



# Improving Upon Our Dig Laws:

Excavation Damage, Data, and Trends for  
Industry and Policymaker Analysis (2018 Data)

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# EXECUTIVE SUMMARY

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Every year, the Common Ground Alliance (CGA) publishes its Damage Information Reporting Tool (DIRT) Report with the latest available annual data. Through that report, industry leaders and policymakers gain insight into recent trends in excavation damage and near misses of buried facilities. In 2016, the Alliance for Innovation and Infrastructure (Aii) analyzed and synthesized the latest findings to present a streamlined view of the data along with recommendations for state- and federal-level policymakers and CGA to further improve safety and efficiency.

This paper continues that review and analysis by looking at the data behind the most recent annual report, *Damage Information Reporting Tool, Volume 15 (2018)*. Here, we highlight the increase in estimated damages and discuss the root causes that continue to lead to damage incidents. Finally, we make recommendations for state and federal regulators regarding public safety and damage prevention; and we recommend options for CGA to improve data collection, analysis, and display.

## **The primary takeaways from the 2018 DIRT Report:**

- Estimated total damage incidents increased by 16 percent over the prior year.
- “Notification Not Made” is the single greatest root cause at 26 percent of incidents, and has accounted for a quarter of all incidents for the past six years.
- Damages due to “Locating Issues” increased, accounting for 24 percent of the root causes of damage incidents.
- Per the report, in 2018, telecommunications facilities were the most often damaged (48%) followed by natural gas (28%).

**Based on our review of the 2018 DIRT Report, we recommend that all states and the federal government consider the following:**

- Implement the recommendations of the Pipeline and Hazardous Materials Safety Administration (PHMSA) in their 2017 *Report to Congress on Improving Damage Prevention Technology*;
- Increase enforcement and compliance measures to encourage greater adherence to laws and regulations, and incentivize use of best practices; and
- Require mandatory incident reporting to ensure future DIRT reports and federal databases have accurate excavation incident information.

**To improve the efficacy of DIRT, CGA should consider the following:**

- Make more DIRT fields mandatory to improve data quality and work to expand reporting participation in low-reporting states; and
- Limit future changes to root causes, groupings, and data presentation to better facilitate year-to-year comparison of data.

# INTRODUCTION

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This paper examines the Common Ground Alliance’s most recent annual excavation damage data report, *Damage Information Reporting Tool, Volume 15 (2018)* (the “DIRT Report”). The DIRT Report is a bedrock resource for damage prevention safety efforts. However, while looking at what the DIRT data tells us, it is equally important to look at what it does not tell us. We provide a review of the data contained in the report, insight into some of the conclusions that can and cannot be drawn, and make recommendations of where to focus future efforts to improve excavation safety.

In Aii’s previous paper, we made two main recommendations.<sup>1</sup> These were to organize data by state rather than by region and to expand root cause descriptions to capture more nuanced explanatory data. The DIRT online dashboard has been subsequently added, allowing data to be viewed by state, and root causes have been expanded. In this paper, in addition to discussing the data from 2018, we assess other changes CGA has made to its DIRT platform and present where additional improvements can be made.

CGA begins its most recent DIRT Report with a recommendations section.<sup>2</sup> These recommendations, which include minimizing “unknown” data entries, reducing “no notification” damages, and promoting pot-holing as a best practice, along with others, are excellent goals and areas for improvement. We encourage CGA to take action on these recommendations as well as those presented here.

This paper also explores the limitation of the DIRT Report both in terms of its accuracy and readability. Concerning accuracy, the voluntary reporting system makes comprehensive data difficult to attain, and the statistical modeling needed to adjust the voluntarily reported actual data into an Estimated Total creates ranges so wide that no clear trend can be definitively stated. Regarding readability, the report is a wealth of statistics and graphics, which require extensive review to understand. Through this analysis, we pull out some of the key data and statistics to provide readers with a concise picture of excavation damage from 2018.

<sup>1</sup> Alliance for Innovation and Infrastructure, *Improving Our Dig Laws*, August 2016.

<sup>2</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15*, September 2019, at pp. 7-9.

*In this paper, we make reference to:*

***Common Ground Alliance***

The Common Ground Alliance (CGA) is a member-driven association focused on “saving lives and preventing damage to underground infrastructure by promoting effective damage prevention practices.” CGA’s stated mission is to “provide clear and tangible value to [its] stakeholders by helping to reduce damages to North America’s underground infrastructure.”

***Damage Information Reporting Tool***

In 2005, CGA began publishing an annual report detailing damage prevention incident data. That report, the Damage Information Reporting Tool (DIRT) provides a summary and analysis of all submitted “events” for the year prior to publication. An “event” is defined by CGA as “the occurrence of downtime, damages, and near misses” during excavation. DIRT allows parties to submit events anonymously to encourage participation and facilitate a more comprehensive database.

# OVERVIEW OF EVENTS

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The DIRT Report analyzes a total of 440,749 reported damage and near miss events submitted for 2018.<sup>3</sup> After filtering the data to eliminate multiple reports of the same incident, the total damage and near miss events come to 341,609 unique incidents reported.<sup>4</sup> This number of unique events is at an all-time high for DIRT. After taking the raw numbers and filtering for redundancy, CGA applies its own model to estimate the total damages that may have occurred, in an effort to account for those incidents not reported.

**Total damage incidents for 2018 is estimated to be 509,000.** That is up 16 percent from the 439,000 incidents estimated for 2017. The 509,000 statistic is the estimate based on reported unique events adjusted to account for unreported damages. While the estimated number of damage incidents is trending higher, it is important to note that DIRT is composed of voluntary submissions. This means that increases or decreases in reported damage could relate, at least in part, to a greater or lesser percentage of damages being reported rather than more or less damage taking place.

Some states report fewer than 10 excavation incidents each year.<sup>5</sup> The sheer scale of underground utilities across America –over 20 million miles of telecom, electrical, pipeline, and other utility lines<sup>6</sup> – make such low incident numbers almost certainly a failure in reporting due to the voluntary nature of reporting, not a success of damage prevention.

## *Who is Submitting Data?*

**Utility locating firms are responsible for well over half of the submissions included in the 2018 DIRT data set.** Locate firms submitted approximately 64 percent of reported events, while natural gas facility operators accounted for roughly 16 percent of submissions, followed by telecommunications at 8 percent, and excavators at just over 7 percent. The remaining 4 percent of submissions were made by (in order from most to least): electric facilities, road builders, public works, “unknown”, liquid pipe, private works, state regulators, railroads, engineer/design, and equipment manufacturer.<sup>7</sup>

<sup>3</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 5.

<sup>4</sup> *Id.*

<sup>5</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 18.

<sup>6</sup> <https://comongroundalliance.com/media-reports/press-releases/survey-reveals-nearly-40-percent-homeowners-who-plan-dig-year-will-put>

<sup>7</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 13.

Because locate firms are not involved in the actual excavation process, they may be unaware when incidents occur. As discussed in the subsequent Recommendations section, mandatory reporting requirements on excavators or facility owners would help address the underreporting of damage incidents. We would encourage more parties reporting, even if reporting the same incident.

### ***Damage Estimation Methodology***

**The predictive value of DIRT’s damage estimation methodology remains low.** CGA estimates that the true range of incident damages could be as low as 230,000 and as high as 787,000. While the DIRT platform is an innovative and collaborative triumph, it is clear that there is room for improvement. With a range of over 557,000 possible incidents between the high and low estimates, it is virtually impossible to truly know whether damages are trending higher or lower. And with a low-end estimate far below the actual reported damage incidents, we can tell the model has low predictive value and a wide confidence interval. These numbers are based on modeling that has improved over the years, but still leaves much to be desired – especially in terms of data quality. The modeling has actually changed since our last analysis – changes which led CGA to revise multiple years of damages upward from that previously reported in its 2017 DIRT Report.<sup>8</sup>

The methodology to estimate total damages relies on data from 10 states: Colorado, Connecticut, Florida, Georgia, Illinois, Kansas, New Mexico, Pennsylvania, Texas, and Virginia. These states were chosen for their perceived level of substantial reporting.<sup>9</sup> These states were deemed to be substantially reporting states by virtue of another statistical model predicting that at least 70 percent of actual damages in these states were reported in 2018.<sup>10</sup> This conclusion includes assessing state laws and regulation on damage prevention measures.

When all is said and done, the model has relatively low explanatory power and thus has an incredibly wide range of estimated total damages within its confidence interval. As one instance, the model estimates a range of possible damages with a low of 230,000 while the actual reported damages incidents come in at 341,609. To narrow the confidence interval to better fit reality, the model needs more and better data. We explore data quality later in this analysis.

<sup>8</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 14*, September 2017.

<sup>9</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 46.

<sup>10</sup> *Id.*



# ANALYSIS OF 2018 DATA

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For policymakers and industry leaders to better understand the trends, this paper highlights important factors behind what is being damaged and what practices can reduce damage. This section includes a discussion of the increasing damage incidents, a breakdown of what facilities are damaged more often, a review of the root causes behind damage incidents, and changes to DIRT that impact how to read the DIRT Report.

Across every metric, and all statistics, **excavation damage rose in 2018**. Total unique events reported, estimated total events, damage per 1,000 transmissions, and damages per million dollars of construction spending all increased from 2017. Unfortunately, the only decrease reported was in data quality, with a drop in the average DQI of reported events in each of the last two years.

While the DIRT Report tells us damage incidents are increasing, it does not necessarily tell us the reasons for the increase. It could be attributable to the ever-greater mileage of underground facilities. With more ground area having sensitive infrastructure below it, it is more likely that damage will occur. On the other hand, if excavation and locating practices and awareness are improving, we would expect damage to decline, even as construction increases or more undergrounding of facilities takes place.

## *Increasing Damage Incidents*

Rather than focus on the higher number of voluntary submissions to DIRT, a better metric to derive a trend may be the damage per 1,000 call transmissions for excavation tickets. In 2018, this statistic, damage per 1,000 call transmissions, increased by 11.23 percent, from a rate of 1.87 to 2.08.<sup>11</sup>

Another measure is cross-analyzing damage against construction spending, to account for more groundbreaking leading to more damage proportionately. For 2018, this too demonstrated more damage than the previous year. The number of damages per million dollars of construction spending increased by 9.19 percent from 2017 to 2018.<sup>12</sup>

<sup>11</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 15.

<sup>12</sup> Interestingly, rather than name the percentage change, the 2018 DIRT Report only lists the ratio change from 0.359 to 0.392. The data is the same, but the implication of increasing by a 9 percent may be perceived differently than an increase by 0.033 in the ratio. Listing both the ratio and the percentage gives decisionmakers the best data to work with. Both percentage change and the ratios themselves are listed for almost every other statistic.

Looking at the overall trend for damage per million dollars of construction spending, there is a three-year uptick, starting in 2016. The ratio increased three percent for 2017 then another increase by 9 percent in 2018.<sup>13</sup>

These two ratios make clear that more damage incidents are occurring each year. It also reinforces the need for technological solutions, best practices being codified, and better awareness and enforcement of best practices and safety rules.

### *What is Being Damaged?*

What facilities are being damaged is important to know. Not only can industry leaders recalibrate their practices based on the type of facility being damaged, but policymakers can better regulate knowing the relative economic and public safety threat at hand.

In 2018, the most common damage was to telecommunications facilities at 48 percent of damage events. This was followed by natural gas at 28 percent. Next is television at 11 percent. electric, water, sewer, liquid pipeline, and steam are each below 10 percent. These percentages are based on the reported events.

The DIRT Report notes, “[t]hrough the process, there was a general consensus that sewer and water damages are under-reported everywhere, and natural gas and telecommunications are fairly well represented.”<sup>14</sup> This may be in part due to the fact that natural gas line incidents require mandatory reporting in many states, and if they meet certain thresholds, these incidents need to be reported to the federal government as well.

With water and sewer being underreported, these could very well be above 10 percent of actual damage. This is important for cities and local governments to note, because unlike many telecommunications lines owned by corporate entities, water and sewer lines are generally public utilities. Policymakers will want to protect public infrastructure, to safeguard vulnerable communities that rely on water and sewage service, and the taxpayers that collectively bear the costs of repairing damaged facilities. This may call for stricter local ordinances and state laws on excavation practices or awareness and training campaigns.

<sup>13</sup> *Id.*

<sup>14</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 48.

Public officials should also take note of the 28 percent of damage incidents that strike natural gas distribution lines. Even if not publicly owned, these types of incidents are more costly than just loss of service or damage repairs. They can be deadly. Natural gas is highly explosive, and improper locating or excavating can threaten lives, property, and economic activity. According to PHMSA, from 1998 to 2018, there were 1,438 serious incidents that killed or harmed 1,191 people.<sup>15</sup> That is about 60 people per year losing their lives or facing injury, or about five people each month. Knowing such a dangerous material is so commonly exposed by locate and excavation errors, policymakers and pipeline operators should take extra precaution and look for the most effective measures going forward.

PHMSA conducted a study on damage prevention practices, and found that for locate and excavation errors specifically, Enhanced Positive Response (EPR) procedures led to an estimated 67 percent reduction in damage.<sup>16</sup> If policymakers are looking for a way to improve safety, looking to PHMSA, the nation's pipeline safety regulator, may be a good place to start. EPR is a method of communication and technology that allows excavators to receive locate requests, virtual maps, photographs, and other information about a dig site after the locator completes the spray paint markings.

When it comes to the private actors, telecommunications and natural gas operators should note the importance of maintaining precise digital maps and photo records of where their facilities are buried. This will help improve the accuracy of locating and marking facilities when an excavation ticket is entered. Some facility owners could also take preemptive action like marking particularly sensitive areas permanently with signs or posts.

<sup>15</sup> <https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-20-year-trends>

<sup>16</sup> *Report to Congress on Improving Damage Prevention Technology* at p. 22.



*Examples of permanent warning signs for awareness and protection of underground facilities.*

## Root Causes

**The root cause of damages categorized as “Notification Not Made” has increased for a second year.** Up slightly from 24 percent in 2017 to 26 percent in 2018, Notification Not Made is the highest singular root cause.<sup>17</sup>

Everyone breaking ground, whether a professional excavator or homeowner doing backyard landscaping, is encouraged or required to notify a one-call center<sup>18</sup> a few days before digging. This notification allows the one-call center to notify utility companies that have buried facilities at risk in the area of the dig. After this notification, the utility sends locators to mark sensitive areas with color-coded spray paint and flags. Without notification, excavators are digging blind and risk striking buried facilities they cannot see until it is too late.

Although significant efforts have been made with respect to the 811 Call Before You Dig messaging, the “Notification Not Made” category has largely plateaued, explaining about a quarter of all damages for the last six years. After “Notification Not Made”, the second highest single cause “Improper Excavation Practice” comes in at 15 percent.<sup>19</sup> Coming in third as a singular root cause is “unknown.” These “unknowns” leave industry leaders and policymakers ill-equipped to

<sup>17</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 21.

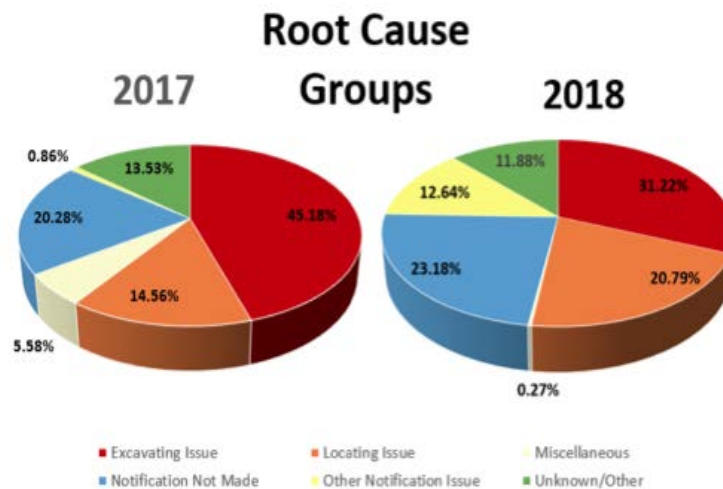
<sup>18</sup> <https://call811.com/811-In-Your-State>

<sup>19</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 21.



determine actions that may reduce damages; and any action to reduce the number of incidents reported with an “unknown” root cause is welcome.

The DIRT Report also breaks root causes down by group, where related causes are combined. Each grouping comprises causes after a notification was made, meaning the damage was caused by an issue locating the underground facility or during the excavation itself.



**The largest grouping of root causes is “Excavating Issue”, accounting for 31.22 percent of incidents.** This included 46,117 reports (13.5 percent) labeled “Improper excavation practice not listed elsewhere” which could otherwise be labeled “unknown, other, or data not collected.” This is part of a larger data quality issue we hope to see addressed by CGA and policymakers through improved reporting practices and requirements.

Other root causes within this group are “Excavator dug prior to verifying marks by test hole (pot-hole)” at 11.29 percent, “Excavator failed to maintain clearance after verifying marks at 3.75 percent, “Marks faded, lost or not maintained” at 1.38 percent, “Excavator failed to shore excavation/support facilities at 1.14 percent, and “Improper backfilling” at 0.18 percent. The very helpful display table color-coded by root cause group (Table 6)<sup>20</sup> is new, which is definitely an improvement in the 2018 DIRT Report. This table would be useful going forward for future reports.<sup>21</sup>

<sup>20</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 24.

<sup>21</sup> There appears to be an error in Table 6, where “Facility marked inaccurately due to locator error” accounting for 3.74% is three spaces too high on the table.

Table 6— Reported damages by root cause for 2018 (color coded by root cause group)

Root Cause	Reports	% of Total
No notification made to One Call Center / 811	79,197	23.18%
Improper excavation practice not listed elsewhere	46,117	13.50%
Root Cause not listed elsewhere	40,742	11.93%
Excavator dug prior to verifying marks by test hole (pot-hole)	38,559	11.29%
Excavator dug before valid start date/time	33,938	9.93%
Facility marked inaccurately due to locator error	12,790	3.74%
Facility marked inaccurately due to abandoned facility	19,535	5.72%
Facility not marked due to locator error	14,596	4.27%
Excavator failed to maintain clearance after verifying marks	12,808	3.75%
Site marked but incomplete at damage location	8,491	2.49%
Facility marked inaccurately due to incorrect facility record/map	5,126	1.50%
Facility not marked due to no response from operator/contract locator	4,997	1.46%
Marks faded, lost or not maintained	4,711	1.38%
Excavator dug after valid ticket expired	4,622	1.35%
Excavator dug outside area described on ticket	3,906	1.14%
Excavator failed to shore excavation/support facilities	3,889	1.14%
Facility not marked due to incorrect facility record/map	2,360	0.69%
Facility not marked do to unlocatable facility	2,020	0.59%
Excavator provided incorrect notification information	737	0.22%
Improper backfilling	601	0.18%
Facility not marked due to abandoned facility	422	0.12%
One Call Center error	411	0.12%
Facility marked inaccurately due to tracer wire	320	0.09%
Previous Damage	301	0.09%
Deteriorated Facility	212	0.06%
Facility not marked due to tracer wire issue	202	0.06%
<b>Total</b>	<b>341,610</b>	<b>100%</b>

**The third largest grouping of root causes is Locating Issue, which accounted for approximately 21 percent of damage incidents in 2018.** This group, displayed in the table in orange, has seen a six percent increase in 2018 over the previous year.

The increase in Locating Issue is curious given the availability of improved technology and practices over the past few years. Enhanced Positive Response techniques, including communication of virtual white lining, digital maps, photographs, and mobile device capability all make locating underground facilities more accurate and efficient.<sup>22</sup> After an underground facility locate job has been completed, the excavator receives comprehensive information about the site, including the locate request information, facility maps, photos, and virtual manifests. This gives the excavator more information than a few spray paint lines and flags on the ground, and allows them to have the information the locator had as well. Although this technology and practice is available and has shown to decrease damage rates by up to 67 percent<sup>23</sup>, it has not been required or implemented in law.

<sup>22</sup> Report to Congress on Improving Damage Prevention Technology.

<sup>23</sup> *Id.*

The individual and grouped root causes show that the best way to achieve real decreases in facility damage is through smart regulation and requiring the use of available proven technology with the highest potential for safety. From the excavation damage data available, we know failure to notify a one-call center is critical, and awareness efforts must continue. Even after notification has been made, we believe that best practices and technologies are being underutilized, under encouraged, and where already in law, underenforced.

### *DIRT Changes*

Since our last paper analyzing CGA's DIRT Report, several improvements have taken place. In our last paper, we recommended making state-level data available rather than only regional groupings for more nuanced understanding of damage incidents. The online DIRT dashboard was subsequently added making that state-level information available and allowing users to explore digital heatmaps, state and province-level information, and view data in more detail.

We would encourage more use of the individual state data to analyze the number and type of damage incidents against the regulatory regime in a state. This may help to analyze which type of regulation are better at promoting reduced levels of damage. While we would like to see more effort in this area of analysis, we understand that the ability to do a meaningful analysis is limited to the extent that there is missing or inaccurate data available to CGA.

We also raised root causes as an issue, with a lack of specificity limiting the usefulness of the data. In 2018, several new root causes were added to the list, and new categories were included across the DIRT platform and report. These are welcome improvements and reflect a desire for better data and more accurate understanding. For the sake of consistency in reporting, however, continually tweaking categories makes comparing data year-to-year more difficult, as one root cause group may increase one year but that may be due to a difference in root causes added, revised, or removed. So long as these changes are diligently noted, it is not a significant issue, but after 15 years of reports, some consistency is desired, and the categories that work or do not should be settled.

We are cognizant that our previous paper recommended more root causes. After the welcome changes in DIRT, we recommend limiting future changes to the number or root cause characterizations and focusing on making more fields mandatory to reduce the number of “unknown” entries.

A final notable change in the 2018 Report is that One Call Centers and Insurance companies were removed as eligible categories under Event Source. One Call Centers had previously been a consistent reporter, and Insurance received Data Quality Index (DQI) scores of 80 and 89 in 2016 and 2017, some of the highest of any data quality.<sup>24</sup> One Call Centers, however, had relatively low data quality, partly because they reported damage second-hand from “damage tickets” from excavators, which also masked the actual event source. Even if Insurance made up a small proportion of reporters, it’s high level of data quality was welcome and should continue to be accepted. Removing these event source reporters seems to be a move in the wrong direction. It would be better to have more submissions, even if multiple stakeholders report on the same incident.

<sup>24</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 13.



# DATA QUALITY ANALYSIS

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The DIRT dashboard and Report are only as good as the data going into them. While DIRT is useful for broad strokes trends, there is great potential for further improvements that would provide stakeholders with actionable data to improve safety. Current issues range from minor data display problems to critical “unknowns” leaving holes in the picture of what is happening on the ground. Ultimately, data quality must be a focus in future years.

CGA acknowledges the need for better data, frequently mentioning “unknowns” throughout the DIRT Report. They also note that:

The DIRT data is a rich source of industry intelligence on damage and near miss events from excavation activities related to buried facilities. Despite this, **uncertainties remain that limit the ability to draw firm conclusions** on the trends in damage events over time and across jurisdictions. There are four reasons for this: (*bold added*)

1. Reporting to DIRT is voluntary in many jurisdictions.
2. In some cases, details pertaining to damage events are unknown or not collected, which translates into unknown data in the DIRT database.
3. Reported data is not a complete census of damage to all buried facility operators.
4. There is limited knowledge of the population of companies or entities performing excavation work that might cause damages. <sup>25</sup>

Improvements in the data may come by making more reporting fields in DIRT mandatory thereby improving data quality, and by CGA encouraging its members and others to institute best reporting practices. This may also require awareness, education, and training by CGA to instruct stakeholders on how to determine, record, and report information to DIRT. Alternatively, as we discuss later, it could take the action of regulators to require stakeholders to report damage incidents to CGA (or instead to a different data accumulating organization) to be incorporated into the DIRT Report.

<sup>25</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p.10.

Average data quality has declined in each of the last two years. For 2018, a majority (64 percent) of entries in the DIRT system have a Data Quality Index (DQI) between 50 and 59 out of a total score of 100.<sup>26</sup> Over 73 percent of entries have data quality below 60.<sup>27</sup> As a measure of the completeness of data reported to DIRT, the DQI is affected by what companies submit, or more importantly, *do not submit* in the virtual fields for things like Root Cause, Type of Facility damaged, and others. Reporting is already voluntary, and when companies enter DIRT to report, certain fields are non-mandatory. By allowing entries of “unknown, other, or data not collected”, the platform gives companies reporting an option for less robust investigation, record keeping, and reporting. Combined with the number of states and territories reporting low event numbers in the first place, the limitation of the quality of data is very noteworthy.

Table 3—2018 data quality index distribution

DQI	# Companies	# Records	% of Companies	% of Records
30-40	5	6,908	1.05%	1.57%
40-50	7	32,426	1.46%	7.36%
50-60	18	285,279	3.77%	64.73%
60-70	25	27,946	5.23%	6.34%
70-80	48	23,749	10.04%	5.39%
80-90	143	49,310	29.92%	11.19%
90-100	232	15,131	48.54%	3.43%
<b>Total</b>	<b>478</b>	<b>440,749</b>	<b>100.00%</b>	<b>100.00%</b>

Beyond the quality of the data being reported, in some jurisdictions there is a dearth of data being reported at all. For this, we look to the map of reports by state or province. Given an estimation of 509,000 total damage incidents in 2018, we would hope this map would be bright red, with each incident being reported even by multiple stakeholders.<sup>28</sup> While we do not want the damage, we do want what is occurring to be well reported.

<sup>26</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p.12.

<sup>27</sup> *Id.*

<sup>28</sup> Note the map provides total reports, not unique events.

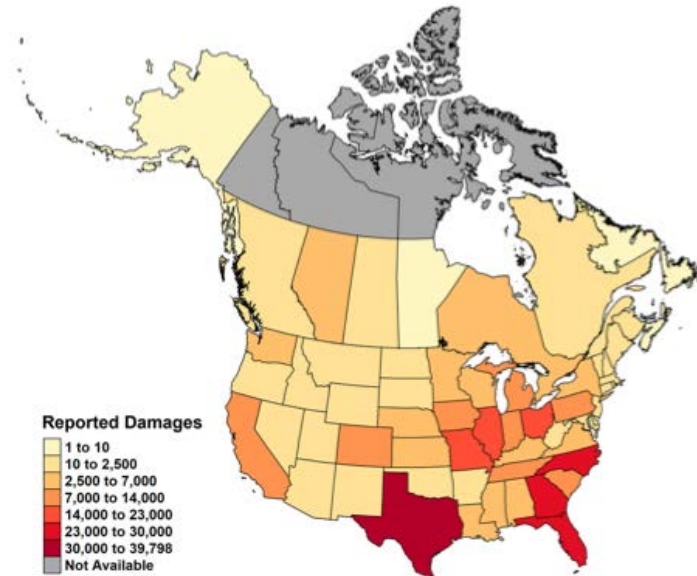


Figure 4—Map of reported damages, 2018

With this map in mind, a major concern is why any territory or state is reporting as few as one to 10 damage incidents. What is being done to improve this? What action needs to be taken to encourage or enforce reporting and best practices among its members? It is clear that some states are either not aware of the need and ability to build a damage incident data base or are not taking damage reporting seriously. One of the best ways for the data in DIRT to be more usable for stakeholders and policymakers is for lawmakers to require accurate reporting.

As it stands, the lack of reporting makes it virtually impossible to know which state have effective safety regulations in their damage prevention policy. By mandating reporting requirements for all damages by the excavators and utilities themselves, we can get a truer picture of how much damage is actually taking place, have better quality data on those damage incidents, and discern which states have effective damage prevention regimes. This would allow an assessment of the regulations and practices in states that lead to a lower rate of damage incidents and allow other states to consider adoption of those regulations or practices.

We also note that the model for estimated total damages is based on the 10 states purportedly providing substantial reporting: Colorado, Connecticut, Florida, Georgia, Illinois, Kansas, New Mexico, Pennsylvania, Texas, and Virginia. Looking at those states in the heatmap, it is not clear that the selected states should be the only ones analyzed in the CGA model. Other states beyond those 10 appear to have high reporting numbers, like Missouri, North Carolina, and Ohio, and some selected states may not be the best to hold up as examples.

## The Unknowns

Although it is mentioned throughout the DIRT Report, the “unknown” data quality issue is pervasive. It is also difficult to address. The voluntary reporting system relies on the integrity and diligence of the stakeholders. But allowing no or low-quality data to be reported makes understanding trends or performing any analysis of the impact of a particular state’s regulatory scheme difficult. Education, training, or awareness about how to report incidents may be effective and should be explored.

Requiring reporting when a facility is damaged is the best way to ensure more data is going into DIRT. When it comes to those “unknowns”, multiple stakeholders reporting the same event will likely flesh out the reality of what happened, as some may choose not to report on themselves and simply list an “unknown”, but others reporting the same event will identify who was at fault or what went wrong.

The very first recommendation leading off the DIRT Report is prioritized to tackle this directly. Following the Executive Summary is Recommendations, led off with:

**Minimize “unknown” data entries.** To ensure that maximum value is derived from each event entered into DIRT, efforts should be directed toward minimizing the amount of “unknown” data entries. This is particularly a concern for the excavator information (type of excavator, work performed, equipment used) where the data is valuable, but the proportion of the unknown data is significant. Additional training and awareness around DIRT may reduce the amount of unknown data.<sup>29</sup>

We welcome this attitude and approach and hope to see CGA pursue it in addition to our own recommendations.

<sup>29</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 7.



## Who Is Causing Damage?

Contractors caused the most damage in 2018 are at 36 percent.<sup>30</sup> This is actually second to “unknown” at 48 percent.<sup>31</sup> Not knowing who is causing damage means we are more limited in our ability to calibrate best practices, awareness, and public policy to address the matter.

This may be due to individuals in the process refusing to take responsibility or reporting before a final investigation has been completed. Thorough investigation is critical, even if it takes more time to complete and report. But the voluntary nature of reports invites stakeholders, including those who may be at fault, to ignore DIRT. It would be preferable for more stakeholders to report even though this may lead to further duplicate reporting of incidents that then need to be sorted by unique incidents.

More generally, “unknowns” are difficult to eliminate because of the way damage occurs. Frequently, a facility is damaged by something other than excavation – like a vehicle crashing into a utility pole or lawnmower striking shallow-buried lines. These can lead to submissions to DIRT that must be categorized as unknown because they do not fit the other categories. Making this more complicated, some damage does not reveal itself until months or years later, possibly revealed by another excavation, heavy rain, corrosive event, or other factor. These irregular events cannot explain all of the “unknowns”, but understanding the context of what goes into the unknown category is important. There must be a natural rate of “unknowns”, but we have not reached it yet. Better reporting requirements for a wider range of incidents would likely improve this. As it stands, far too many entities still report insufficient or no information.

To illustrate the “unknown” problem, in *DIRT Appendix A: Excavation Information*,<sup>32</sup> the latest report groups the most common combinations of excavator, work performed, and equipment used. The description “unknown” appears numerous times in this table in each of the descriptive categories. In fact, the largest category presented, over 100,000 unique incidents, show that the type of excavator is “unknown”, the work performed is “unknown” and the equipment used is “unknown”. What can be done by industry leaders and policy makers to reduce the incident of “unknown” reporting? Better data should lead to guiding better thoughts about how to reduce or eliminate damage incidents.

<sup>30</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 28.

<sup>31</sup> *Id.*

<sup>32</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 15* at p. 44.

## Appendix A: Excavation Information

Table A1—Top 20 combinations of excavator, work performed, and equipment used, including unknown data, in Canada and the U.S., 2018

Excavator	Work Performed	Equipment Used	Unique Damages
Unknown/Other	Unknown/Other	Unknown/Other	105,669
Contractor	Unknown/Other	Unknown/Other	33,535
Utility	Unknown/Other	Unknown/Other	10,856
Unknown/Other	Unknown/Other	Trencher	7,765
Contractor	Unknown/Other	Trencher	7,313
Contractor	Water	Backhoe/Trackhoe	6,129
Contractor	Unknown/Other	Backhoe/Trackhoe	5,266
Contractor	Sewer	Backhoe/Trackhoe	5,186
Municipality	Unknown/Other	Unknown/Other	4,344
Farmer	Unknown/Other	Unknown/Other	4,282
Contractor	Natural Gas	Backhoe/Trackhoe	3,585
Contractor	Electric	Backhoe/Trackhoe	2,745
Unknown/Other	Water	Unknown/Other	2,650
Unknown/Other	Unknown/Other	Boring	2,310
Utility	Unknown/Other	Trencher	2,125
Contractor	Unknown/Other	Hand Tools	1,941
Contractor	Bldg. Construction	Backhoe/Trackhoe	1,928
Unknown/Other	Telecommunications	Unknown/Other	1,913
Contractor	Water	Unknown/Other	1,873
Unknown/Other	Unknown/Other	Grader/Scraper	1,797

# RECOMMENDATIONS

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Aii recommends two fronts for improvement. First, recommendations directed to state and federal policymakers related to changes in Damage Prevention programs, laws, or regulations. Second, Aii offers recommendations for CGA to consider when refining its DIRT Report and analysis.

## ***Recommendations for States and the Federal Government***

- **Implement PHMSA Recommendations from 2017 Report to Congress on Improving Damage Prevention Technology**

Section 8 of the “Protecting our Infrastructure of Pipelines and Enhancing Security Act of 2016” (PL114-183) tasked PHMSA with conducting a study on how modern technologies can be better incorporated into state Damage Prevention programs and what technologies are currently commercially available to improve pipeline safety. PHMSA’s report released in August of 2017 cited Enhanced Positive Response (EPR) on multiple occasions – more than any other individual solution – as a workable and proven safety measure.<sup>33</sup> According to PHMSA’s report, users of EPR report up to a 67 percent decrease in damage rates. (The report also cited better and more consistent enforcement practices and mandatory reporting, both of which are discussed in more detail below.)

Congress should include a provision in the overdue pipeline safety reauthorization legislation requiring states to adopt EPR as a required component of state Damage Prevention programs in order to be certified as sufficiently safe both for the purpose of grant eligibility and to retain the state’s independent enforcement authority. Such a mandate would be consistent with PHMSA’s report to Congress on improving Damage Prevention safety.

If Congress does not act expeditiously, all states and other jurisdictions should take it upon themselves to update laws and regulations to require EPR.

<sup>33</sup> Report to Congress on Improving Damage Prevention Technology.

- **Increase enforcement efforts to encourage stronger adherence to laws and regulations, and incentivize best practices**

Many states do not have a designated enforcement body or specified penalties for failure to comply with Damage Prevention laws. Data from the Common Ground Alliance’s 2014 DIRT report indicates that states who designate a specific enforcement authority, usually that state’s Public Utility Commission, have seen positive results.<sup>34</sup> Further, inconsistent enforcement and penalties across state lines create uncertainty for infrastructure owners, locate firms, developers, and excavation firms.

States should designate a specific enforcement body, update Damage Prevention laws to explicitly identify penalties for non-compliance, and enforce damage prevention laws aggressively. Alternatively, Congress should require states to designate a specific governmental body for Damage Prevention violation enforcement and create a federal model schedule of penalties to make enforcement more consistent across state lines.

- **Require mandatory incident reporting to ensure future DIRT reports and federal databases have accurate excavation incident information**

Congress should include a provision in the overdue pipeline safety reauthorization legislation requiring that all damages to underground infrastructure within a certain tolerance zone of a natural gas pipeline – a tolerance wide enough to capture near misses, including damages to other non-natural gas facilities located within the same conduit or right of way – be reported to PHMSA or another non-profit run Damage Prevention database (i.e. CGA’s DIRT database), and that the same database host publish an annual report summarizing all such incidents that occurred within the previous year.

While PHMSA is certainly capable of hosting such a database, it may make sense to provide CGA additional funding along with a mandate to all excavators to report all incidents and near misses. Such an approach allows CGA to leverage much of the work it is already doing but improve its usefulness without increasing costs on the non-profit entity. Further, because the federal government does not exercise jurisdiction over local telecommunications facilities, municipal water lines, and the like, CGA is best suited to organize and publish this information.

<sup>34</sup> Common Ground Alliance, *Damage Information Reporting Tool, Volume 11* at p. 24.

## ***Recommendations for DIRT***

- **Make more DIRT fields mandatory to improve data quality and increase reporting participation in low-reporting states**

DIRT relies on voluntary reporting of events. Those submitting should be encouraged to submit the most data possible, which may include making more fields mandatory. The “unknown” problem around data submission is already a number one recommendation from CGA. CGA must do more to encourage all parties to submit reports. It may offer DIRT submission tutorials, requiring training for new members, and sending out reminders and notices about the importance of submitting any and all recent incidents. Even if redundant reports are submitted for the same event, one may contain more information and by pairing them, “unknowns” can be reduced. The alternative is for state or federal regulation requiring parties report to CGA or some other entity.

Our final thought for improving DIRT is for CGA to work with members, regulators and other groups to expand reporting in all states, especially those with low reporting numbers. CGA should reach out to state legislatures and advise on best ways to improve reporting numbers. In at least one province, the total annual submissions to DIRT are lower than 10. To achieve a future with less damage, CGA will have to not only collect and present the data, but look for ways to fill in the holes in that data by approaching low-reporting states and encouraging regulatory regimes best suited for public safety.

- **Limit future changes to root causes, groupings, and data presentation to better facilitate year-to-year comparison of data**

Several areas are moving in the right direction. The Call Before You Dig Awareness map included in the DIRT Report shows actual survey responses by region, which were missing in previous reports. The awareness trends are also much easier to read and understand in 2018 when compared with previous years. The usefulness of the DIRT Report is almost equally shared by the quality of the data itself and the way the data is displayed. Excellent data and well crunched statistics are worthless if they cannot be displayed in a readable format and internalized by the stakeholders using them.

Additionally, the overall effectiveness of the report is in its readability. Deciding on a consistent template, for sections but also the graphs and data tables and the way they display information would be useful for comparing reports year to year.



Finally, on consistency, at some point the root causes and other categories and groupings should be fixed. Better data is always a good thing, but after 15 years of acquiring and reporting on DIRT data, we should know what works and what does not. To improve data further, changes to the model and report format should not be placed above improvements in data submission and training stakeholders in how to put the best data forward to DIRT.

# CONCLUSION

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The DIRT report is an invaluable tool in helping industry and policymakers better understand incident trends, root causes, and the efficacy of best practices. Every legislative, regulatory, or best-practice-setting process should rely on comprehensive data and analysis as the cornerstone of rulemaking efforts. DIRT serves as a great foundation for efforts to improve excavation safety. However, while looking at what the DIRT data tells us, it is equally important to look at what it does not tell us.

DIRT tells us that damage events attributed to “Notification Not Made” have stagnated over the past six years, hovering at a significant 25 percent of root causes. It also tells us that events attributed to “Locating Issues” have increased despite technological advancements specifically related to mapping facilities.

What the report does not tell is what specifically about excavation practices is lacking, this is where resolving “unknown” data will be critical. It also does not tell us which states experience the highest and lowest volume of events, making it nearly impossible to determine whether there is a correlation between the strength of each state’s damage prevention statutes and regulations, and their excavation damage outcomes. The voluntary nature of reporting means that states with very high damage reporting look like they host the most damage, when in reality, we cannot make that conclusion from the available data.

**Based on the data included in the 2018 DIRT Report, we recommend that all states and the federal government consider the following recommendations:**

- Implement PHMSA Recommendations from 2017 *Report to Congress on Improving Damage Prevention Technology*;
- Increase enforcement and compliance measures to encourage greater adherence to laws and regulations, and incentivize best practices; and
- Require mandatory incident reporting to ensure future DIRT reports and federal databases have accurate excavation incident information.

**To improve the efficacy of DIRT, CGA should consider the following:**

- Make more DIRT fields mandatory to improve data quality and work to expand reporting participation in low-reporting states; and
- Limit future changes to root causes, groupings, and data presentation to better facilitate year-to-year comparison of data.



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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.



The Alliance for Innovation and Infrastructure (Aii) is an independent, national, educational organization dedicated to identifying our nation's infrastructure needs, creating awareness of those needs, and finding solutions to critical public policy challenges.

Aii strives to promote proven, innovative technology and higher safety standards to achieve industry excellence nationwide.

Our goal is to create higher standards by promoting innovative technologies and safer outcomes for national infrastructure projects.

The Alliance consists of two non-profit organizations; the Public Institute for Facility Safety, 501(c)(3) education and research organizations, and the National Infrastructure Safety Foundation, a 501(c)(4) social welfare organization. Two all-volunteer boards govern the Alliance. These boards also work in conjunction with the Alliance's own volunteer Advisory Council.

