Volume 13

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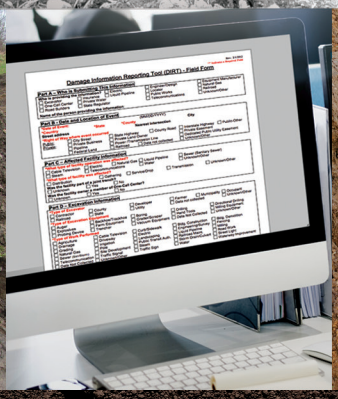
# DIRT

Damage Information Reporting Tool



# Analysis & Recommendations

# 2016

CGA™

Common Ground Alliance

**Dear Damage Prevention Stakeholders**,

The Common Ground Alliance is pleased to report that an all-time high number of event records - over 390,000 - were submitted to DIRT for 2016. This is an increase of nearly 30,000 records (about 7%) over those reported in 2015. Last year, we introduced a new method to identify, match, and weight multiple reports of the same event. This can occur when two or more stakeholders, such as a locating company, facility operator, excavator, or one call center enter a DIRT report for the same event. This method was applied to the 2016 data, consolidating it to about 324,000 events, approximately 12% more than the 2015 equivalent. By consistently growing the total number of events submitted into DIRT, we can build increasingly complete analysis and recommendations.

The 2016 DIRT Report includes several novel approaches, including an innovative analysis that estimates the societal impact of damages to underground utilities, which was nearly $1.5 billion. In addition, this year's report includes a discussion comparing damage prevention paradigms in U.S. and other countries.

The 2016 DIRT data indicates that damages due to lack of 811 notification are down significantly, especially among occupant/farmers. The results of the Annual 811 Awareness Study show high awareness of the need to call 811 prior to digging among those who are planning or recently completed a digging project. It also found a decrease in digging activity by these types of excavators. These two factors, plus the continuing steady decline in "*no notification"* damages by professional excavators, contributed to the significant decrease in these incidents.

The DIRT report is again supplemented by an online interactive dashboard that allows industry stakeholders to conduct their own filtering and analysis. The dashboard also includes added abilities to sort by states/provinces, and new analysis based on the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration's (PHMSA) adequacy determinations of state enforcement programs. The response to the interactive dashboard introduced last year has been very positive. This useful tool is truly helping stakeholders use data to identify the best opportunities to reduce damages in their communities.

Since joining the CGA as President, I have been consistently impressed by the dedication of our membership to achieve a common goal and advance our key programs, and the Data Reporting & Evaluation Committee definitely fits into this category. I'd like to thank everyone who works diligently to ensure the DIRT Report continues to be a key tool in helping stakeholders determine how to best protect underground utilities, the people who dig near them, and their communities.

Be safe,

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

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**Link to Interactive Tableau Dashboard**

http://commongroundalliance.com/dirt-2016-interactive-report

## Introduction

In 2016, the number of reports for the United States and Canada submitted to DIRT totaled to 390,366. Identifying and consolidating multiple reports of the same event resulted in 323,962 consolidated events, which is approximately 12.4% more than 2015 (288,346). When Canadian (536) and U.S. (5,557) near miss events are excluded, the total number of damage events drops to 317,869, 14.0% higher than 2015 (278,861).

This year's DIRT Report highlights key takeaways that demonstrate that the industry continues to make progress in several areas, but that opportunities for improvement remain. First, the estimated number of U.S. damages in 2016 is 379,000, up nearly 20% from 2015. However, it is 45% lower than the 2004 estimate of 675,000. Second, the ratio of damages to construction spending has declined dramatically, from 0.63 damages per million dollars of construction spending in 2004 to 0.41 in 2016. Third, the rate of damages caused by 'Notification NOT Made' has declined from 57% in 2004 to 16% in 2016.

This year's report is again supplemented with an interactive DIRT analysis tool available on the Common Ground Alliance (CGA) website that will allow industry stakeholders to drill deeper into the data. It also includes several new sections that relate DIRT to other issues of interest to the damage prevention community—the societal impact of damages, damage prevention paradigms in other countries, and the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration's (PHMSA) determinations on the adequacy of state damage prevention programs.

## Key Takeaways

This year's DIRT Report highlights several key takeaways that demonstrate that despite the increase in damages submitted to DIRT, the industry continues to make progress in several key areas:

- Estimated total U.S. damages increased 20%, from 317,000 to 379,000.
- Since 2010, damages have stabilized into the 300,000–400,000 range despite there being a rebound in construction spending.
- Damages per 1000 transmissions increased 14%, from 1.54 in 2015 to 1.76. However, the rate is lower than the 2013 and 2014 rates of 2.07 and 1.84 respectively, indicating a long-term trend of improvement.
- The ratio of damages to construction spending has declined dramatically from 0.63 damages per million dollars of construction spending in 2004 to 0.41 in 2016.
- Call before you dig awareness remains consistent with historical findings at 45% (survey taken June 2017).
- The societal costs associated with underground facility damages in the U.S. in 2016 are estimated at $1.5 billion. This is a minimum estimate based on routine costs for stakeholders directly connected to a damaged facility. It does not include costs such as property damage, evacuations, road closures, environmental impacts, lawsuits, injuries, and fatalities.

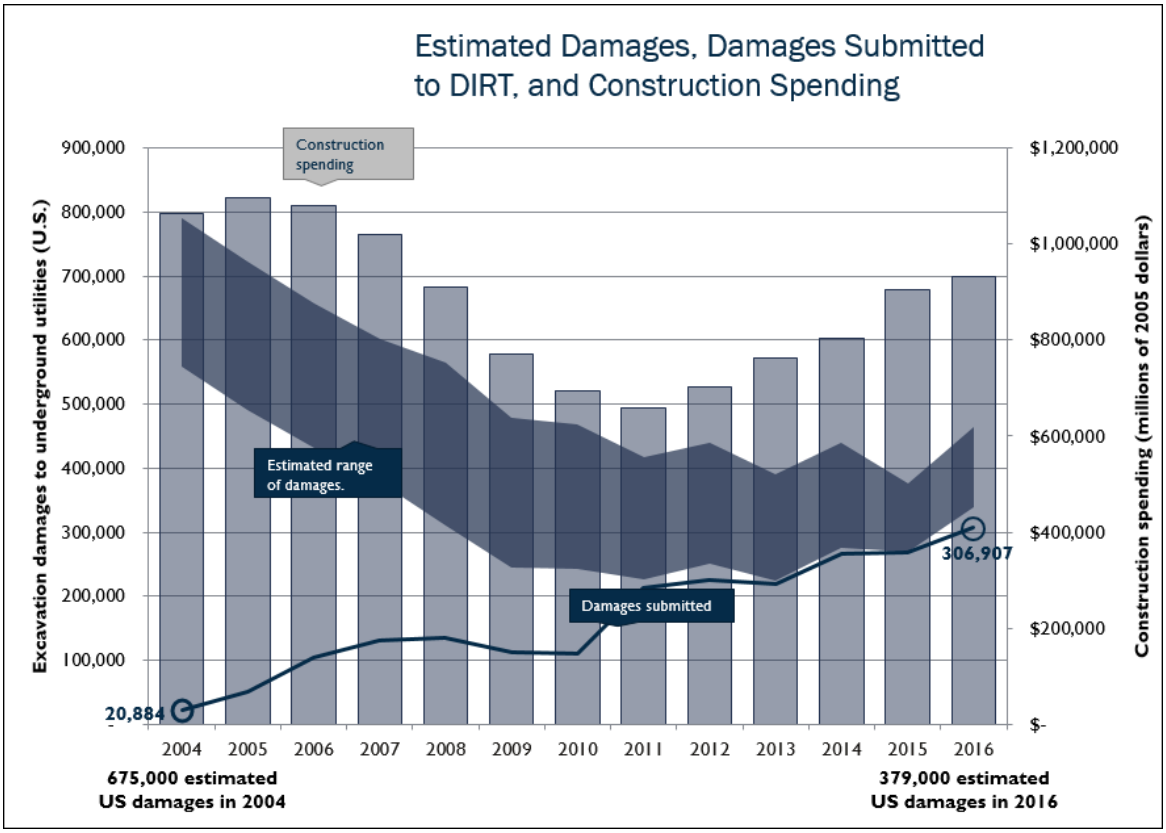
## Recommendations

1. Promote safe excavation practices by professional excavators after locates are requested and accurately provided.
2. Encourage stakeholder use of the DIRT interactive dashboard to hone in on factors contributing to damages at the state level. Where applicable, use DIRT data to evaluate 811 notification exemptions and enforcement policies, especially in states deemed inadequate by PHMSA.
3. Be prepared for the roll-out of the new DIRT form on Jan. 1, 2018. Become familiar with the revised questions and be prepared to capture information during damage investigations on or after that date. Watch for information and announcements on availability of resources, webinars, etc.

## Estimates of U.S. Total Damage and Damages/1,000 One Call Transmissions

An estimated 379,000 underground utility damages occurred in the U.S. during 2016. This estimate was developed through several multiple regression model iterations analyzing the correlation between reported damages and other influencing variables. Correlation was established within a subset of states that report a substantial number of damages. States were classified as 'substantial reporting' through a review of states' governance, resources available within the state, and the assessment of industry associations and experts. Governance includes state regulations, statutes, and legislation that affect the reporting of damages. Resources include entities such as a PSC (Public Service Commission), PUC (Public Utility Commission), or one call center with an active VPD (Virtual Private Dirt).

*Exhibit 1: Estimated number of U.S. excavation damages*



For 2013 through 2015, 16 states were classified as substantial reporting: Colorado, Connecticut, Georgia, Illinois, Indiana, Kansas, Michigan, Missouri, New Mexico, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Virginia, and Washington. For 2016, California and Oregon were added. These 18 substantial reporting states were used to establish which known variables are best for predicting the number of damages occurring in those states.

The 2016 estimated damages regression model predicts weighted damages using a host of known variables, including building permit counts, total infrastructure construction spending put in place, One Call Systems International (OCSI) data (incoming requests and transmissions), and population change from 2015 to 2016. These variables were found to have the highest level of correlation ($R^2$ = .912) with the DIRT-submitted, weighted damages in the substantial reporting sates. For the remaining states, the model's coefficients are applied to the known variables (e.g., building permit counts) to create an estimate of actual damages within the state. For example, analysis of substantial reporting states found five underground utility damages are expected for every $1,000,000 in infrastructure activity. This coefficient is then applied to the remaining states where infrastructure activity is known but the number of damages is unknown. While this model uses state-level data, it is not designed to derive damage estimates at the state level.

Once these initial state estimates are derived and compiled, the national estimate is compared to the number of damages reported to DIRT for the given year. Adjustments are made based on a consideration of previous years' DIRT results and the observations and opinions of industry stakeholders. This ensures that the results align with existing and emerging trends in the industry and do not rely solely on an econometric model. These efforts to classify, correlate, extrapolate, compile, and adjust yielded the estimate of 379,000 underground utility damages in the U.S. for 2016. The 19.6% increase compared to the 2015 estimate (317,000) is primarily attributable to an increase in construction activity, population growth, and the growing share of the population living in dense urban areas. Since 2010, damages have stabilized into the 300,000–400,000 range despite there being a rebound in construction spending. As more states become substantial reporters, the range of the estimate will continue to narrow.

To achieve the total damage per 1,000 transmissions estimate, the number of incoming locate requests was analyzed and an estimate of total incoming locate requests was developed based upon the same methodology used to estimate total U.S. damages. In 2016, U.S. one call centers that submitted to the OCSI Data Collection Tool reported 28,414,785 incoming locate requests.

The following process details how the 2016 estimated damage rate was developed:

- Estimate of 2016 total U.S. damages = 379,000
- Incoming locate requests to one call centers that completed the OCSI Data Collection Tool in 2016 = 28,415,000
- Using the same methodology to calculate the estimated total U.S. damages and extrapolating from the 28,415,000 requests above to account for the centers that did not provide data, estimated total 2016 U.S. locate requests = 32,560,000
- The ratio of outgoing transmissions to incoming locate requests[1] reported to OCSI = 6.62

[1] Each incoming locate request to a one call center results in several outgoing transmissions to facility operators: gas, electric, cable TV, telephone, sewer, water, etc.

Assuming this ratio remains valid for the non-reporting U.S. OCSI locations,

379,000 / [(32,560,000 x 6.62) ÷ 1000] = **1.76** damages per 1,000 outgoing transmissions

The 2016 estimated damage rate is 14% higher than 2015 (1.54). However, if we look back to 2013 as a starting point (the first year CGA performed this analysis using outgoing transmissions), a trend of gradual reduction continues. It may be that 2015's rate was an outlier.

| Year | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|
| **Damages/1000** | 2.07 | 1.84 | 1.54 | 1.76 |

Damages per Locate Ticket has evolved into the standard metric used in the damage prevention community. It has the advantage of being simple, and the data is relatively available. At the same time, there is general unease about it for a variety of reasons. These are just some examples:

- State laws vary regarding life-of-ticket (e.g., need to renotify if work goes beyond X days) or scope of ticket (e.g., limited to X city blocks or Y linear feet). Such limitations lead to more tickets in the denominator.
- State laws vary regarding exemptions for 811 notifications based on type of work (e.g., hand tools, agriculture) or type of excavator (e.g., homeowner).
- State laws vary regarding number of contractors on a ticket. Does each excavator on a worksite require their own ticket, or can a sub-contractor "piggy-back" on a general contractor's tickets?
- One call center policies vary regarding ticket transmissions (if one or more facility operators do not respond on time, the excavator notifies the one call center which retransmits the ticket—including to operators that did respond on time). Are the retransmits included in the ticket count?
- For damages due to "no notification to the one call center," the damage is counted in the numerator but there is no corresponding ticket in the denominator.
- One call centers are working to filter out unnecessary transmissions to operators with no buried facilities in the work area. This reduces costs and improves efficiency for the facility operators, but also reduces the ticket total in the denominator.

If a single entity is collecting this information consistently, damages per ticket can be a useful measure of progress over time. However, when making comparisons to other companies, states, or industries, concerns arise over whether all are counting things the same way.

The Data Reporting & Evaluation Committee (DR&EC) is exploring what might be gained from "changing the denominator(s)" of the damages per ticket metric that is currently used as an industry standard to mark progress. Other possibilities might be size of the work-area polygon on a locate ticket, miles of buried facilities, population, population growth rate, and construction spending. Each of these has its own set of pros and cons. At a national level, construction spending and population growth correlate very well with damage rates, but these may be difficult to obtain and apply at the local level where

facility operators, locating companies, and excavators operate. Work area size may be a step in the right direction, but there would still be issues with life-of-ticket, re-transmissions, etc.

The DR&EC welcomes thoughts and ideas on this topic. Use the "Contact Us" feature on the CGA website, or consider joining the Data Reporting and Evaluation Committee.

## Societal Impact of Damages

A major addition to this year's DIRT report is an attempt to capture the scale and distribution of the impact of underground utility damages for society. Simply, how much better off would society be if no underground utilities had been damaged in 2016, and who would most feel that impact?

Answering these questions requires combining information in the 2016 DIRT database with a model of the cost of each damage to various stakeholder groups. An analysis based on the DIRT data split reported damages into specific types and modeled stakeholder costs. This resulted in a cost estimate of $1.1 billion, representing a lower boundary, or minimum estimate, of the impact of underground utility damages in the U.S. for 2016. This estimate is based on the 276,000 U.S. events reported to DIRT, which is about 75% of the 379,000 estimated total U.S. damages. As a rough estimate, and assuming that damages not reported to DIRT have similar characteristics to those that are reported, the costs presented here could be increased by about one third (370/276=1.33), bringing the total cost estimate up to approximately $1.5 billion.

The DIRT database contains reports from both the U.S. and Canada, but the reports vary substantially by country. For example, liquid pipelines account for 0.04% of all weighted damages in the U.S. In Canada, liquid pipelines represent 7.6% of all weighted damages. One call center notification laws also vary by country. It is likely that the costs associated with excavator downtime, emergency response, and facility repair and restoration also vary by country. Even the currency is different. Limiting the model's scope to U.S. damages allows for greater validity while covering the 96.6% of damages in the DIRT database that occur in the U.S.

Modeling the societal impact of underground utility damages required classifying the damages in the DIRT database, assigning specific stakeholders to those damages, and modeling the impact per damage to each stakeholder group for each type of damage. Damages recorded in DIRT were categorized by the facility damaged (8 categories: telecom, natural gas, cable TV, electric, water, sewer, liquid pipeline, and steam) and the variety of facility operation (5 varieties: distribution, service/drop, transmission, gathering, and not specified), resulting in 40 distinct damage types. Each damage type was modeled as having potential impacts associated with four affected stakeholder groups (facility customers/users, facility owners, emergency responders and excavators), resulting in 160 distinct inputs for cost per incident. The sources used to build these cost inputs are detailed in Exhibit 2.

Within each damage type, the cost to various stakeholders is found by multiplying the amount of disruption each damage causes (base cost) by the economic impact of that disruption (cost multiplier). This shareholder cost per damage type is then multiplied by the number of damages of that type that occurred (frequency multiplier). The final step is adding the value of lost product for natural gas damages.

This model allows certain types of damage to be more expensive than others. Exhibit 3 shows that telecommunications facilities are the most damaged, with 129,332 U.S. damages in 2016 resulting in $391 million in costs. However, the greater impact per damage for natural gas facilities means that natural gas damages contribute the greatest share of costs, accounting for $513 million (46.2%). Electric and cable TV damages account for costs of $61 million and $21 million, respectively. The remaining facility categories (water, sewer, liquid pipeline, and steam) each account for less than 2% of the total costs.

*Exhibit 2: Cost inputs colored by information source*

| Stakeholder Group | Customers & Users | Facility Owners (restoration) | Facility Owners (lost product) | Emergency Responders | Excavators |
|---|---|---|---|---|---|
| Base cost | Length of service interruption by damage type. | Restoration cost by damage type. | Volume of lost product (natural gas only). | Number of crews and length of response by damage type. | Length of excavator downtime by damage type. |
| Cost Multiplier | Cost of 1 hour of service interruption by service type. | n/a | Cost of 1 unit of lost product. | Cost of 1 hour of emergency response by crew type. | Cost of 1 hour of excavator downtime. |
| Frequency Multiplier | Number of damage incidents by damage type. | Number of damage incidents by damage type. | n/a | Number of damage incidents by damage type. | Number of damage incidents by damage type. |

Indicates input was determined using analysis of 2016 DIRT data

Indicates input was determined using analysis of 2016 PHMSA data

Indicates input was determined using a review of expert sources and industry publications

*Exhibit 3: Frequency and costs of damages by facility damaged*

| Facility | Avg. Cost per Damage | 2016 Damages | 2016 Cost | % Contribution |
|---|---|---|---|---|
| Natural gas | $ 5,914.05 | 86,830 | $ 513,516,909 | 46.2% |
| Telecom | $ 3,022.24 | 129,332 | $ 390,872,700 | 35.2% |
| Electric | $ 4,905.64 | 24,364 | $ 119,521,000 | 10.8% |
| Cable TV | $ 2,190.99 | 27,737 | $ 60,771,450 | 5.5% |
| Water | $ 3,003.79 | 7,130 | $ 21,417,000 | 1.9% |
| Sewer | $ 5,163.99 | 761 | $ 3,929,800 | 0.4% |
| Liquid pipeline | $ 7,711.16 | 112 | $ 863,650 | 0.1% |
| Steam | $ 1,800.00 | 5 | $ 9,000 | 0.0% |
| Average | $ 4,021.06 | 34,534 | $ 138,862,689 | 12.5% |
| Total | - | 276,271 | **$ 1,110,901,509** | - |

Some stakeholder groups were more impacted than others. Exhibit 4 shows customers and users of facilities bear the largest burden, shouldering $338 million (30.4%) in costs. The impact to facility owners is estimated to be $267 million in 2016, or 24.1% of the total. Emergency responders are the third-most impacted group, accounting for $261 million (23.5%) in impact. Costs to excavators are estimated at $244 million, or 21.9% of the total.

*Exhibit 4: Costs of Damages by Stakeholder Group*

| Stakeholder Group | 2016 Cost | % Contribution |
|---|---|---|
| Customers/Users | $ 338,002,000 | 30.4% |
| Facility Owner | $ 267,679,509 | 24.1% |
| Emergency Responders | $ 261,439,000 | 23.5% |
| Excavator | $ 243,781,000 | 21.9% |

These estimates are very conservative and should be treated as absolute minimum boundaries. The model is restricted to stakeholders' routine costs that are directly connected to a damaged facility. Some underground facility damages have extraordinary consequences, such as property damage to excavating equipment and the surrounding area, legal costs, and even injuries and fatalities. All impacts related to those living and working near damaged facilities and impacts to the general public are likewise not incorporated into our calculation. These costs include, but are not limited to, evacuation of residences and businesses, environmental impacts and soil disturbance from the release of pipeline products, and loss of time caused by road closures and traffic delays.

These additional impacts can be illustrated by examining a case study that received wide coverage in the damage prevention community.[2] On Nov. 16, 2016, a contractor excavating in downtown Canton, Ill., struck an underground gas service line, causing a gas leak. A repair crew from the gas company stopped the leak, but an explosion of the migrating gas killed one gas company responder, injured several others (including a locator), and damaged nearly 100 nearby small businesses.

## Other Countries, Other Systems, and their Metrics

The damage prevention system in North America has come a long way with significant, quantified improvements as shown in the annual DIRT Report. Over the past few years, the DIRT Report has included analysis comparing the performance of states and provinces with the goal of teasing out which regulations, enforcement policies, and other factors may be correlated with damage metrics.

The purpose of such an analysis is not to single out under-performers but rather to identify which factors may be most conducive to effective damage prevention results in a non-emotional, data-centric manner. The DIRT Report is produced by the *Data Reporting and* ***Evaluation*** Committee, after all.

One thought that has been bubbling for a while among some in the damage prevention industry is this: Why stop at state-to-state comparisons? Why not compare country-to-country?

[2] This information is not drawn from DIRT, but rather from publicly available sources such as PHMSA data and industry publications such as the American Locator Magazine (see Volume 31, Issue 1 and Issue 3).

We do not know the answers to the following two critical questions:

1) Which country's damage prevention paradigm results in the fewest damages per notification, excavation event, dollars of excavation, or other metric/proxy for excavation activity.
2) Which country's damage prevention paradigm results in the lowest Total Cost of Ownership (TCO) for the facility owner?

The first metric is more important than the second, but we should not lose sight of the reality that cost is always a factor. No facility owner or excavator has an infinite budget for damage prevention. Perhaps a metric such as Damage Prevention Cost per Excavation Activity would be helpful in this assessment.

The damage prevention system in the U.S. is one of the most mature in the world and is looked upon as a pioneering system. However, it is one of the most rigid in that, typically, only facilities owners and their explicitly authorized agents may access and locate their facilities, and the deadline for when a locate must be completed is fixed.

This rigidity results in a couple of significant gaps. First, if an excavator needs to work the next weekend and it's now Thursday at 10 a.m. in a state with a 48-hour response time, they can notify 811 now but not legally begin work until the following Monday at 10 a.m.

The excavator at this point has four options. None of the options are good, all have additional consequences, and some may be illegal:

1) Hope all affected facilities are located by close of business Friday. It still may be against regulation to start work before Monday at 10 a.m.
2) Submit a non-compliant emergency or short notice ticket and hope it goes through.
3) Proceed to excavate over the weekend before the legal due date and without all affected facilities located, and accept the risk.
4) Wait until 10 a.m. Monday and assume/hope the locate will be done by that time.

What if the excavator could submit a non-emergency one call ticket at 10 a.m. on a Thursday morning and start work on a Thursday afternoon? In Canada, Australia, New Zealand, or the United Kingdom, this would be very possible. Overall, excavators in other countries have more control of when and how quickly locate requests are performed than in the U.S.—while assuming associated risks. Might such flexibility, responsiveness, and entrepreneurship in the U.S., the epicenter of such values, help damage prevention results as well as overall cost effectiveness?

One might look at the above hypothetical example and respond, "Well, the excavator should have planned better and called 811 before Thursday morning." Perhaps, but is it reasonable, in 2017, to expect an industry stakeholder to wait two business days or four calendar days before they can start their work?

In addition, let's slightly change the hypothetical example and stipulate that the excavator in the above scenario submitted a one call ticket at 4 p.m. on Wednesday so it should be done by 4 p.m. on Friday. One might think "The probability of locating for this ticket being late is very small." Not really. If any single facility is marked on-time 95% of the time and there are six facilities at a site, there is a 26% probability (calculation: $1 - 0.95^{\wedge 6}$) that one or more of the facilities will not be marked on-time. Therefore, the excavator has a one-in-four chance of being delayed until Monday (or later).

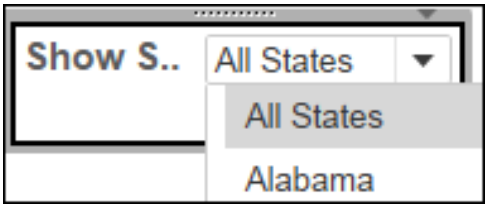
There are other gaps in the U.S. paradigm that other countries appear to address more effectively, but the bottom line is that the CGA Data Reporting and Evaluation Committee, Best Practices Committee, Technology Committee, and the CGA itself should seek to acquire data, metrics, and analyses regarding damage prevention results in other countries, perhaps igniting further industry brainstorming and insights into what improvements may help us further improve damage prevention results.

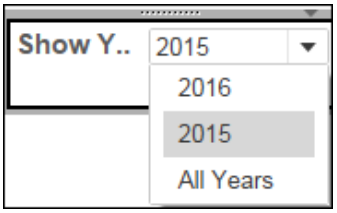
## Data Analysis

### Overview of Tableau Dashboard

The 2016 DIRT report marks the second year that the Common Ground Alliance has provided an interactive dashboard tool to allow industry stakeholders to conduct their own filtering and analysis. The tool is hosted on the CGA website and contains nine individual dashboards that each highlight a specific concept, e.g., damage characteristics by state, damage cause analysis, etc. The visualizations contained within each dashboard act as a filter to allow users to drill down into topics that are of most interest to them.

The 2016 Interactive Dashboard contains a few changes that should enhance and expand its usefulness. First, a 'Show State' filter has been added to several dashboards to allow a specific state to be selected. As you click through the other dashboards with state-specific information, they will remain filtered on the selected state. Similarly, a 'Show Year' filter allows users to toggle between 2015 and 2016 data, and both years combined. This feature also carries over to the other dashboards with this feature.




A new dashboard has been added that centers around PHMSA's determinations on the adequacy of state damage prevention programs. The new dashboard offers filters for DIRT elements such as root cause, work performed, facilities damaged, etc. PHMSA has jurisdiction over the natural gas industry for safety regulation.

In the interest of saving space in this report, and because it becomes difficult to see details when scaled down, fewer exhibits showing a full dashboard will be provided compared to the 2015 report. Instead, we will show snippets with the important information under discussion and/or a written description of the key information. Stakeholders are encouraged to visit the dashboard and experiment with it. The best way to become familiar with the dashboard and learn its capabilities is to duplicate the filters described in this report and then try some using your own state or industry. Because each dashboard contains a lot of information, it is best to avoid using devices with small screens such as tablets and smartphones.

It is also important to remember that in the dashboards, near-miss events are excluded, as are records with "Unknown" or "Did Not Collect" in the field being analyzed. Because each dashboard contains a different combination of questions, and DIRT reports have different combinations of questions answered with Known versus Unknown data, the total numbers of reports on the various dashboards

will differ. For example, the Work Performed by Excavator dashboard has 134,331 total records, while the Work Performed by Equipment Type dashboard has 56,248 total records. This indicates that an excavator type is a known value in DIRT reports more often than the equipment type.

## Who Is Submitting Information

The 2015 DIRT report introduced a new method to identify potential multiple reports relating to the same event. This method was applied to the 2016 data set.

There were 390,366 underground damage and near-miss event records submitted for 2016, and after applying the matching and weighting methodology, that figure consolidates to 323,962, (17% reduction). This method reduced the 2015 data by 20.6%.

The overall increase in events submitted and the smaller percentage of overlapping reports are likely due to a combination of the actual increase in damages and to growth in the number of companies submitting to DIRT with no other company overlapping them. There were 270,598 unique reports (no overlap) in 2016 compared to 226,228 in 2015 (20% higher). In 2016 there were 9,538 reports from 133 companies reporting for the first-time.

Exhibit 5 shows the effect this methodology has on the number of reports by reporting stakeholder.

*Exhibit 5: Matching and weighting effect on reporting stakeholder events*

| Reporting Stakeholder | Unweighted Events | Weighted Events | Change | % Reduction |
|---|---|---|---|---|
| One-Call Center | 16,868 | 10,869 | 5,999 | 35.57% |
| Electric | 4,939 | 4,272 | 667 | 13.51% |
| Engineer/Design | 27 | 24 | 3 | 11.73% |
| Excavator | 39,113 | 26,978 | 12,135 | 31.03% |
| Liquid Pipe | 362 | 353 | 9 | 2.39% |
| Locator | 238,035 | 207,092 | 30,943 | 13.00% |
| Natural Gas | 70,318 | 58,304 | 12,014 | 17.08% |
| Private Water | 153 | 140 | 13 | 8.22% |
| Public Works | 1,407 | 1,298 | 109 | 7.72% |
| Railroad | 4 | 4 | 0 | 0.00% |
| State Regulator | 8,054 | 5,300 | 2,754 | 34.19% |
| Road Builder | 120 | 109 | 11 | 9.03% |
| Telecommunications | 10,184 | 8,539 | 1,645 | 16.15% |
| Unknown | 782 | 678 | 104 | 13.25% |
| TOTAL | 390,366 | 323,962 | 66,404 | 17.01% |

In terms of raw numbers, locators had the most overlap with other reporting stakeholders. This is unsurprising, since locators submitted the most reports and are most likely to overlap reporting by another entity such as a facility operator, one call center, or excavator. One call centers, followed closely by regulators, had the largest percentage reduction, which indicates that in many cases they are overlapping reporting with one or more other entities. This is also logical, because these two

stakeholders do not perform excavation or operate or locate buried facilities. Any reports they enter are likely based on information obtained from other sources.

Exhibit 6 shows several elements of the Reporting Stakeholder dashboard with no filters applied.

*Exhibit 6: Reporting Stakeholder Dashboard Snippets (no filters)*

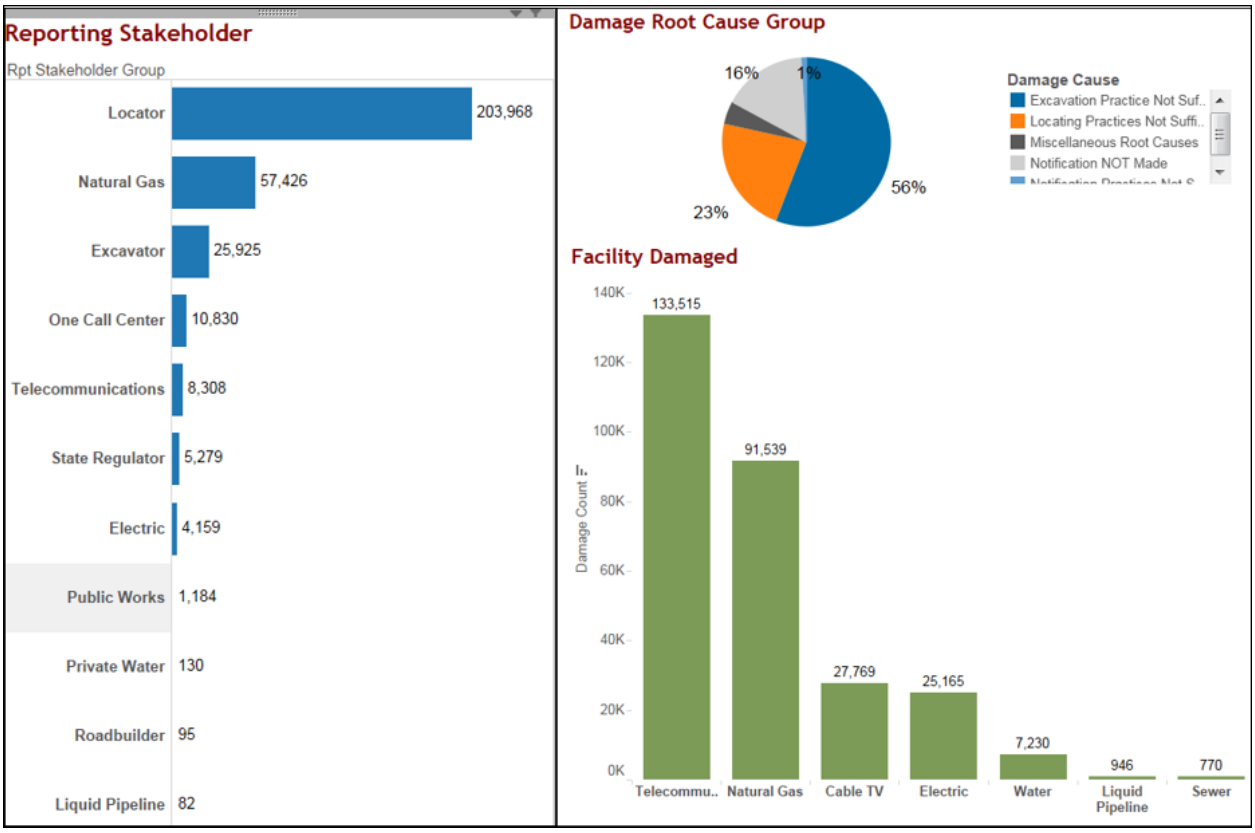
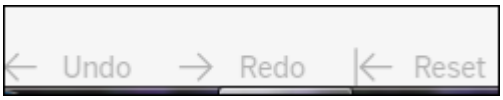


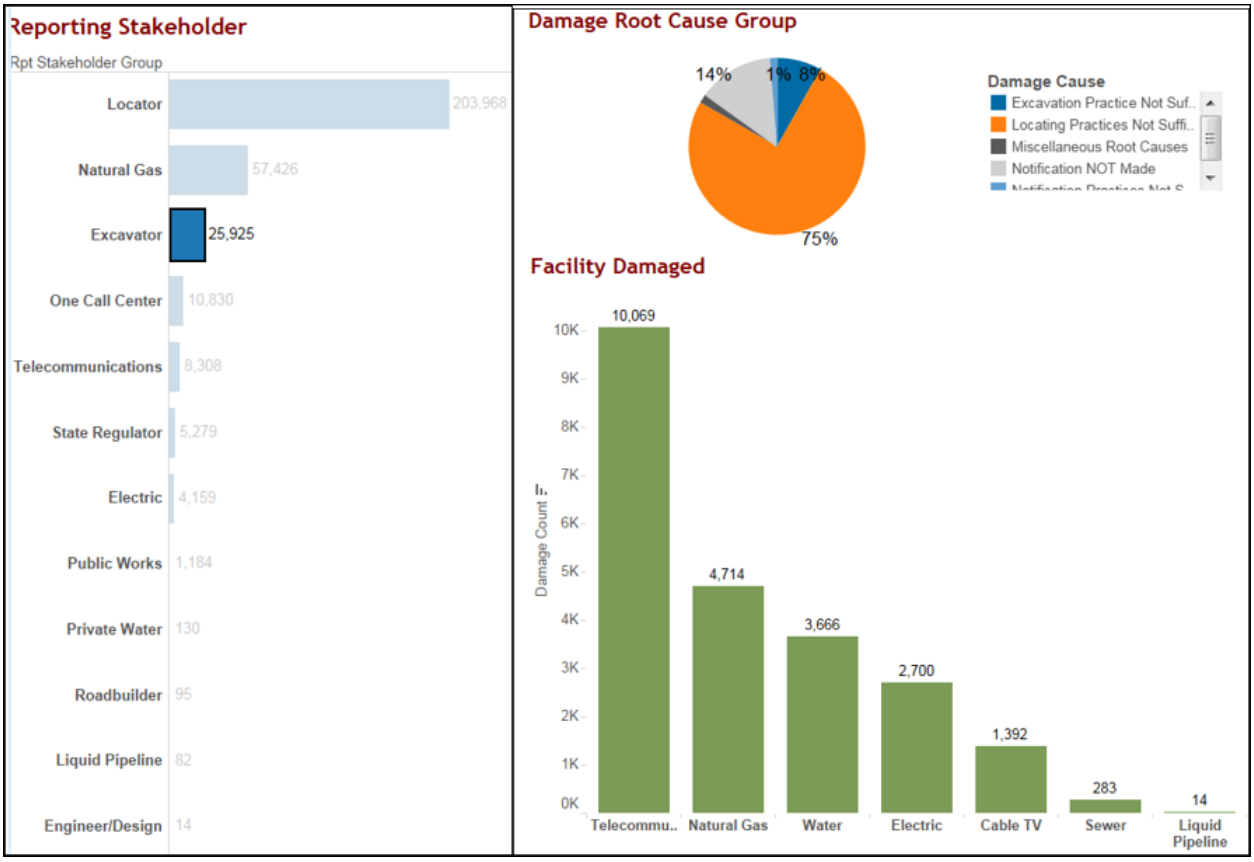

Exhibit 7 shows the same dashboard, but by clicking on Excavator in the Reporting Stakeholder Group,[3] the Damage Root Cause and Facilities Damaged elements have recalculated. Note how the Damage Root Cause Pie chart recalculates significantly.

All the interactive dashboards operate in a similar fashion. Clicking on any one element causes the others to recalculate. It is possible to go more than one step from the original full data set. Therefore, one should always be aware of what filters have been applied when viewing dashboards. To back out of the filtering, click again on the filtered element(s), or click on "Reset" on the lower left of the screen.




[3] Appendix 3 shows the groupings used in this report and on the dashboard for root cause, excavator type, excavation type, and work performed.

*Exhibit7: Reporting stakeholder dashboard snippets (filtered on Natural Gas)*




## Damage Cause

Exhibit 8 shows the distribution of root cause groups for 2009 through 2016. In 2016, damages caused by Notification NOT Made declined to 16%. The decline in the share of damages caused by Notification NOT Made is a long-term trend. Although the decline has been uneven, it has averaged about 2.5% per year. After remaining consistent at 25% to 26% from 2012 to 2014, damages due to Notification Not Made shifted more dramatically in 2015 and 2016. Future years' data will tell us if either of these years were outliers.

To better understand 2016's substantial decline in damages caused by Notification NOT Made, an analysis of damages by each root cause group for professional excavators and occupants/farmers was performed, as shown in Exhibit 9. While the share of damages caused by Notification NOT Made by professional excavators has declined steadily by about 0.5% per year, occupants/farmers dropped 38% in a single year. As a percentage of the total, damages involving occupants/farmers as the type of excavator declined from 11.8% in 2015 to 10.7% in 2016. The overall volume of damages by professional excavators is always much greater than occupants/farmers. Although low in percentage terms, the influence of professional excavators is large in terms of raw numbers. These factors all contributed to the overall decline in damages due to Notification NOT Made from 31% in 2015 to 16% in 2016.

*Exhibit 8: Damage root cause groups 2009 - 2016*

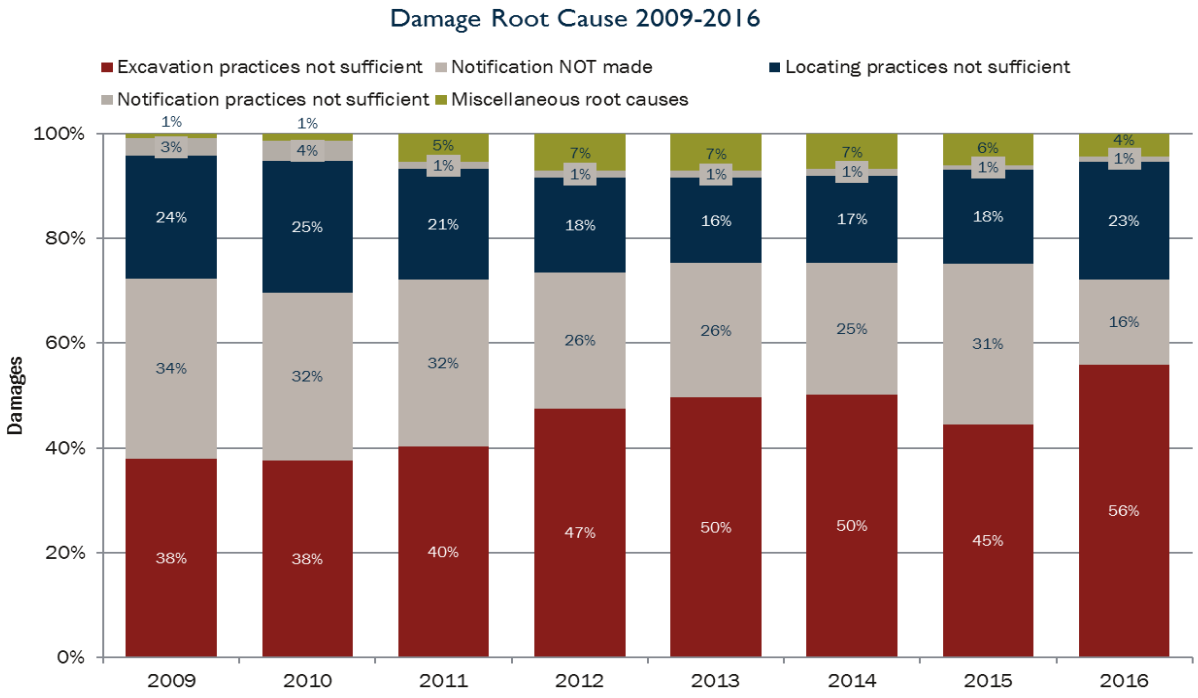
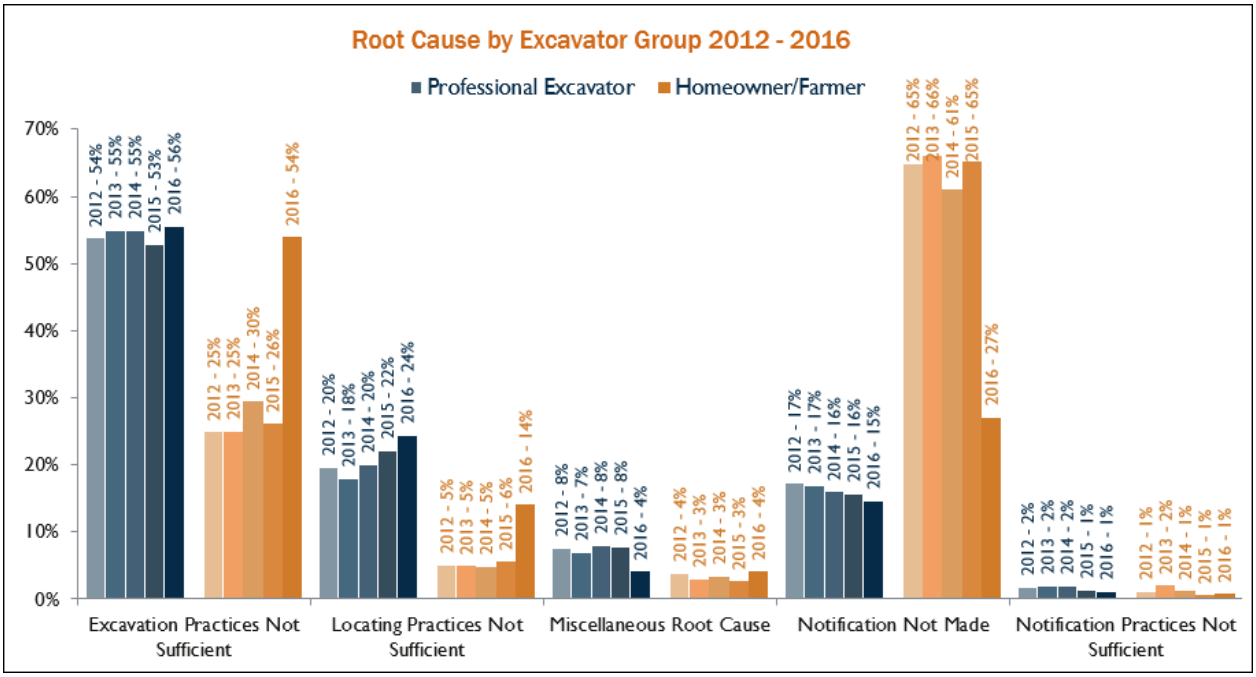



*Exhibit 9: Root cause by excavator group*



## Work Performed by Type of Work, Excavator, and Equipment

To illustrate how the interactive dashboard can be used to drill further into the data, we will use the Work by Excavator and Work by Equipment dashboards. Exhibit 10 shows a section of the Work by Excavator dashboard with no filters applied (2016 data). Note that the Contractor/Developer excavator group makes up approximately two-thirds of the total damages when sorted this way.

*Exhibit 10: Work Performed by Excavator Type Dashboard Snippets (no filters)*

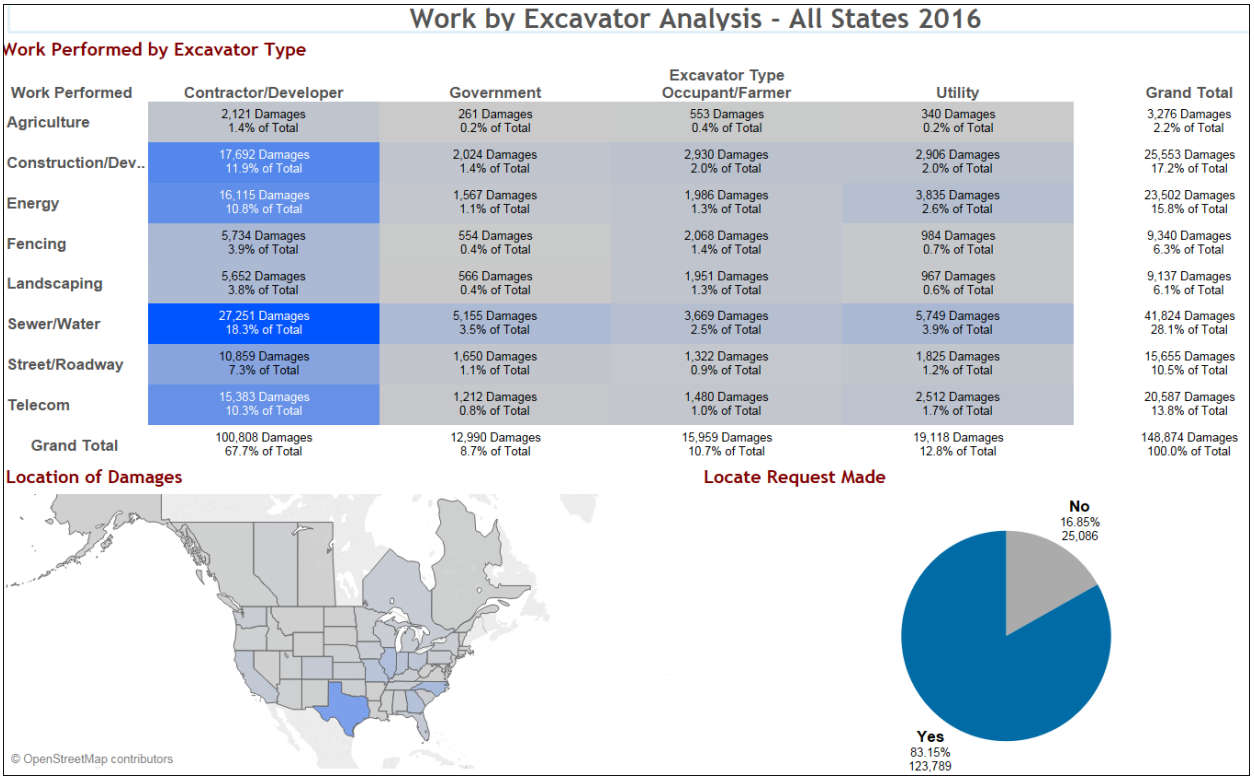



Exhibit 11 shows snippets from the same dashboard, but first by clicking on the intersection of Occupant/Farmer and Fencing, and then by clicking Occupant/Farmer and Landscaping. Note how the Locate Request Made pie charts recalculate to show a significantly higher percentage of Nos with these filters applied. When the same filters are applied to the 2015 data, the Nos are 58.22% for Fencing and 78.95% for Landscaping.

Exhibit 12 shows the same type of filtering using the Work by Equipment dashboard with the intersections of Hand Tools—Fencing and Hand Tools—Landscaping (2016 data). For comparison, the No portion of the Locate Request Made pie chart with no filters applied is 26.87%.

*Exhibit 11: Work performed by excavator type dashboard snippets (filtered on occupant/famer - fencing (top) and occupant/farmer–landscaping (bottom))*

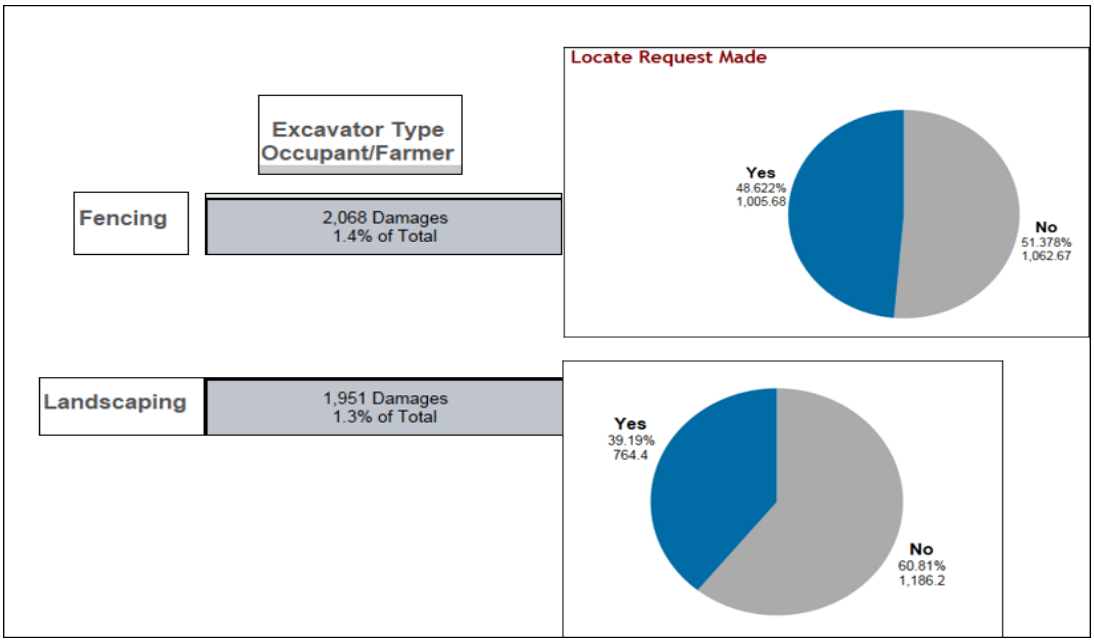
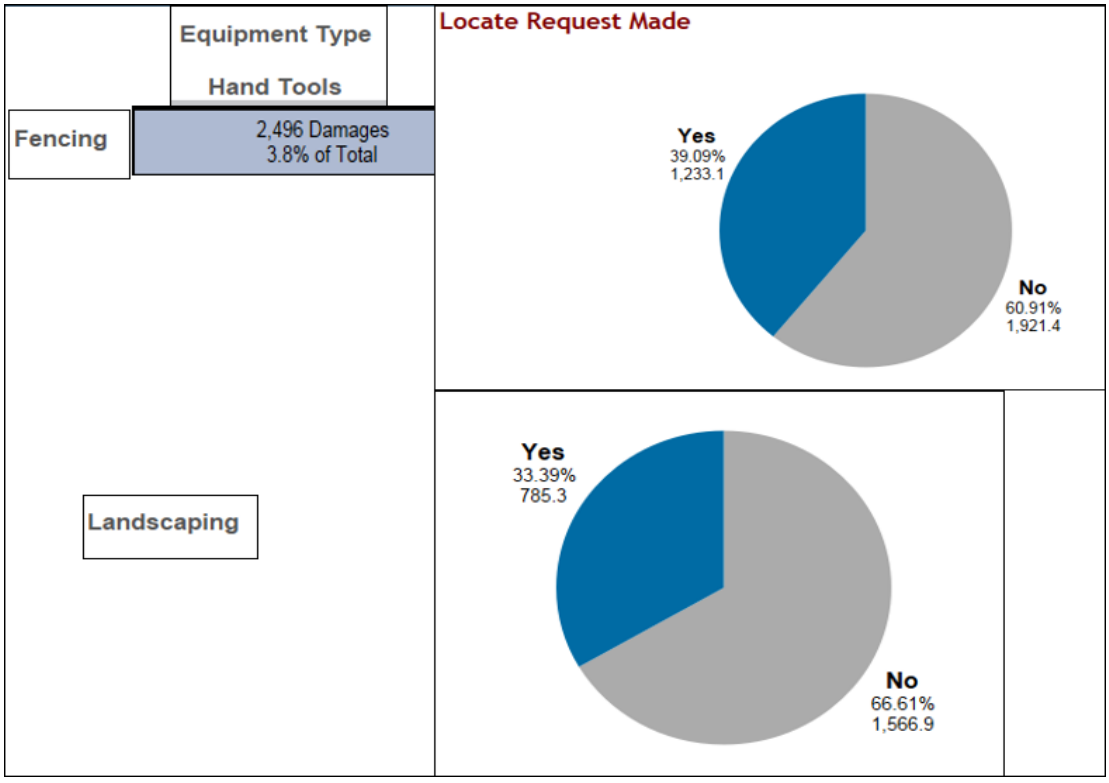



*Exhibit 12: Work performed by equipment type dashboard snippets (filtered on hand tools–fencing (top) and hand tools–landscaping (bottom))*



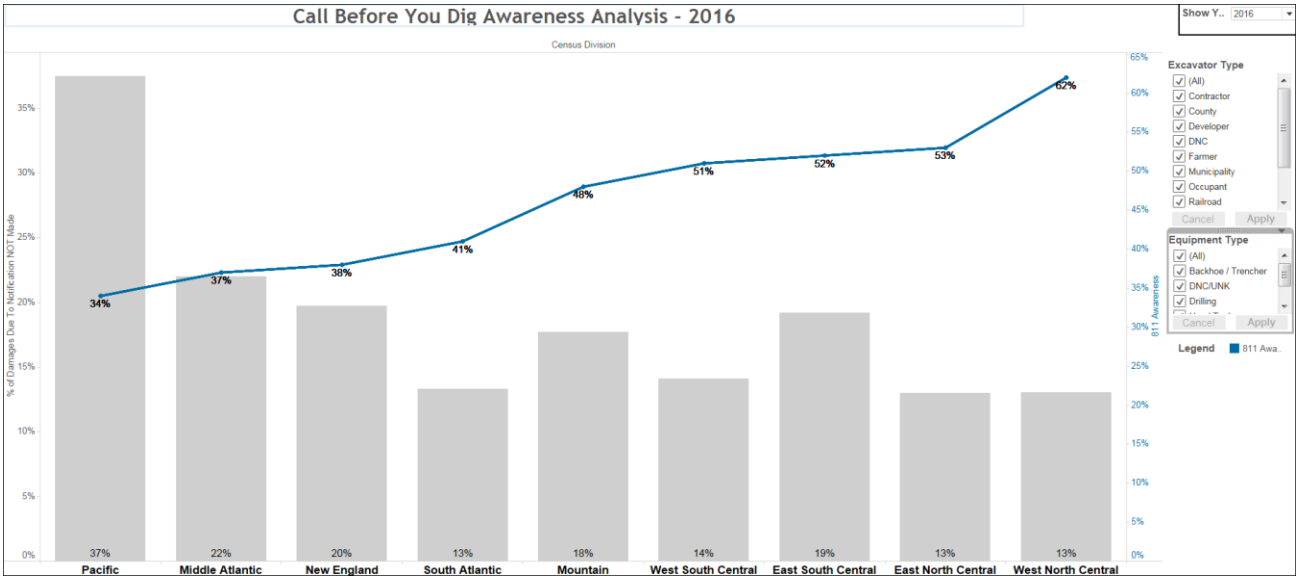
Even though more space in this report is devoted to analysis of Occupant/Farmers, Landscaping, Fencing, and Hand Tools, it is important to keep in mind that the single largest damage combination is Contractor/Developer–Sewer/Water–Backhoe/Trencher. Focused efforts to reduce these damages would yield the highest dividends in terms of bring down total damages.

## Call Before You Dig Awareness

The CBYD Awareness dashboard examines the relationship between Call Before You Dig Awareness and percentage of damages attributed to Notification NOT Made. This analysis uses the results of the "Call Before You Dig/811 National Awareness Study" conducted for CGA by Povaddo, LLC, in June 2017. The study was conducted at the U.S. Census Division[4] level and evaluates general (not limited to professional excavators) awareness of call before you dig services.

Exhibit 13 is an image of the CBYD dashboard. It shows that higher levels of Call Before You Dig Awareness are associated with lower percentages of damages due to Notification NOT Made, and vice versa. This dashboard can be filtered on various combinations of Type of Excavator and Equipment.

*Exhibit 13: "Call Before You Dig" (CBYD) general awareness in U.S. census division versus percentage of events with root cause Notification NOT made (no filters)*




Here are the key findings of the Povaddo Study:

1. Awareness of call before you dig services remains consistent with historical findings at 45%.
2. Awareness of 811 specifically continues to increase gradually with 39% aided and 9% unaided recall (see Exhibit 14).
3. 36% of respondents have seen or heard advertising that promotes the 811 service, in line with the elevated advertising awareness seen in 2016. Awareness of 811 advertising drives engagement with call before you dig services. Those who have seen or heard 811

[4] See https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf for details.

advertisements are more likely to be aware of call before you dig services (75%) and to say "811" sounds familiar (73%).

4. Usage of 811 fell slightly to 8%, and this increases to 20% among those aware of 811. An additional 15% of respondents who are not aware of 811 or have never called in the past said they have called or gone online to request that underground utility lines on their property be marked.
5. 59% of respondents say they are likely to call 811 before starting a digging project in the future (see Exhibit 15)**.** Respondents who are planning a digging project are most likely to call the service (87%), followed by those who have completed a previous project (79%). This important finding illustrates that the value of 811 is most recognized by those who need the service.
6. Overall, engagement remains consistent with historical findings following slight increases in 2016. Fewer people completed digging projects over the past year, and the number of those planning a future project has gone down slightly as well, likely fueling some minor decreases in engagement. Engagement with 811/call before you dig services is higher among people who have done or are planning a digging project, live in the West North Central and East South Central regions, are suburban or rural residents, and have higher incomes.

*Exhibit 14: Trend data – unaided and added 811 recall*

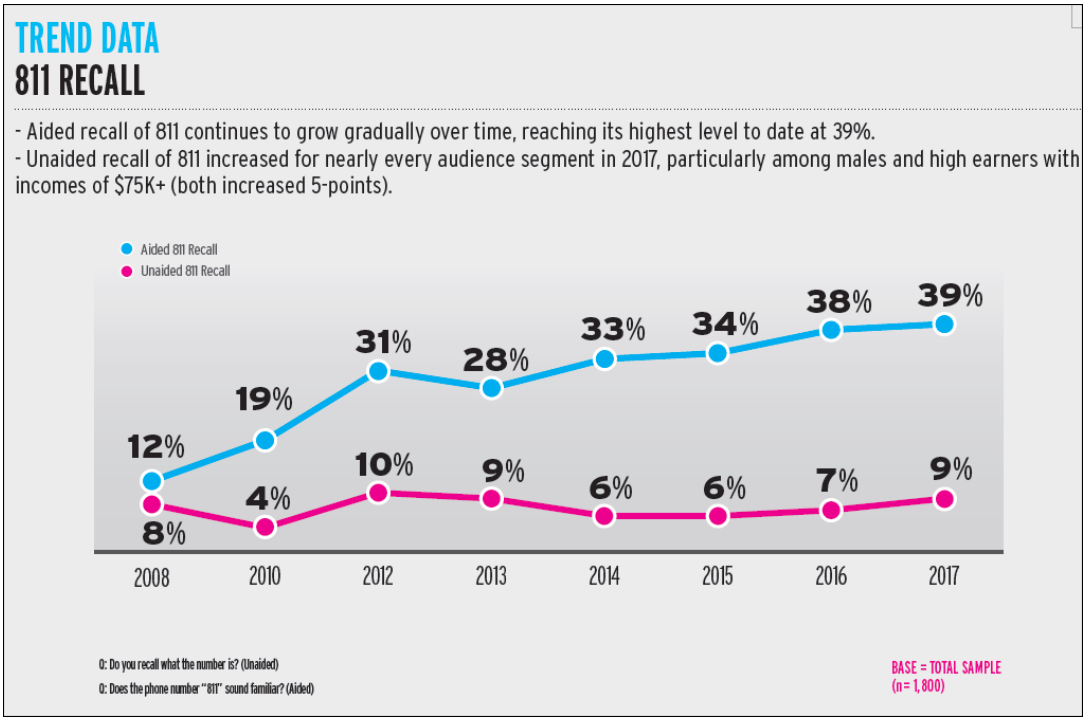
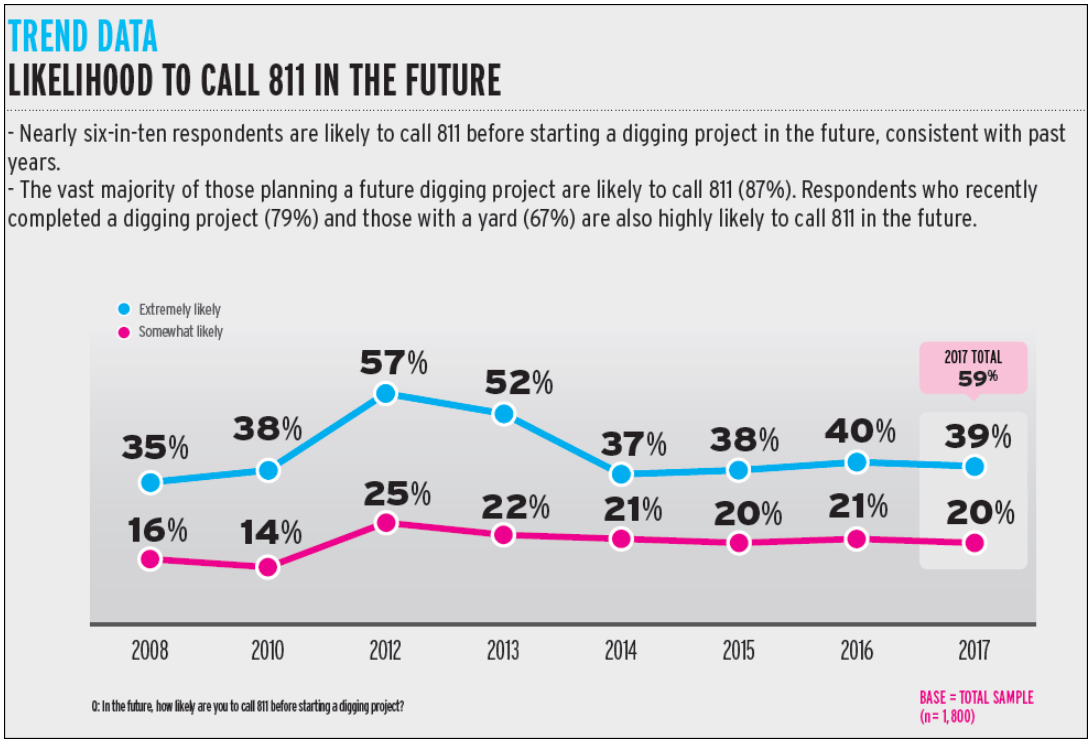


*Exhibit 15: Trend data – likelihood to call 811 in the future*




### PHMSA Determinations of Adequacy

On July 13, 2015, PHMSA announced the issuance of a final rule to establish the process for evaluating state excavation damage prevention law enforcement programs and enforcing minimum federal damage prevention standards in states where damage prevention law enforcement is deemed inadequate or does not exist.

PHMSA has completed its initial review of the state programs and issued letters to the states with its findings. These are publicly available at: https://www.phmsa.dot.gov/pipeline/safety-awareness-and-outreach/excavator-enforcement/determinations-of-adequacy. The 2016 DIRT report includes a new dashboard centered around these determination-of-adequacy letters. It also includes filtering on Work Performed by Excavator Type, Root Cause, Facilities Damaged, Facilities Affected, and Reporting Stakeholder. It also includes the ability to filter by Status - Adequate, Inadequate, and Contesting.

Exhibits 14 and 15 show this dashboard filtered on Natural Gas as the Facility Damaged for states deemed Inadequate and Adequate, respectively. With none of these filters applied, the Damage Root Causes are the same as seen in Exhibits 6 and 8, with Notification NOT made at 16%. By filtering on Natural Gas as the Facility Damaged, the Root Cause pie chart recalculates to 22% Notification NOT Made for states deemed Adequate, and 26% for states deemed Inadequate. Furthermore, an analysis of

publicly available data from PHMSA for natural gas distribution[5] finds that damages per 1,000 locate requests was 2.79 for adequate states and 3.23 for inadequate (2016 data). These analyses suggest a connection between adequacy of enforcement and use of 811 services and damage rates.

*Exhibit 14: PHMSA determinations of adequacy dashboard snippets (filtered on Natural Gas–Inadequate)*

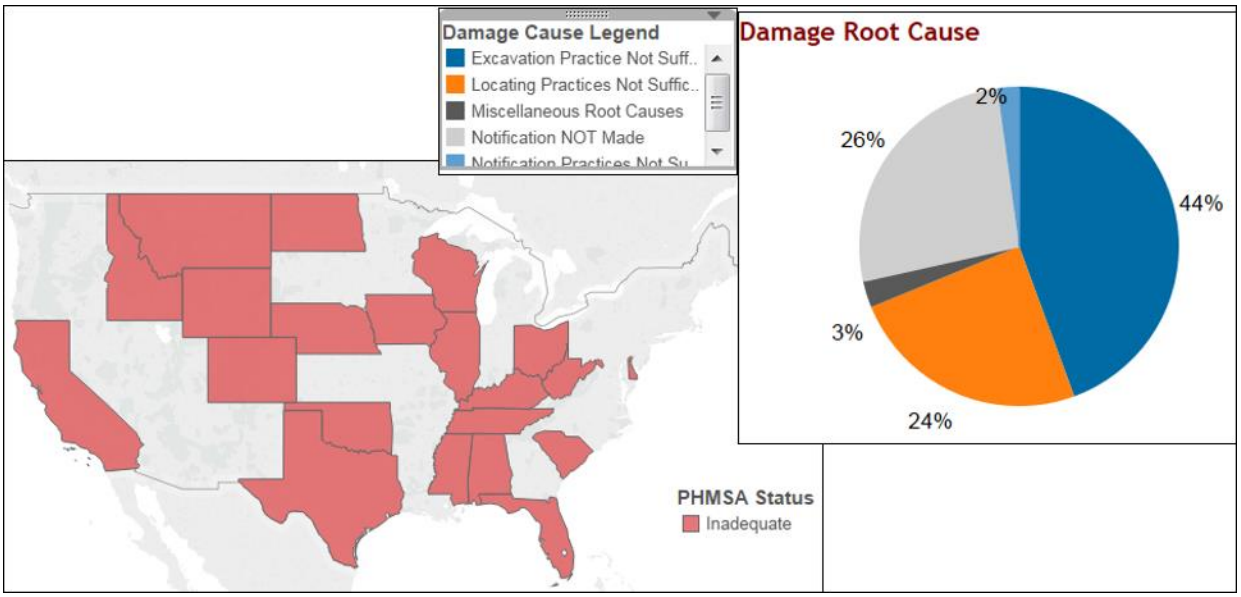
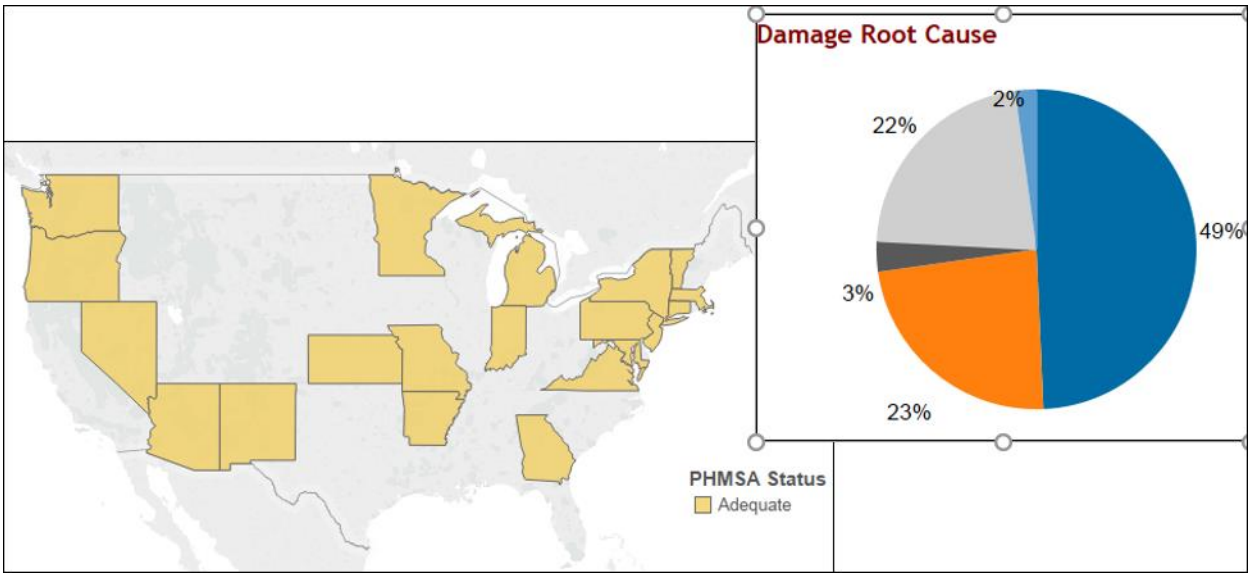



*Exhibit 15: PHMSA determinations of adequacy dashboard snippets (Filtered on Natural Gas–Adequate)*




[5] Go to https://opsweb.phmsa.dot.gov/primis_pdm/excavation_damage.asp and click on "Continue to PDM Reports."

## Data Quality Index (DQI)

The Data Quality Index (DQI) measures the completeness of event data submitted to DIRT. Each part within the DIRT form has a relative weight based on the value that it provides to statistical analysis. Each question within each part is also weighted, adding to 100 within the part. Points are subtracted when *Unknown, Other,* and *Data Not Collected* are used. The DQI is intended to provide submitters feedback based on measures of the 'completeness' and/or 'quality' of the data they submit so that they can identify opportunities to improve.

Exhibit 16 shows the 2016 and 2015 DQI by reporting stakeholder. Because the matching and weighting method involves combining records from different reporting stakeholders, it makes more sense to present the DQI scores based on the original unweighted 363,176 records.

*Exhibit 16: DQI by reporting stakeholder*

| Reporting Stakeholder | DQI 2016 | DQI 2015 | Change |
|---|---|---|---|
| One-Call Center | 47 | 45 | +2 |
| Electric | 67 | 65 | +2 |
| Engineer/Design | 65 | 58 | +7 |
| Excavator | 47 | 51 | -4 |
| Insurance | NA | 80 | |
| Liquid Pipe | 76 | 77 | -1 |
| Locator | 72 | 71 | +1 |
| Equipment Manufacturer | NA | 70 | |
| Natural Gas | 72 | 71 | +1 |
| Private Water | 79 | 84 | -5 |
| Public Works | 79 | 74 | +5 |
| Railroad | 67 | 69 | -2 |
| State Regulator | 63 | 67 | -4 |
| Road Builder | 70 | 67 | +3 |
| Telecommunications | 59 | 53 | +6 |
| Unknown | 59 | 56 | +3 |
| TOTAL | 68 | 67 | +1 |

The DQI continues to improve incrementally year to year. Locators, Natural Gas, and Telecommunications reporting stakeholders all improved. One Call Centers also improved, while Excavators declined.

The DIRT data output includes **COMP_STAKEHOLDER_GROUP,** which is auto-populated based on the user's DIRT registration information, and **RPT_STAKEHOLDER_GROUP,** which is entered by the user.

Several one call centers take "damage tickets" from excavators and submit these as DIRT reports. The Data Reporting & Evaluation Committee (DR&EC) has been discouraging one call centers from listing *One Call Center* as the reporting stakeholder, with some success. The DIRT Users Guide material for "Who Is Submitting this Information" states, "*One Call Center: For one call centers that compile data from other parties, such as their membership, for submission to DIRT, the original-source stakeholder group should be used rather than one call center, to allow for more accurate analysis of the original*

*source of the data."* The DR&EC needs the original source of the DIRT information to analyze in conjunction with other DIRT fields. For example, with reports identified as coming from excavators rather than one call centers, more accurate analysis can be made of the excavator viewpoint on issues important to them, such as downtime and root cause.

| COMP_STAKEHOLDER_GROUP | RPT_STAKEHOLDER_GROUP | |
|---|---|---|
| 1CAL | EXCV | Do |
| 1CAL | 1CAL | Don't |

Some of the DQI shifts among one call centers and excavators may be associated with some centers now properly recording the Reporting Stakeholder (shifting from "Don't" to "Do").[6] However, they still may not be collecting key data points such as type of equipment, work performed, or root cause, that would lead to a higher DQI. The average DQI for excavators submitting directly to DIRT rather than through a one call center is 82.

[6] For 2015, the 1CAL-1CAL combination was 26,663 out of 50,561 reports entered by 1CAL as **COMP_STAKEHOLDER GROUP**, or 53%. For 2016 it was 16,866 out of 61,238, or 28%. The combo of 1CAL-EXCV make up most, but not all, of the difference, i.e., there are some 1CAL-NATGAS, 1CAL-TELECOM, etc.

## Appendix 1: Highlights from CGA Programs and Committees

### Best Practices

The CGA Best Practices are agreed on by consensus of all 16 CGA stakeholder groups and designed to improve worker safety, protect vital underground infrastructure, and ensure public safety during excavation activities conducted in the vicinity of existing underground facilities.

CGA releases a new edition of Best Practices every spring with updates that reflect changes in damage prevention, especially those caused by the always-evolving technologies that are at the core of progress in the industry.

In 2016, one new best practice was adopted and two existing practices were revised.

**Best Practice 5-33: Facility Owner Provides a Monitor During Excavation** was adopted, with the following Practice Statement:

> If a facility owner/operator considers it necessary to be on site during excavation activities to work with the excavator in protecting their existing facilities, the facility owner/operator plans with the excavator to be present during those excavation activities within the time specified by state/provincial law.

**Best Practice 2-5: Markers for Underground Facilities** was revised. The practice statement remains the same, but the practice description was revised to the following:

1. Add additional types of below-ground markers.
2. Separate above-ground and below-ground markers in the practice description.
3. Move the APWA color-coded language to the first paragraph because it applies to both above-ground and below-ground markers.
4. Add a description for the installation of below-ground markers.
5. Add additional references.

**Best Practice 8-4: Structured Education Programs** was revised. The practice statement remains the same, but the practice description was revised to provide more flexibility and to match communication tactics based on demographics, damage events, effectiveness measurements, and other relevant factors.

### Educational Programs and Marketing

CGA's Educational Programs and Marketing Committee is charged with managing promotional outreach, including the 811 campaign. Committee members analyze information in the annual DIRT Report to identify key target audiences, such as farmers, landscapers, and fence contractors, along with homeowners who dig on their own property.

Based on the 2015 DIRT Report, the Committee identified an opportunity to help the agricultural community learn how their farming and ranching activities can impact buried utilities. A video that dispels myths was tailored to reach their specific stakeholder group. It can be downloaded from

http://commongroundalliance.com/damage-prevention/toolkits/811-videos-psas-and-supporting-tools. The committee is continuing the communication mission by developing an Ag Community pre-excavation checklist and shorter video vignettes of each myth from the longer video.

Because the 2015 DIRT Report reflected an opportunity to educate landscaping and fencing contractors, the committee is connecting with these types of excavators to develop deeper contact. A PowerPoint presentation has been created for the American Fence Association, and the committee is in the early planning stages for a video for each of these groups. These efforts may have contributed to the improvements seen in damages due to No Notification Made to One Call Center for these types of excavators and work performed.

The DIRT data also indicates that municipalities may benefit from education. The Committee is also reviewing options for a playbook for a grassroots effort to communicate with municipalities and will use regional data to guide those efforts.

## One Call Systems International (OCSI)

One Call Systems International (OSCI) is a CGA committee comprised of one call center representatives and other industry professionals whose mission is to promote facility damage prevention and infrastructure protection through education, guidance, and assistance to one call centers internationally. OCSI collects information from one call centers on notification statistics, policies regarding geographical size of notifications, valid duration of notifications, and more. Some of the data is used in the DIRT report to estimate the U.S. Total Damage and Damages per 1,000 Transmissions. The OCSI data committee continually encourages one call centers to report data each year, including personally contacting one call centers needing assistance with submitting data. Incentives such as drawings with gift card prizes have also been used and had some success. As further incentive to submit their 2016 data by Feb. 28, OCSI sponsored a drawing for a free registration to the Annual CGA Conference & Expo held in March.

## Technology

The CGA Technology Committee was formed in 2010 as a successor to the Research & Development Committee. Its mission is to provide a forum for identifying damage prevention technologies, review new technologies from all parts of the damage prevention industry, and report on its findings to the full CGA membership.

On June 22, 2016, President Barack Obama signed the “Protecting Our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016.” A provision of the Act required PHMSA, in consultation with stakeholders, to conduct a study on improving existing damage prevention programs through technological improvements in location, mapping, excavation, and communications. The Act requires PHMSA to submit a report to the Senate and House of Representatives one year from the date of enactment of the law.

PHMSA invited CGA to participate in this study. The Technology Committee led the gathering and presentation of information. It conducted a survey of the CGA membership and compiled it into a report submitted to PHMSA in late November 2016.

One provision of the PIPES Act was that PHMSA's study include *"an analysis of the feasibility of a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information."*

CGA's report to PHMSA stated that *"CGA believes a national data repository for pipeline excavation accident data that creates standardized data models for storing and sharing pipeline accident information is feasible through the use of DIRT."*

The Committee intends to build upon its report to PHMSA and produce its first annual Technology Report later in 2017. The report will provide a summary of key technology improvements that the industry could adopt and technology challenges for the industry to solve, including focus on the leading causes of damages as identified by the Annual CGA DIRT Report.

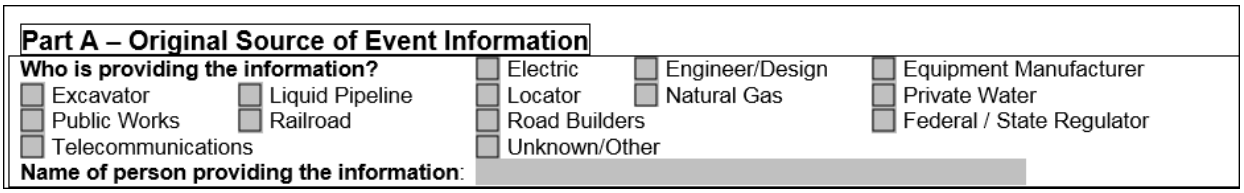
The Technology Committee revamped the survey used for the PHMSA study and made it into a ***Technology Collection Form*** available at any time for interested parties to submit ideas. Go to the following site to take the survey: http://commongroundalliance.com/programs/technology

## Appendix 2: DIRT Form Revisions Effective Jan. 1, 2018

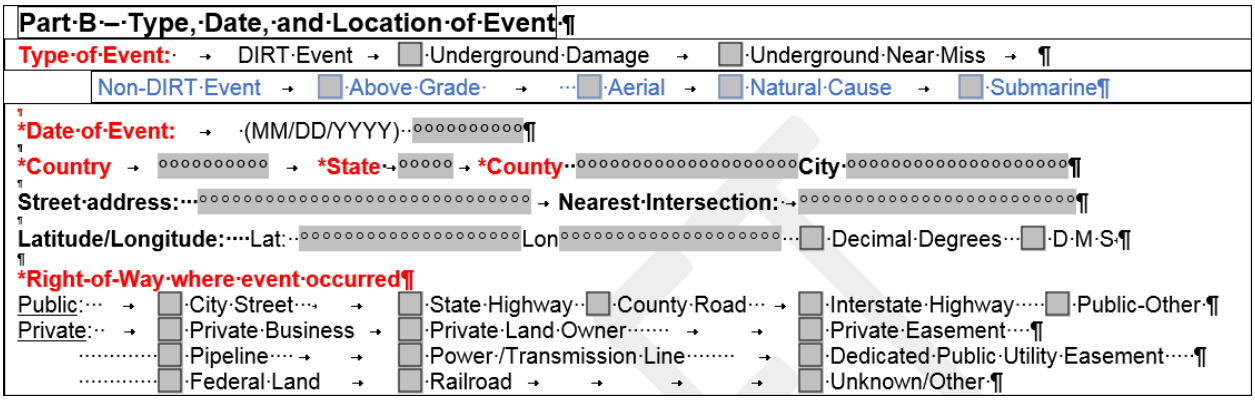
The Data Reporting and Evaluation Committee (DR&EC) performed a comprehensive review of the DIRT form to determine if some questions and/or associated answers should be eliminated, added, consolidated, or revised. The DR&EC reviewed historical data on which questions were answered with high percentages of known values (i.e., high DQI) versus *Unknown/Other* or *Data NOT Collected*, and on which answers were frequently or seldom selected. The DR&EC also reviewed user support and feedback tickets and requests for enhancements to DIRT. Because of these efforts, a new version of DIRT will take effect on Jan. 1, 2018.

The DR&EC has released additional information about the roll-out and how to transition from the old to new form via articles in the monthly CGA Newsletter. It will also provide additional resources on the CGA website, conduct webinars and presentations at the annual CGA conference, and email announcements.

The individual revisions are described below.




- Title changed from **Who Is Submitting this Information** to **Original Source of Information**
- **One Call Center** removed
- **Insurance** removed
- **State Regulator** changed to **Federal/State Regulator**
- **Data Not Collected** deleted




- Heading changed from **Date and Location of Event** to **Type, Date, and Location of Event**
- **Underground** changed to **Underground Damage** **
- **Underground Near Miss** added **
- **Above Ground/Surface changed** to **Above Grade**
- **Accuracy** question deleted
- **Data Not Collected** deleted

**Corresponds with removing **Was there damage to a facility?** from Part H.

**Part C – Affected Facility Information**

*What type of facility operation was affected? ☐ Cable Television ☐ Electric ☐ Liquid Pipeline ☐ Natural Gas ☐ Sewer ☐ Steam ☐ Telecommunications ☐ Water ☐ Unknown/Other

*What type of facility was affected? ☐ Distribution ☐ Gathering ☐ Service/Drop ☐ Transmission ☐ Unknown/Other

Was the facility part of a joint trench? ☐ Yes ☐ No ☐ Unknown

Did this event involve a Cross Bore? ☐ Yes ☐ No

Was facility owner One Call Center member? ☐ Yes ☐ No ☐ Unknown

If No, is facility owner exempt from One Call Center membership? ☐ Yes ☐ No ☐ Unknown

Measured Depth From Grade ☐ Embedded in concrete/asphalt pavement ☐ 18" – 36" / 46 - 91 cm ☐ <18" / 46 cm ☐ >36" / 91 cm Measured depth from grade _____in/cm

- **Sewer (Sanitary Sewer)** changed to **Sewer** in **Facility Operation**
- **Did this event involve a Cross Bore? q**uestion added
- **If No,** *(i.e., facility owner is not a One Call Center member)* **is facility owner exempt from One Call Center membership?** question added
- **Measured Depth from Grade** question added

**Part D – Excavation Information**

*Type of Excavator ☐ Contractor ☐ County ☐ Developer ☐ Farmer ☐ Municipality ☐ Occupant ☐ Railroad ☐ State ☐ Utility ☐ Unknown/Other

*Type of Excavation Equipment ☐ Auger ☐ Backhoe/Trackhoe ☐ Boring ☐ Bulldozer ☐ Drilling ☐ Directional Drilling ☐ Explosives ☐ Farm Equipment ☐ Grader/Scraper ☐ Hand Tools ☐ Milling Equipment ☐ Probing Device ☐ Trencher ☐ Vacuum Equipment ☐ Unknown/Other

*Type of Work Performed ☐ Agriculture ☐ Bldg. Construction ☐ Bldg. Demolition ☐ Cable Television ☐ Curb/Sidewalk ☐ Drainage ☐ Driveway ☐ Electric ☐ Engineering/Survey ☐ Fencing ☐ Grading ☐ Irrigation ☐ Landscaping ☐ Liquid Pipeline ☐ Milling ☐ Natural Gas ☐ Pole ☐ Public Transit Auth. ☐ Railroad ☐ Road Work ☐ Sewer ☐ Site Development ☐ Steam ☐ Storm Drain/Culvert ☐ Street Light ☐ Telecommunication ☐ Traffic Signal ☐ Traffic Sign ☐ Water ☐ Waterway Improvement ☐ Unknown/Other

- **Bulldozer** added to **Excavation Equipment**
- **Railroad Maintenance** changed to **Railroad** in **Work Performed**
- **Sewer (San/Storm)** changed to **Sewer**
- **Data Not Collected** deleted for all questions in the Part

**Part E – Notification and Locating**

*Was the One-Call Center notified? ☐ Yes ☐ No Ticket Number

If Yes, type of locator ☐ Facility Owner ☐ Contract Locator ☐ Unknown/Other

If No, is excavation activity and/or excavator type exempt from notification? ☐ Yes ☐ No ☐ Unknown

Was work area white-lined? ☐ Yes ☐ No ☐ Unknown

**Part F – Intentionally left blank**

- **If Yes, which One Call Center? question removed**
- **If No** *(i.e., One Call Center was not notified)*, **is excavation activity and/or excavator type exempt from notification?** question added
- **(If No, Skip Part F)** removed from next to **No**
- **Was work area white-lined? question added**
- **Type of Locator** question moved from Part F to Part E
- **Data Not Collected** deleted
- **Facility Marks Visible** and **Correct** questions deleted from Part F
- **Part F** heading changed to **Intentionally left blank**

**Part G – Excavator Downtime**

**Did Excavator incur down time?** ☐ Yes ☐ No

**If yes, how much time?** ☐ 0 ☐ < 1 hr ☐ 1 -<2 hrs ☐ 2-<3 hrs ☐ 3+ hrs Exact Value _____ ☐ Unknown

**Estimated cost of down time?** ☐ $0 ☐ $1 -1000 ☐ $1,001 - 5,000 ☐ $5,001 - 25,000 ☐ $25,001 - 50,000 ☐ >$50,000 Exact Value _____ ☐ Unknown

- **$1 to 500** and **$501 to 1,000** combined into **$1 to 1,000**
- **$1,001 to 2,500** and **$2,501 to 5,000** combined into **$1,001 to 5,000**

**Part H – Interruption and Restoration**

***Did the damage cause an interruption in service?** ☐ Yes ☐ No ☐ Unknown

**If yes, duration of interruption** ☐ < 1 hr ☐ 1 - <6 hrs ☐ 6 - <12 hrs ☐ 12 - <24 hrs ☐ 24 - <48 hrs ☐ 48+ hrs Exact Value _____hrs ☐ Unknown

**Approximately how many customers were affected?**

☐ Unknown ☐ 0 ☐ 1 ☐ 2 - 10 ☐ 11 - 50 ☐ 51+ Exact Value _____

**Estimated cost of damage / repair/restoration:** ☐ $0 ☐ $1 - 1,000 ☐ $1,001- 5,000 ☐ $5,001 - 25,000 ☐ $25,001 - 50,000 ☐ > $50,000 Exact Value _____ ☐ Unknown

- **Was there damage to a facility?** deleted (now covered by Type of Event in Part B)
- **Data Not Collected** deleted in Interruption question
- In duration question,
  - **1 to 2 hrs, 2 to 4 hrs, 4 to 8 hrs**, and **8 to 12 hrs** replaced by **1 to 6 hrs** and **6 to 12 hrs**
  - **1 to 2 days, 2 to 3 days,** and **3 or more days** replaced **by 12 to 24 hrs, 24 to 48 hrs, and 48+ hrs**
- In cost of repair/restoration question,
  - **$1 to 500** and **$501 to 1,000** replaced by **$1 to 1,000**
  - **$1,001 to 2,500** and **$2,501 to 5,000** replaced by **$1,001 to 5,000**
- **Injury** question deleted
- **Fatality** question deleted

***Part I – Root Cause Select only one**

**Notification Issue**

☐ No notification made to One Call Center/ 811
☐ Excavator dug outside area described on ticket
☐ Excavator dug prior to valid start 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
☐ Excavator failed to protect/shore support facilities
☐ Improper backfilling practices
☐ Marks faded or not maintained
☐ Improper excavation practice not listed above

**Locating Issue**

*Facility not marked due to*:
☐ Abandoned facility
☐ Incorrect facility records/maps
☐ Locator error
☐ No response from operator/contract locator
☐ Tracer wire issue
☐ Unlocatable Facility

*Facility marked inaccurately due to*
☐ Abandoned facility
☐ Incorrect facility records/maps
☐ Locator error
☐ Tracer wire issue

**Miscellaneous Root Causes**

☐ Deteriorated facility ☐ One Call Center Error ☐ Previous damage
☐ Root Cause not listed (comment required)

- **One-Call Notification Practices Not Sufficient** group heading changed to **Notification Issue**
- **No notification made to the One Call Center** replaced with **No notification made to One Call Center/811**
- **Notification to One Call Center made, but not sufficient** deleted

- **Wrong information provided to One Call Center** deleted
- Add the following new Notification Issue Root Cause selections:
    - **Excavator dug outside area described on ticket**
    - **Excavator dug prior to valid start date/time**
    - **Excavator dug after valid ticket expired**
    - **Excavator provided incorrect notification information**
- **Excavation Practices Not Sufficient** group heading changed to **Excavation Issue**
- **Failure to maintain marks** changed to **Marks faded or not maintained**
- **Failure to support exposed facilities** changed to **Excavator failed to protect/shore facilities**
- **Failure to use hand tools where required** deleted
- **Failure to test-hole (pot-hole)** changed to **Excavator dug prior to verifying marks by test-hole (pothole)**
- **Failure to maintain clearance** changed to **Excavator failed to maintain clearance after verifying marks**
- **Other insufficient excavation practices** changed to **Improper excavation practice not listed above**
- **Locating Practices Not Sufficient** group heading changed to **Locating Issue**
- Unlocatable Facility selections sorted by *Facility not marked* and *Facility marked inaccurately* with the following listed under both:
    - **Abandoned facility** (moved from **Miscellaneous Root Causes)**
    - **Incorrect facility records/maps**
    - **Locator error**
    - **Tracer wire issue**
- The following added under *Facility not marked*:
    - **No response from operator/contract locator**
    - **Unlocatable Facility**
- Under Miscellaneous Root Causes,
    - **Data Not Collected** deleted
    - **Other** replaced with **Root Cause not listed**

## Appendix 3: Groupings Used in Report and Dashboard

*Root Cause Group*

| Group | Root Cause |
|---|---|
| Excavation practices not sufficient | Failure to maintain clearance<br>Failure to support exposed facilities<br>Failure to use hand tools where required<br>Failure to test hole (pot-hole)<br>Improper backfill practices<br>Failure to maintain marks<br>Excavation practices not sufficient (other) |
| Notification NOT made | No notification made to one call center |
| Locating practices not sufficient | Incorrect facility records/maps<br>Facility marking or location not sufficient<br>Facility was not located or marked<br>Facility could not be found or located |
| Notification practices not sufficient | Notification of one call center made but not sufficient<br>Wrong information provided to one call center |
| Miscellaneous root cause | Abandoned<br>One call center error<br>Deteriorated facility<br>Previous damage |

*Excavator Group*

| Group | Type of Excavator |
|---|---|
| Contractor/Developer | Contractor, Developer |
| Government | State, County, Municipal |
| Occupant/Farmer | Occupant, Farmer |
| Utility | Utility |

*Excavation Equipment Group*

| Group | Type of Excavation Equipment |
|---|---|
| Backhoe/Trencher | Backhoe, Trackhoe, Trencher |
| Drilling | Auger, Bore, Directional drill, Drill |
| Hand tools | Hand tools, Probe |
| Other | Grader, Scraper, Road milling equipment, Explosives, Vacuum equipment, Farm implement |

*Work Performed Group*

| Group | Type of Work Performed |
|---|---|
| Agriculture | Agriculture |
| Construction/Development | Construction, Site Development, Grading, Drainage, Driveway, Demolition, Engineering, Railroad, Waterway |
| Energy | Natural Gas, Electric, Steam, Liquid Pipe |
| Fencing | Fencing |
| Landscaping | Landscaping |
| Sewer/Water | Sewer, Water |
| Street/Roadway | Roadwork, Curb/Sidewalk, Storm Drainage, Milling, Pole, Traffic Signals, Traffic Signs, Streetlight, Public Transit |
| Telecom | Telecommunication, Cable TV |

# 2016 CGA DIRT Analysis & Recommendations

*Prepared by:*

FMI Corporation

CGA's Data Reporting & Evaluation Committee

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Common Ground Alliance

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