where a change in behavior would reasonably be expected to lead to a change in the outcome, i.e. avoidance of the event. *For definitions and further explanation, please see Part I of the DIRT Users Guide.*

New damage reported or previous damage suspected.

Does it look deteriorated (corrosion/graphitized)?

Does it look like previous excavator damage (leaking/broken)?

YES → ○ MISC ROOT CAUSE — Deteriorated facility

NO → **NEW DAMAGE REPORT** ← NO — YES

Can you identify the damaging party? — NO

YES → ○ MISC ROOT CAUSE — Previous damage

Treat as "Reported Damage" ← YES

Was there a ticket/valid ticket?
(Ticket is valid for the date, time, location, and person(s) excavating)

NO

Was the area marked? — NO — YES — **Was the area marked?** — YES — NO

YES

Consideration for internal quality control for operator or locator: Would a valid ticket likely have prevented the damage? — NO — **Was the damage within the tolerance zone based on the marks?**

YES

Did excavator fail to maintain marks or request refresh marks? — YES → ◎ EXCAVATION ISSUE — Marks faded or not maintained

NO

Select One:

- ◯ NOTIFICATION ISSUE — No notification made to One Call Center / 811
- ◯ INVALID USE OF REQUEST BY EXCAVATOR — Excavator provided incorrect notification information
- ◯ INVALID USE OF REQUEST BY EXCAVATOR — Excavator dug after valid ticket expired
- ◯ INVALID USE OF REQUEST BY EXCAVATOR — Excavator dug outside area described on ticket
- ◯ INVALID USE OF REQUEST BY EXCAVATOR — Excavator dug prior to valid start date / time
- ○ MISC ROOT CAUSE — 811/One Call Center error

YES ← NO

Did excavator visually verify/expose before excavating (pothole)? — NO → ◎ EXCAVATION ISSUE — Excavator dug prior to verifying marks by test-hole *(pothole)*

YES

Did excavator fail to maintain marks or request refresh marks? — YES → ◎ EXCAVATION ISSUE — Marks faded or not maintained

NO

Did the excavator fail to maintain clearance after verifying marks? — YES → ◎ EXCAVATION ISSUE — Excavator failed to maintain clearance after verifying marks

NO

Did the excavator fail to protect/support exposed facility? — YES → ◎ EXCAVATION ISSUE — Excavator failed to protect / shore / support facilities

NO

Did excavator fail to use caution while backfilling facility? — YES → ◎ EXCAVATION ISSUE — Improper backfilling practices

NO

Were other insufficient practice use? Other cause? (explain) — YES → ◎ EXCAVATION ISSUE — Improper excavation practice not listed above

NO

○ MISC ROOT CAUSE — Root cause not listed *(comment required)*

YES — NO

Was facility inaccurately documented in GIS / as-built maps? — NO → ◎ FACILITY MARKED INACCURATELY — Incorrect facility records / maps

YES

Was facility inaccurately marked because of a conflict with abandoned facility? — YES → ◎ FACILITY MARKED INACCURATELY — Abandoned facility

NO

Was facility inaccurately marked due to tracer wire issue? — YES → ◎ FACILITY MARKED INACCURATELY — Tracer wire issue

NO

Was it marked inaccurately due to operator / locator error? — YES → ◎ FACILITY MARKED INACCURATELY — Locator error

NO

○ MISC ROOT CAUSE — Root cause not listed *(Comment Required)*

Did excavator fail to maintain marks or request refresh marks? — YES → ◎ EXCAVATION ISSUE — Marks faded or not maintained

NO

Was there no response from the operator / locator? — YES → ○ FACILITY NOT MARKED — No response from operator / contract locator

NO

Was the facility not marked because of a conflict with abandoned facility? — YES → ○ FACILITY NOT MARKED — Abandoned facility

NO

Was the facility not documented in GIS/ as-built map properly? — YES → ○ FACILITY NOT MARKED — Incorrect facility records / maps

NO

Was the facility not marked due to tracer wire issue? — YES → ○ FACILITY NOT MARKED — Tracer wire issue

NO

Were marks incomplete at the damage location? — YES → ○ FACILITY NOT MARKED — Incomplete marks at damage location

NO

Was the facility unable to be located? — YES → ○ FACILITY NOT MARKED — Unlocatable facility

NO

Was it an operator / locator error? — YES → ○ FACILITY NOT MARKED — Locator error

NO

○ MISC ROOT CAUSE — Root cause not listed *(comment required)*

● Excavation Practices ● Invalid Use of Request by Excavator ● Locating Practices ● Miscellaneous ● No Locate Request
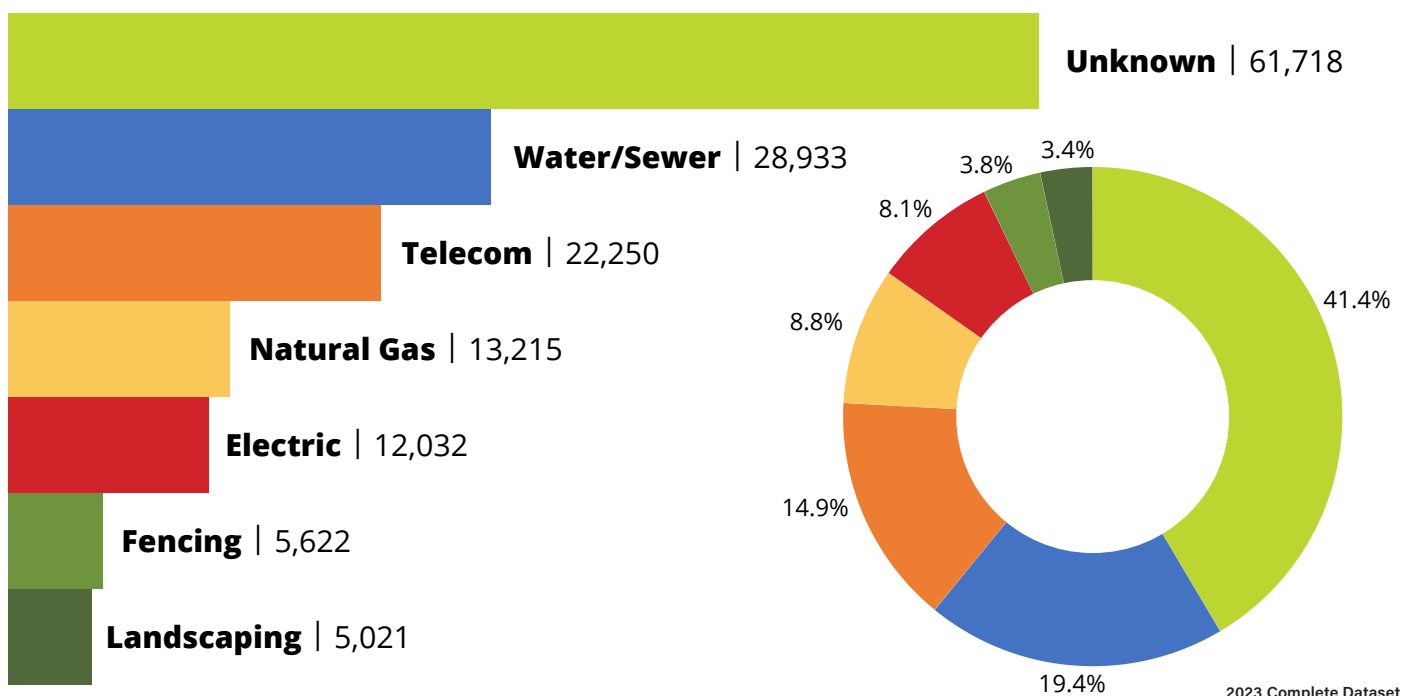
Improving Work Type Classification

One of the most challenging aspects of DIRT data collection is accurately capturing the type of work performed. This data point consistently has the highest percentage of unknown entries, despite its potential value in tailoring outreach and education efforts to specific stakeholder groups. For example, fencing and landscaping contractors have different issues than fiber installers.

How much does telecom work contribute to damages?

Telecom work is the leading individual known work type associated with damages, but nearly three times as many damages are reported as "unknown." Presenting data as percent known assumes that what's masked in the unknown data follows the same patterns as known data.

Unknown Work Type Dominates

Unknown | 61,718
Water/Sewer | 28,933
Telecom | 22,250
Natural Gas | 13,215
Electric | 12,032
Fencing | 5,622
Landscaping | 5,021

41.4%
19.4%
14.9%
8.8%
8.1%
3.8%
3.4%

2023 Complete Dataset

The Data Committee is collaborating with OCSI to develop a **comprehensive list of common work types** from 811 tickets, with the **goal of creating a searchable tool that maps these to recommended DIRT selections**. Currently, some 811 centers accept any free-text description for work type, and there can be numerous ways of describing the same work. There are 30 "known" work type options in DIRT, but some 811 centers have hundreds or thousands in their systems. The Data Committee's initiative to map common work types will encourage 811 centers to map to standardized work type classifications, leading to more consistent data analysis and potentially new or revised work type options in DIRT.

Common Work Types From 811 Tickets	
811 Center Work Type Example	**DIRT Match**
Anchors/Footings - Installation	Bldg. Construction
Footings/Foundation Work - New Dwelling	Bldg. Construction
General Construction/Commercial/Residential/Site	Bldg. Construction
Fiber - Bury Drop/Line/Main	Telecommunications
Fiber - Federal Grant Install/Repair	Telecommunications
Telephone - Pole/Anchor	Telecommunications
Secondary/Reclaimed Water - Install New Assets	Water
Water - Filtration/Softener	Water
Water - Install Line/Main/Tap	Water

Understanding Mandatory Reporting Requirements

To address common questions about mandatory reporting and its impact on data quality and damage rates, CGA conducted a survey of 811 centers and state regulators in early 2024. The survey aimed to **clarify various state damage reporting requirements and their relationship to DIRT reporting**. Results were categorized into five groups based on the level and nature of reporting requirements, ranging from basic notification of damages to comprehensive reporting systems.

This survey serves multiple purposes: it helps establish parameters for defining "mandatory reporting states," provides resources for stakeholders to understand and comply with state requirements and informs the evaluation of how mandatory reporting considerations affect DIRT data analysis. By clarifying these aspects, CGA aims to **improve data quality and consistency across the industry**, ultimately contributing to more effective damage prevention strategies.

State Reporting Requirement Categories

1 Immediate reporting to affected operator and/or 811 center for repairs/ emergency response

2 Immediate reporting of damages to PSC/ PUC as part of pipeline safety rules

3 Reporting of "violations" or "complaints" to a PSC/PUC or Enforcement Board (May accept what comes to them but NO "mandatory" duty to report)

4 Required reporting to an 811 center or PSC

5 Required reporting into DIRT as part of a state enforcement program (often with VPD/Network)

- *1 to 4 may or may not find their way into DIRT*
- *3 to 5 may have varying report due dates after event*
- *Some states could have 1 and/or 2, PLUS 4, 3, or 5*
- *"Required" could be limited to different combinations of facility operators (all or gas/liquid pipelines) and/or excavators*

How Reporting Requirements Influence Data Analysis

State A requires excavators to report damages by telephone to the 811 center, which voluntarily enters the data into DIRT. State A's root cause data leans toward Locating Practices.

State B requires gas and liquid pipelines to enter damages into a DIRT Data Network. Its root cause data leans toward No Locate Request and Excavating Practices.

Are Locating Practices truly worse in State A?

Different "mandatory reporting" rules may contribute to some stakeholders being overrepresented in a state's data, which may skew root causes and other data points.

DPI | DPI's Role in Developing Next-Generation Metrics and Rapid Data Analysis

As CGA continues to drive damage prevention industry data collection, standardization and analysis, the Damage Prevention Institute (DPI) plays a crucial role in creating an environment of shared accountability for all stakeholders. The purpose of the the DPI is to deliver additional insights into the systemic behaviors that lead to improved safety outcomes in the damage prevention industry.

DPI Highlights

- DPI extends and accelerates CGA's data collection efforts through mandatory monthly DIRT reporting and submission of **stakeholder-specific damage prevention metrics**.

- **DPI participants demonstrate higher DQI scores** compared to non-participants, improving the overall quality of the DIRT dataset.

- Preliminary analysis of DPI data reveals that **companies with 10-49 employees have a higher damage rate** compared to both smaller and larger companies, possibly due to variations in the maturity of their damage prevention programs.

- **Interactive dashboards and data views**, allowing anonymous performance comparisons among peers, are in development and scheduled for release by the end of 2024.

Reporting requirements for DPI participants are established through a collaborative process involving the DPI Metrics Committee, the DPI Advisory Committee and the CGA Board of Directors. Monthly reporting of damages into DIRT is mandatory for CGA members participating in the DPI. This rigorous reporting schedule is designed to enhance our ability to react more quickly to damage data trends. Currently, DPI-eligible stakeholders include excavators, locators, design and engineering firms, and facility owner/operators, each playing a vital role in the damage prevention ecosystem.

The DPI Metrics Committee works closely with CGA's Data Committee to collaborate on cross-industry data initiatives supporting damage prevention. As DPI matures and expands to include additional stakeholders, it can provide mechanisms for **helping the industry improve DIRT DQI and standardize metrics** for key areas of inquiry like on-time and accurate locating.

DPI Data Insights

Preliminary analysis of the data collected from DPI participants has already yielded valuable insights. For example, DPI identified that participating companies with 10-49 employees have a higher damage rate compared to both smaller and larger companies. This finding **may be attributed to variations in the maturity of damage prevention programs among companies of different sizes**. These insights are instrumental in shaping how CGA can best support its members through targeted peer reviews, education and other DPI program activities.

Damages per 10,000 Work Hours by Employee Count

Employee Count	Damages per 10,000 Work Hours
1 - 9	0.46
10 - 49	1.86
50 - 99	0.83
100 - 999	0.35
1,000+	0.71
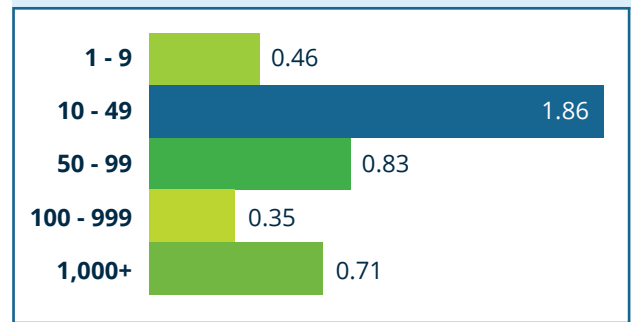
The Relationship Between DPI and DQI

High-quality data quality is essential for effective analysis in DPI. Participants are required to submit more complete DIRT reports than typical DIRT users. These enhanced submissions result in a higher DQI for DPI data, providing a more comprehensive dataset for analysis.

Analysis of the 2023 DIRT dataset reveals that DPI participants achieve a higher average DQI compared to non-participants, which in turn raises the overall DQI of the entire DIRT dataset. This improvement in data quality enhances the reliability and usefulness of the collected information for industry-wide analysis and decision-making.

	# of Reports	Average DQI
DPI Participants	32,294	83
Non DPI Participants	189,253	69
Combined Total	221,547	71

Performance-Driven Industry Benchmarking

Baseline performance metrics have been developed for each stakeholder group to ensure comprehensive evaluation. **Excavators**, for instance, are measured on their damage rate, which is calculated as the number of damages caused by excavator practices per 10,000 work hours. For **locators**, the metrics focus on marking timeliness and damages attributable to locator performance. **Facility owner/operators** are evaluated on their management of mapping processes and their handling of trouble locate tickets.

The DPI Metrics Committee has established three task teams to refine our measurement framework. These teams focus on evaluating DPI metrics to ensure they are meaningful and support improvement across the industry.

Excavator Metrics

Damages Attributable to Excavator Practices *Divided by* 10,000 Work Hours

Numerator: Damage reports for the month with the following root cause in DIRT:

Notification issue
- ☐ No notification made to a One Call Center/811
- ☐ Excavator dug outside of area described on ticket
- ☐ Excavator dug prior to valid state date/time
- ☐ Excavator dug after valid ticket expired
- ☐ Excavator provided incorrect notification information

Excavation issue
- ☐ Excavator dug prior to verifying marks by test-hole (pothole)
- ☐ Excavator failed to maintain clearance after verifying marks
- ☐ Marks faded or not maintained
- ☐ Excavator failed to protect/shore/support facilities
- ☐ Improper backfilling practices
- ☐ Improper excavation practice not listed above

Denominator: Work hours *(see definition of **actual work hours** below)* in the month, divided by 10,000.

DEFINITIONS

Work hours *are defined as: **actual work hours, per state**. Hours worked should include all employee work hours (including all types of work, projects and customers) over the month per state for the entire organization. If work hours are not available for employees on salary or commission, hours worked may be estimated on the basis of scheduled hours or eight hours per workday (per OSHA's TRIR calculation definition of work hours).*

Locator Metrics

On-Time Tickets *Divided by* Total Number of Tickets

Numerator: Total number of locate tickets marked or cleared on time, but utility type, per state.

Denominator: Number of locate tickets received in the month by utility type, per state *(see definition of locate ticket below)*.

Damages with Locating Issue Root Cause *Divided by* 1,000 Locate Tickets Received

Numerator: Damages with locator root cause attributable to:

Locating issue

Facility not marked do to: ☐ Locating error ☐ No response from operator/contract locator

Facility marked inaccurately due to: ☐ Locating error

Denominator: Number of locate tickets *(see definition of **locate ticket** below)* received in the month, divided by 1,000.

DEFINITIONS

Locate ticket *is defined as: Each locate request issued by the 811 center with a unique identifier, excluding damage tickets, design tickets, or tickets that do not require a mark-out or clear. These include refresh/renewal tickets, even if the original ticket number does not change. For example, tickets #12345 and #12345-rev1 are counted separately. For **single-locate tickets** that require marking more than one underground facility type, count each facility type separately.*

On-time locates *are defined as: Those considered in compliance with the corresponding state law and/or regulatory requirements.*

Facility Owner/Operator Metrics

Damages with Mapping Error Root Cause *Divided by* 1,000 Locate Tickets Received

Numerator: Damage reports for the month with the following root causes in DIRT:

Locating issue

Facility not marked do to: ☐ Incorrect facility records/maps (includes no maps)

Facility marked inaccurately due to: ☐ Incorrect facility records/maps (includes no maps)

Denominator: Number of locate tickets *(see definition of **locate ticket** on previous page)* received in the month, divided by 1,000.

Projects Completed *Divided by* Number of Mapping Records Updates to Records Department

Numerator: Number of installation and/or replacement projects completed in the month. Only count completed projects that necessitate an update to mapping records.

Denominator: Number of times in the month that mapping record updates were provided to the internal mapping records department (or equivalent department).

DEFINITIONS

Trouble locate ticket *is defined as: A trouble ticket occurs when, upon initial arrival at the location, the tolerance zone for an existing facility cannot be established with confidence consistent with the law and the owner/operator's requirements. A trouble locate ticket is escalated internally for advanced/enhanced resolution measures (e.g., vacuum truck, line tracer, ground penetrating radar, in-line 3D gyro mapping technology, etc.).*

Mapping records updates *are defined as: Any changes to mapping records associated with new facilities and any facility work that requires a modification to existing mapping records.*

Peer Review Encourages Improved Performance and Collaborative Problem-Solving

The DPI has also implemented a peer review model aimed at fostering collaboration and knowledge-sharing within the industry. The goal of this model is for participants to **share key successes and challenges** in reducing dig-ins to buried infrastructure, and to **collaborate on industry benchmarking** and systemic improvements.

Following a pilot program in spring 2024, which received positive feedback from participating excavators, a more robust peer review process is set to launch in fall 2024. Participants in the pilot program noted that it helped connect and build a network where learning and understanding of common challenges and solutions could be shared to influence the entire damage prevention industry.

Accreditation Requires Leadership Commitment

Participation in the DPI is synonymous with seeking DPI accreditation and fulfilling data submission and peer review responsibilities. While some stakeholders may choose to require DPI participation from their contractors, CGA does not mandate participation for any organization.

Stakeholder-specific accreditation criteria have been established to enhance damage prevention through shared accountability. **Accreditation from the DPI demonstrates an organization's leadership in damage prevention through commitment to true shared accountability.**

The Value of DPI

The value of the DPI extends beyond individual organizational performance documentation. By enabling comparisons to industry benchmarks and facilitating analysis of behaviors that lead to different damage prevention outcomes, the **DPI fosters a culture of continuous improvement**. Achieving reductions in damages requires individual organizations in the industry to be accountable for their shared responsibilities.The program creates healthy competition regarding improved safety, while peer reviews empower participants to enhance their performance with the support of industry peers.

Looking ahead, **CGA is actively developing interactive dashboards and data views that will allow participants to visualize their own performance in comparison to their peers**. These tools, slated for release by the end of 2024, will provide valuable insights while maintaining data privacy through anonymization and password protection. As the DPI continues to evolve, it promises to be an invaluable resource in the ongoing effort to reduce damages to underground infrastructure and improve safety across the industry.

There's more to uncover.

Visit the **DIRT Interactive Dashboard** to explore 2021-2023 damage data in-depth. Use the DIRT Explorer to filter data by geography, stakeholder group, facility damaged, equipment type and more. State- and province-level data is available as well.