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**Damage Information and Reporting Tool (DIRT)**

**CGA DIRT Analysis and Recommendations**

**For Calendar Year 2004**

**— Volume I —**

**Released December 5, 2005**



**This report may be referenced as the Common Ground Alliance analysis on 2004 data submitted into DIRT.**

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# THE DIRT ON FACILITY DAMAGE

PROMOTING EFFECTIVE DAMAGE PREVENTION  
THROUGH SHARED STAKEHOLDER RESPONSIBILITY,  
BEST PRACTICES IDENTIFICATION & PROMOTION,  
AND DAMAGE INFORMATION REPORTING.

Damage Information  
Reporting Tool (DIRT):  
Analysis and  
Recommendations  
For Calendar Year 2004  
Released December 2005  
— Vol. I—

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## About CGA

The Common Ground Alliance (CGA) is a member-driven association dedicated to ensuring public and worker safety, environmental protection, and the integrity of the public/private utility infrastructure by promoting effective damage prevention practices. CGA is a national, nonprofit organization with over 1,100 individual members, 155 member organizations and 30 corporate sponsors. Officially formed in 2000, CGA represents a continuation of the damage prevention efforts embodied by the *Common Ground Study* in 1999. That study was sponsored by the U.S. Department of Transportation and represents the collaborative work of over 160 industry professionals who identified best practices relating to damage prevention.

The *Common Ground Study* devotes an entire chapter to data Reporting and Evaluation, and identifies a number of related best practices. The CGA has identified one of its important purposes as increasing safety and preventing damages to underground infrastructure by serving as a clearinghouse for underground utility safety and damage data collection, analysis, and dissemination. Since 2001, the CGA Data Reporting and Evaluation Committee (DR&EC) has worked to develop a method of collecting information from underground utility safety and damage prevention stakeholders. The first evolution of this effort was introduced in November of 2003 as the Damage Information Reporting Tool (DIRT, or “the tool”). DIRT is a secure web application designed to collect and report underground facility damage and locating and excavation safety information. Under the guidance of the DR&EC, the tool has undergone numerous revisions. It now includes features such as a data query wizard, the granting of user access

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rights and online training videos. For additional details on these features and the structure and specifications of DIRT, or on using DIRT to report information for your organization, visit [www.cga-dirt.com](http://www.cga-dirt.com).

A major goal of the DR&EC is to encourage widespread use of DIRT among stakeholders. Currently there are over 27,000 records in the system, with nearly 22,000 of these records voluntarily submitted by stakeholders for 2004. This report provides a look at the 2004 data, along with a summary of important findings and considerations. Recommendations for improving the data collection process and evolving this critical effort to the next level are also offered.

As the CGA motto states: *Damage Prevention is a Shared Responsibility!* The DR&EC thanks those individuals who have worked hard to envision and develop the DIRT tool and those organizations and individuals who have submitted their valuable data in the spirit of cooperation, shared responsibility and concern for corporate and public welfare.

This report may be referenced as the Common Ground Alliance analysis on 2004 data submitted into DIRT.

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# Locate Accurately Dig Safely.®

Underground Safety and Facility Damage Prevention  
"A Shared Responsibility"

## The Value of Reporting

CGA has demonstrated its commitment to underground utility safety and damage prevention efforts and its emerging leadership among all stakeholders. Over the past several years, the Common Ground Alliance (CGA) has endeavored to build a framework upon which to combine industry best practices and underground utility safety and damage reporting to understand and characterize the state of damage prevention. The vision is to measure and improve the effectiveness of our nation's damage prevention programs. As we move forward, this collaborative work will focus on utilizing information to identify, initiate and participate in stakeholder efforts to improve stakeholder understanding, increase safety, minimize breakdowns in the damage prevention process, and ultimately minimize the number of facility damages. Much of this effort will come through education, training, marketing and advertising programs. The ongoing analysis and assessment of the information from these tools and the growing participation in these programs will provide the means to monitor and evaluate damage prevention efforts. This in turn can provide the necessary feedback to assist with damage prevention advancements at a local, national, and international level.

## About This Report

Stakeholders throughout the U.S. have voluntarily provided the data for analysis in this report. CGA has collected and summarized the data and published this report to fulfill its previously stated purpose and to facilitate improvements in safety and damage prevention efforts. CGA specifically states, under the *Purpose of Data Collection* on the CGA Web Site–DIRT Overview, that, "*The data will not be used for enforcement purposes or to try and determine damage liability.*" In addition, "*The individual identities of parties involved with damages will be kept confidential.*"

As part of the aforementioned effort, CGA does anticipate that stakeholders will utilize this information to create positive transformation within the utility safety and damage prevention community and specifically, within damage prevention programs and efforts. The intended audience includes the following stakeholder groups: underground facility owners and operators, underground facility locators, One-Call notification centers, excavators<sup>(1)</sup>, regulatory and compliance agencies and related industry associations. CGA is not responsible for any action taken based upon the information or the interpretation of any information presented within this report.

<sup>(1)</sup> For the purpose of this report, excavator refers to any party performing excavation work.

## Executive Summary

Buried facilities have been damaged during excavation activity ever since the first sewer and water facilities were placed underground hundreds, if not thousands, of years ago. The growing use of several facility installation practices over the past few decades and the lack of accurate documentation have increased both the likelihood and the occurrence of facility damages. These include burying electrical and telecommunication infrastructure, the recent practice of placing multiple facilities in joint trenches, and the increased use of directional drilling techniques. At a global level, the financial costs to the stakeholders, utility customers, and the communities have undoubtedly been enormous. These costs include not only human costs from injuries and fatalities, but also the cost of construction delays, facility repairs, property damages, lost service revenue, legal and litigation costs, and disruption of businesses, community services, and personal lives. There are also ongoing damage prevention, public awareness and educational costs, as well as frequent legislative and regulatory costs incurred by stakeholders.

Unfortunately, the extent of facility damage and the magnitude of this impact at a national or local level are not accurately known, nor are they easy to measure. The effort to collect and assess this impact would be a monumental project. Even within a local community or within a single stakeholder company, the full costs of facility damage and its impact on the company and the community are not always accurately documented or compiled. Although there have been efforts over the years by select stakeholder groups and regulatory agencies to define and document the extent of facility damage and its financial and social impact, all but a few have tended to be narrow in scope and have met with limited success.

To begin to comprehend the extent of all facility damages, the breakdowns in the damage

prevention process, and the magnitude of the associated costs, it becomes necessary to undertake this monumental project to identify the root causes of damage — a project that will include ALL stakeholders throughout the reporting areas. The value of such a project is evident: ensuring public and worker safety and the protection of our vital infrastructure.

The CGA was formed in 2000 with the purpose of *“working to reduce damages to the underground facility infrastructure—ensuring public safety, environmental protection, and the integrity of services by promoting effective damage prevention practices.”* This purpose includes serving as a clearinghouse for damage data collection, analysis and dissemination. For such a project to align with this purpose, a national data repository would need to be created and maintained. It also needs to be populated with relevant and accurate data from all stakeholders in every part of the country. As previously mentioned, the DR&EC undertook the work of designing this data repository—the Damage Information Reporting Tool (DIRT)—and encouraging stakeholders to submit their information. As stated on the CGA Web Site—DIRT Overview, *“The primary purpose in collecting underground facility damage data is to analyze data, to learn why damages occur, and how actions by industry can prevent them in the future; thereby ensuring the safety and protection of people and infrastructure.”* It goes on to state, *“Data collection will allow CGA to identify root causes of damage, perform trend analysis, and help educate all stakeholders so that damages can be reduced through effective practices and procedures.”* This report is the first of many that will come forward from this project in the years ahead. As additional stakeholders embrace the vision of CGA and accept their shared responsibility, the analysis, findings, and recommendations in these reports will serve to improve the quality and effectiveness of damage prevention efforts throughout the U.S. and Canada.

To establish an effective foundation upon which to read and apply the analysis, findings and recommendations in this report, it is necessary to identify what this report does and does not do:

- This report does provide a limited and summarized analysis of 21,688 facility damage records that were submitted for 2004 by a limited number of stakeholders in the U.S.
- This report does identify a number of key findings and presents a number of recommendations to improve the viability of the tool and of the report in future years.
- This report does not identify individual stakeholders involved with reported damages or specific damage events.
- This report does not identify how many excavation projects occurred in the U.S. or the ratio of facility damages to excavation projects.
- This report does not identify how many facility notifications<sup>(2)</sup> were requested by excavators or the ratio of damages to notification requests.
- This report does not identify how many locate notifications<sup>(3)</sup> were delivered to facility owner/operators by One-Call notification centers or directly by excavators, or the ratio of damages to locate notifications.
- This report does not measure or report the actual number of facility damages that occurred in the U.S. or in any particular area of the U.S., though it does identify one methodology for providing an estimate of the number of facility damages in the U.S. Please refer to Conclusion 6 (Page 6) for a discussion of this estimate, and to Appendix-A for a description of the methodology used to calculate this estimate.

<sup>(2)</sup> For the purpose of this report, a facility notification is requested by an excavator through the One-Call notification center.

<sup>(3)</sup> For the purpose of this report, a locate notification is delivered to a facility owner/operator by the One-Call notification center.

- This report does not measure the quantity, quality or effectiveness of industry or stakeholder damage prevention efforts, including those for state One-Call programs.
- The dataset of facility damages submitted does not provide a random sample of damages that occurred in the U.S. or in any specific geographic region of the U.S.
- This report does not provide damage trend analysis, as this is the first year to analyze the data.

It is important to reiterate that CGA does not have a complete record of all excavation projects, all facility notifications requested by excavators, all facility locate notifications delivered to facility owner/operators, or all facility damages that occurred for the entire U.S. The data analyzed in this report was voluntarily submitted by stakeholders that supported the data collection and reporting effort for 2004. This data (and so this report) cannot be used to establish the state of facility damages, or of damage prevention efforts, in general for the U.S or for any geographic area of the U.S.

As defined in the CGA Best Practices Handbook (Version 2.0), Reporting and Evaluation Best Practices, the Best Practice #1 recommends that, *"ALL STAKEHOLDERS REPORT INFORMATION"*. Although only a small group of pioneering stakeholders submitted data for 2004, the vision that originated in the *Common Ground Study* referenced earlier, and the vision that CGA, the DR&EC, and many stakeholders wholeheartedly embrace is that ALL stakeholders will soon report ALL relevant events and provide complete and accurate information. The Best Practice #2 states that, *"The requested data is standardized and consists of the minimum essential information that can be analyzed to determine what events could, or did, lead to a damaged facility."* By collecting and analyzing this data and understanding why and how facilities get damaged, stakeholders can work to reduce facility damages by applying what is

learned to improving damage prevention awareness, education and training programs. Needless to say, without sufficient participation by stakeholders, this project will not reach its full potential of providing an accurate and complete understanding of why and how facility damages occur, nor will it provide the greatest impact to damage prevention efforts envisioned by CGA with the creation of DIRT.

The reader is cautioned that extreme care must be used when interpreting or drawing conclusions about facility damages from the limited data submitted in 2004. Nevertheless, it is interesting that the data in this report shows that nearly half of the reported facility damages occurred even though a facility notification was requested from the applicable One-Call notification center. It would be easy, but quite incorrect, to think that One-Call notification doesn't help prevent facility damage. Or, it would be easy, but again incorrect, to say that damage prevention awareness efforts are ineffective based upon this observation. It is important to remember though, that there were probably hundreds of thousands of excavation projects that occurred in every state in the country. For the vast majority of the time, utility owner/operators and excavators were aware of and complied with state One-Call laws; facility notifications were made prior to digging, the owner/operators responded properly, and there was no damage to any underground facilities. We believe this because of the tremendous number of facility notifications that are requested by excavators as well as the corresponding number of locate notifications delivered to facility owner/operators by One-Call notification centers. Unfortunately, the actual numbers from the One-Call notification centers, or the stakeholders themselves, were not available to bear out this anecdotal observation. CGA is currently working on a data collection effort that will provide some of this information in future years.

CGA undoubtedly acknowledges that damage prevention programs and efforts over the past two

decades have made a positive impact on the number of damages as well as a positive social and financial impact. Although facility damages may have increased over the years for some stakeholders and in some geographic areas of the country, the increases have been partly due to continued population growth, robust economic growth, and local demand for infrastructure and its associated services. Without the concerted and determined damage prevention efforts of all stakeholders over the years, the results may have been much worse. All stakeholders can be commended for their concern with the public safety, the protection of the environment, and for maintaining the integrity of the underground infrastructure.

## *Conclusions*

In summary, there are a few useful conclusions that can be drawn from the analysis of the information submitted for 2004.

- 1) Damage prevention awareness programs are still necessary for the general public, the professional excavator and the facility owner/operators. Nearly 50% of the reported facility damages occurred when a One-Call notification was not requested by the excavator.
- 2) Education and training programs on excavating best practices should be targeted to contractors, facility owner/operator and government organization<sup>(4)</sup> personnel who excavate, and their job site personnel. Nearly half of the reported damages occurred despite the fact that One-Call notification was made. Nearly 24% of the damages occurred due to insufficient excavating practices even though a proper notification was made and locating/marketing practices were sufficient. The majority (61%) of the reported damages identified the contractor as the excavating party.

<sup>(4)</sup> Government organization includes municipal, county, and state agencies.

- 3) Education and training programs on locating and marking best practices should be targeted at owner/operators, contract locators, as well as government organization facility locating personnel. At least 7.0% of the reported damages occurred when there were insufficient locating practices. An additional 4.3% of the damages may have occurred due in part to other locating and marking issues.
- 4) Based upon the analysis of the data by facility operation type, the data suggests that certain facility types were more frequently damaged under certain circumstances of root cause, excavator type, equipment type, and/or work-performed type. For example: natural gas and electric facilities were more frequently damaged when no One-Call notification was made by an excavator. Additionally, water and sewer facilities were more frequently damaged when insufficient excavating practices were employed by an excavator even after a One-Call notification was made by the excavator. Although the analysis in this report does not accurately depict ALL facility damages, this valuable information should be considered when public awareness campaigns and education and training programs are developed by CGA, One-Call notification centers, and the stakeholders themselves.
- 5) All stakeholders who submit information need to align their damage investigation and reporting practices to the DIRT specification. Providing complete and accurate information on all fields will provide the most value to the data analysis in future reports.
- 6) A statistical analysis was performed to estimate the number of facility damages in the U.S. (including a 95% confidence interval<sup>(5)</sup> for the estimate). The 2004 damage data from Colorado was used for the estimation since

Colorado facility owner/operators are required to report all underground facility damages. (Note: Owner/operators in Colorado are not required to report information on near miss and/or contractor downtime.) Based upon a number of assumptions defined in Appendix-A, the ratio of facility damages to population for each county in Colorado was used to estimate the number of damages for the U.S. The estimated number of facility damages in the U.S. in 2004 was 675,276 with 95% confidence limits of [634,193.8 , 716,358.8]. That is to say that there is a 95% probability that the actual number of damages is within the specified range based upon the data set submitted. Another estimate of the extent of facility damages in the U.S. may be obtained by substituting a measure more related to the number of facility damages than the population; for example, the number of housing starts.

Many CGA Regional Partners, members and non-members alike have adopted the CGA Best Practices and are actively implementing them within their associations and organizations. There is also a growing trend in the industry for contractors and excavators to implement internal damage prevention education and training programs alongside existing regulatory safety programs. It is anticipated that these stakeholders will attest to the success of these programs and their effectiveness of reducing the occurrence of facility damage as well as reducing project delays and cost overruns. It is expected that these programs will increase the overall profitability and success of the business. As more individual stakeholders within the industry embrace the vision and the goals of CGA and support the programs that CGA offers, our shared purpose of preventing damage to underground infrastructure can ultimately be achieved.

<sup>(5)</sup> 95% confidence interval is a statistical term used to convey that we are 95% confident that the interval contains the unknown, but true, value; the estimated range being calculated from a given set of sample data.

## Key Findings

### ***Who Submitted Information?***

21,688 facility damage and near miss<sup>(6)</sup> events were submitted by stakeholders into DIRT. The gas stakeholder group submitted 48.2%, or 10,460 records. Underground facility owner/operators as a group submitted 87.6% (19,000 records), while state regulatory agencies submitted 11.9% (2,586 records). The road builder, excavator, and railroad stakeholder groups submitted 0.2%, or 54 records.

### ***Which Facility Operations Were Damaged?***

Natural gas facility operations sustained the largest share of damages, 51.6% or 11,197 records. Telecom facility operations followed with 27.5%, or 5,974 records, then electric and CATV facility operations with 8.4% (1,821 records) and 5.0% (1,091 records), respectively. These four facility operation types accounted for a combined 92.6% of the records. All other facility operation types accounted for less than 1% of the records. In addition, the unknown/other facility type accounted for 6.5%, or 1,407 records. Stakeholders reported that 91.0% of the damaged facilities were either service drop or distribution type facility and only 1.7% were transmission or gathering type facility.

### ***What Type Of Excavator Damaged The Facility?***

Stakeholders reported that contractors were the excavating party that damaged 61.4% of the facilities. Note that this does not necessarily mean that the excavator's actions were the root cause of the facility damage. Occupants damaged 10.1%, facility owner/operator personnel damaged 3.2%, and government organization personnel damaged 2.0% of the facilities. The data submitted indicates

contractors and facility owner/operator personnel more frequently damaged natural gas facility, while occupants and government organization personnel more frequently damaged telecom facility.

### ***What Type Of Excavation Equipment Was Used When the Facility Was Damaged?***

Stakeholders reported that the backhoe was used as the excavating equipment for 35.2% of damaged facilities. Hand tools and trenchers were used for 7.7% and 6.9%, respectively. The type of excavation equipment was reported as either unknown/other or the data was not collected for 41.0% of the records. Backhoes, trenchers, and hand tools<sup>(7)</sup> more frequently damaged natural gas, followed by telecom facility. Drilling equipment<sup>(8)</sup> more frequently damaged telecom, followed by natural gas facility.

### ***What Type Of Work Was Performed When The Facility Was Damaged?***

Stakeholders reported that 9.5% of the facility damages occurred when the excavator was performing landscaping work. Sewer, electric and water work followed with 9.1%, 6.9%, and 6.0%, respectively. The type of work performed was reported as either unknown/other or the data was not collected for 43.4% of the records. When the work-performed types are grouped according to similar work type, excavators performing utility work accounted for 28.5% of all reported damages, while excavators performing landscaping and fencing work accounted for 13.9%.

Although sewer and water facility damages accounted only for 0.9% of the damages, 15.1% of the damages occurred when excavators were performing sewer and water work. Excavators

<sup>(6)</sup> Near miss — An event where underground facility damage did not occur, but a clear potential for damage was identified.

<sup>(7)</sup> Hand tools include hand tools, vacuums, and probes.

<sup>(8)</sup> Drilling equipment includes augers, borers, and drills.

performing work on all types of utility more frequently damaged natural gas, followed by telecom facility. Excavators performing landscaping and fencing work more frequently damaged telecom, followed by natural gas facility.

### ***What Was The Root Cause Of The Facility Damage?***

Stakeholders reported that 48.0% of the facility damages occurred when the excavator did not make a facility notification to the One-Call notification center. Damage also occurred on 46.4% of the facilities when in fact the excavator did make a notification to the One-Call notification center. Stakeholders reported data not collected as the root cause for 5.6% of the records.

Insufficient excavating practices were identified as the root cause for 23.8% of the records. Insufficient marking practices and facility not located were identified as the root causes for 6.9% and 3.6%, respectively, of the records. The top four root causes combined accounted for 82.3% of the damaged facilities.

The data shows there are significant differences in the distribution of which facility operation sustained damages from each root cause.

## Recommendations

The recommendations presented in **bold text** focus on suggestions to enhance the value of the Damage Information Reporting Tool (DIRT), the analysis of the data submitted, as well as future reports resulting from the analysis.

**1. Data submitters are encouraged to utilize the Feedback link located at the bottom of each screen within the DIRT web site for comments & suggestions.**

The DR&EC will review each submission for any possible required action.

Please access the web site at [www.cga-dirt.com](http://www.cga-dirt.com).

**2. The DR&EC should consider adopting a set of option groupings within the type of excavator, type of excavation, and work-performed fields.**

The DR&EC might review the option groupings used in this report and establish a set of groupings for reporting purposes. The groupings reduce the options in the fields to a set with similar or related characteristics. This helps identify stronger or more prevalent relationships between two or more data fields and allows for more meaningful analysis.

**3. The DR&EC should consider framing a number of specific questions for the analysis and report to address.**

The relationship between data elements is complex and multidimensional. A voluminous report would be required to completely address all dimensions and relationships. Although approaching the analysis and its resultant report as a wide-ranging study is unavoidable in early years, identifying more specific areas of interest would provide more clarity and value.

**4. The DR&EC should consider additional analysis in future years such as:**

1) Separating near miss and damage events and reporting on them separately.

2) Analysis and reporting of multiple stakeholder records submitted for the same damage incident; especially as they relate to root cause.

3) Analysis and reporting of damages by calendar period (month, quarter, or season).

**5a. Eliminate the use of the “Data Not Collected” option as soon as practicable.**

Recognizing that some stakeholders were not currently capturing all of the required data fields during their incident investigation and reporting process, the DR&EC added the “Data Not Collected” option to encourage and allow for data submission by those stakeholders.

A number of the fields in the 2004 dataset had 50%–95% of the information reported as “Data Not Collected”. A more meaningful analysis will result with accurate and complete information.

**5b. Encourage all data submitters to provide information in all fields, even those not designated as required.**

Although not all fields on the data form are required, a more meaningful analysis can be derived from accurate and complete reporting of all information.

**6. Adjust the field option lists as necessary to capture the “Other” options (new options) submitted by stakeholders while minimizing the use of the “Unknown” option.**

Use of the “Unknown/Other” option was provided to capture data not specified in the option list. This option will remain in the list, but as the CGA Best Practices Handbook (Version 2.0), Reporting and Evaluation Best Practices, the Best Practice #5, states, *“Requested information may change.”*

The DR&EC should consider the consistent use of the options “Data Not Collected”, “Unknown” and “0” for the Description of Damage Part-H fields. The facility repair cost field combines records that reported “0” cost and records that reported up to

\$5,000 into a single field. The other two fields break out the “0” records. Also, the ranges in the option list of all three fields overlap at the boundaries.

### 7. Define and collect baseline metrics.

Baseline metrics can be used to assess the level of facility damages against a backdrop of some other useful measure. They can also be used to measure performance and/or the level of activity against a prior period; or used to measure trends or progress towards a future goal. The key is that they be accurate, meaningful, and useful. The baseline can be created to measure damages against geographic factors, demographic factors, economic factors, or underground facility factors.

Any of six or more measures might be collected to establish this backdrop. Measures might include:

- 1) State and/or county population as a measure of the underlying demand for infrastructure and services,
- 2) State housing permits or housing starts as a measure of current construction and potential excavating activity,
- 3) State and county facility notifications (from excavators) from the One-Call notification centers as a measure of actual excavating activity,
- 4) State and county locate notifications (to facility owner/operators) from the One-Call notification centers or the facility owner/operators as a measure of risk to each/all facility operation types,
- 5) Customer base (or customer meters) served by the facility operation as a more precise measure of potential risk to each facility operation type, and
- 6) Miles of facility or square miles of operator service territory as a more precise measure of potential risk to each facility operation type.

Although the first four measures would be good to know in general, more specifically, they would only

be meaningful if ALL damages were submitted into DIRT, or if a random sample of all damages were available to use as a proxy for all damages. Otherwise, they are not very useful as a measure against a limited submission of facility damages.

The fifth and sixth measures would be both meaningful and useful if measured in the aggregate by facility operation type or geographic area. They should also be easy to collect from the stakeholders submitting damage records while still maintaining the confidentiality of the data providers. These measures are meaningful because they directly relate to the specific damage records submitted by each/all stakeholders. They are useful because they can be used to develop an aggregate metric to measure the damages that occurred against the measure of customers served or against the actual extent of the facility operation in use. They can be used to create a useful metric with which to compare other facility operation types, other geographic areas, and other time periods. They can also be used to better assess trends and to establish future goals for damage prevention awareness and education programs. These metrics would also meet two requirements defined in the CGA Best Practices Handbook (Version 2.0), Reporting and Evaluation Best Practices. The Best Practice #20 recommends that, *“Results are quantified against a standardized risk factor”*. The Best Practice #21 recommends that, *“Performance levels and trends are assessed”*. Of course, each facility operation type would have to define an appropriate measure to collect.

### 8. Interact with the other CGA Committees to use the analysis from these reports to target and track the effectiveness of damage prevention programs.

For example, mechanisms and measures could be developed that would serve to identify and target stakeholders groups, geographic areas, etc. for awareness campaigns and educational programs. Facility damage levels and multi-year trends could then be monitored to establish how effective each initiative was in increasing awareness and minimizing facility damages.

## Who Submitted Facility Damage Information? DIRT Data Form Part-A and Part-B

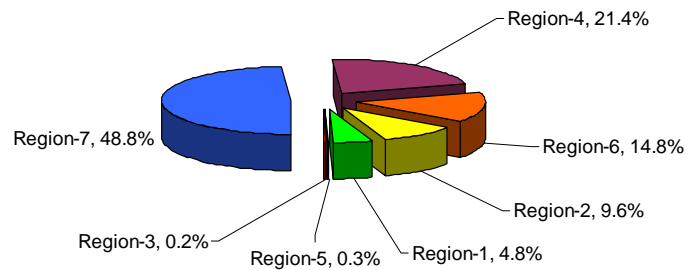
It is important to understand the scope of the facility damage information submitted for 2004. Due to the confidentiality assurance to the CGA membership, nothing specific can be said about the number of, or identity of, the stakeholders that voluntarily submitted facility damage information. This section attempts to give the reader a sense of that scope while remaining within the bounds of the confidentiality commitment. As a reminder, the data submitted does not represent the distribution of facility damages in any particular geographic area within the U.S.

Participating stakeholders submitted 21,688 facility damage records for 2004.

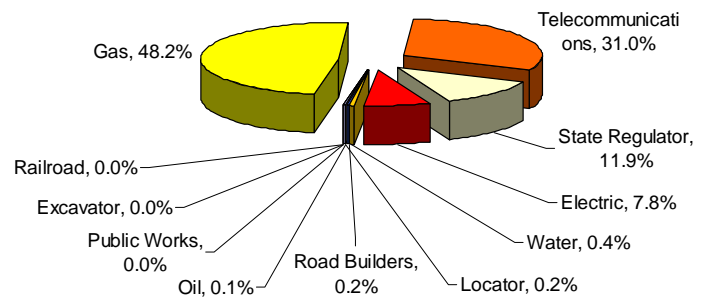
The DR&EC has adopted the One-Call Systems International regionalization for the 50 U.S. states, plus Washington D.C., Puerto Rico and Canada. A map of the regions is included on the next page. At least some facility damage data was submitted for each of the seven U.S. regions. Regions 7, 4, 6 and 2 submitted 94.7% of the data, with Region 7 submitting nearly half of the damages. See Chart #1 for additional detail.

Chart #2 identifies eleven of the fifteen defined stakeholder groups who submitted at least one facility damage record. Gas stakeholders submitted 48.2% of the records, followed by

**Chart #1  
DIRT/OCSI Region - 2004**



**Chart #2  
DIRT Stakeholder Group - 2004**

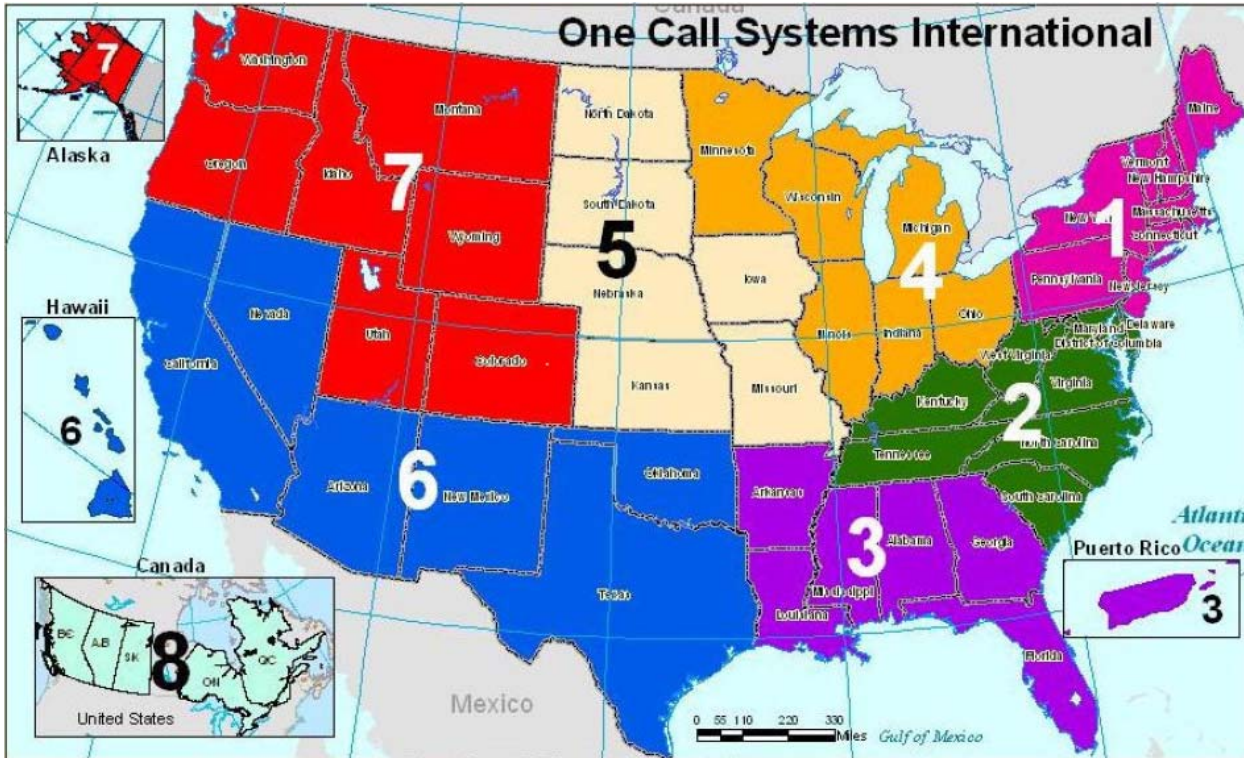


telecommunication (includes CATV) with 31.0%, state regulator with 11.9% and electric stakeholders with 7.8%. The four stakeholder groups combined submitted 98.9% of the records. Damage reporting from the other stakeholders was minimal.

Table #1 indicates the number of records submitted for each region and stakeholder group.

**Table #1 - DIRT Stakeholder Group and DIRT/OCSI Region**

Stakeholder Group	Region-7	Region-4	Region-6	Region-2	Region-1	Region-5	Region-3	TOTAL	PERCENT	CUMM PERCENT
Gas	2,627	4,434	3,169	227	2		1	10,460	48.2%	48.2%
Telecommunications	6,310	29	41	292	17	5	33	6,727	31.0%	79.2%
State Regulator		185		1,322	1,019	60		2,586	11.9%	91.2%
Electric	1,561			121				1,682	7.8%	98.9%
Water	84			8				92	0.4%	99.3%
Road Builders				51				51	0.2%	99.6%
Locator		2		45				47	0.2%	99.8%
Oil	3	1	3	22			1	30	0.1%	99.9%
Public Works	5						4	9	0.0%	100.0%
Excavator			1	1				2	0.0%	100.0%
Railroad							1	1	0.0%	100.0%
Engineer/Design								0	0.0%	100.0%
Equipment Manufacture								0	0.0%	100.0%
Insurance								0	0.0%	100.0%
Unknown/Other							1	1	0.0%	100.0%
<b>TOTAL</b>	<b>10,590</b>	<b>4,651</b>	<b>3,214</b>	<b>2,089</b>	<b>1,038</b>	<b>71</b>	<b>35</b>	<b>21,688</b>	<b>100.0%</b>	
<b>PERCENT</b>	<b>48.8%</b>	<b>21.4%</b>	<b>14.8%</b>	<b>9.6%</b>	<b>4.8%</b>	<b>0.3%</b>	<b>0.2%</b>	<b>100.0%</b>		
<b>CUMM PERCENT</b>	<b>48.8%</b>	<b>70.3%</b>	<b>85.1%</b>	<b>94.7%</b>	<b>99.5%</b>	<b>99.8%</b>	<b>100.0%</b>			



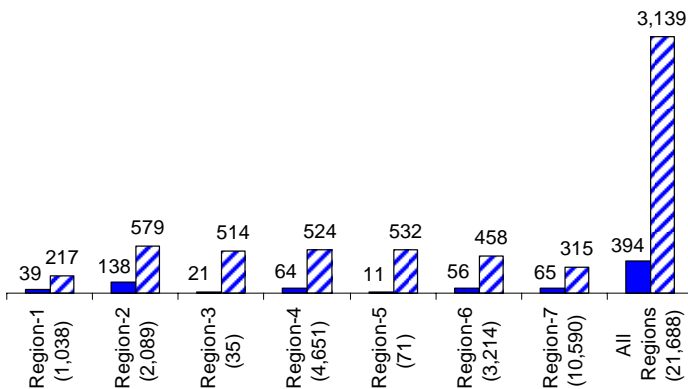
The data submitted represents underground facilities damaged in 394 counties across 32 states within the U.S. Stakeholders did not submit data for 19 states. Washington D.C. is included as a state for the purpose of this report. Charts #3 and #4 show the number of counties and states within each region that had at least one record submitted for each facility operation type.

*Stakeholders voluntarily submitted 21,688 facility damage records into DIRT, with the Gas industry submitting 48.2% and the Telecommunication industry submitting 31.0%.*

**Chart #3**

**Counties with Data and Total Counties In Region - 2004**

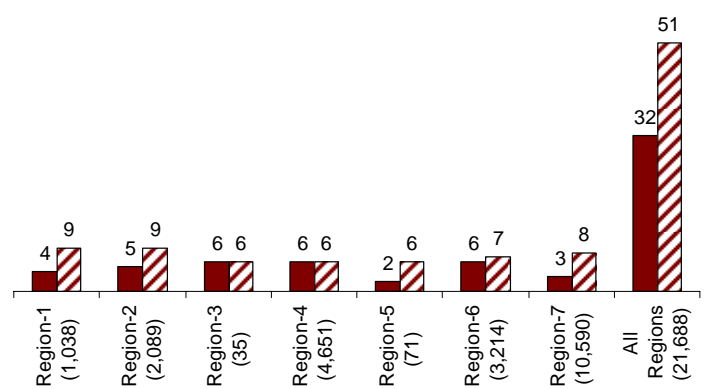
■ Submitted Counties ■ Total Counties



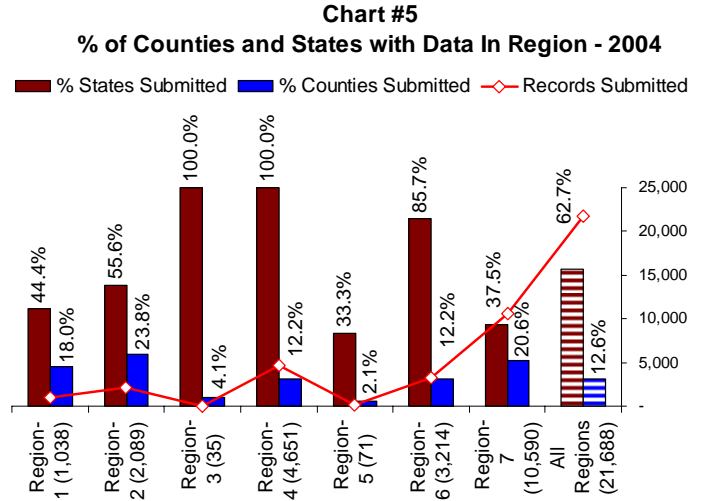
**Chart #4**

**States with Data and Total States In Region - 2004**

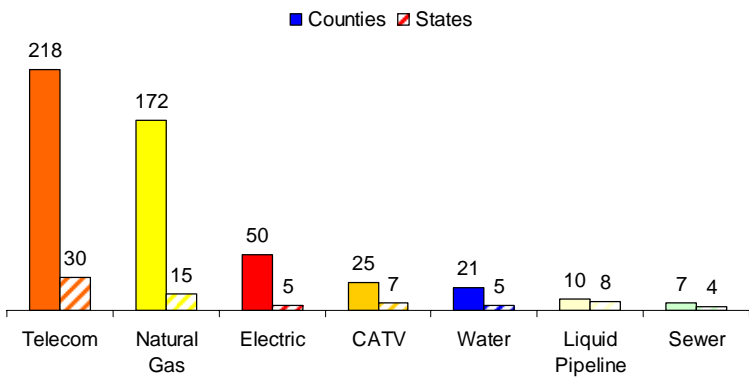
■ Submitted States ■ Total States



As the “All Regions” bars in Chart #5 show, data was submitted for 62.7% of states and 12.6% of counties within the U.S. The number in the bar label represents the number of records submitted for each region. Regions 3 and 4 had some data submitted for each state within the region. The data submitted for Regions 2 and 7 represented the largest share of counties within the region, with 23.8% and 20.6%, respectively. Again, Regions 7 and 4 represented the most records and Regions 5 and 3 the least.



**Chart #6**  
**Counties and States by Facility Operation - 2004**



Another interesting way to establish the scope of the data is to look at how many states and counties were represented by the data based upon facility operation type. Chart #6 provides this representation. Although steam is a facility operation type in the DIRT tool, there were no damage records submitted. The telecom and gas facility operation damages that were submitted occurred in 218 and 172 counties, respectively, and in 30 and 15 states, respectively. It should be noted that the counties and states have substantial overlap among the facility operation types, which results in many states and counties being counted more than once.

## Affected Facility Information – DIRT Data Form–Part C

### Facility Operation Type

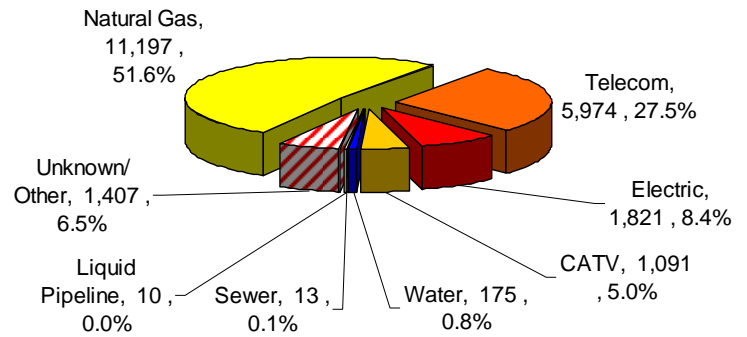
Facility operation identifies the type of facility that sustained a damage or near miss during an excavation project. As previously noted, Table #1 identified the stakeholder groups that submitted data into DIRT. Since the gas and telecommunication stakeholder groups submitted most of the data, the distribution of records for the stakeholder groups and the facility operation will be similar. Please note that facility operation includes four facility types not directly identified by the stakeholder groupings: CATV, sewer, steam, and liquid pipeline. CATV facility was most likely included in the telecommunication stakeholder group; sewer facility was most likely included in the public works group; and liquid pipeline facility was most likely included in the oil group. Steam facility operation did not have any damage records submitted and so is not include in the analysis.

Natural gas facility accounted for 51.6% of the damages submitted in 2004. Telecommunication facility (excluding CATV) followed with 27.5%. Electric and CATV facility accounted for 8.4% and 5.0%, respectively. The unknown/other option was chosen by stakeholders for 6.5% of the data. Chart #7 identifies the facility operation type and includes both the number of records submitted and the percent of the total.

As Chart #8 shows, the top four facility operation types accounted for 92.6% of the data, while the remaining three facility types combined (water, sewer, and liquid pipeline) accounted for less than 1%.

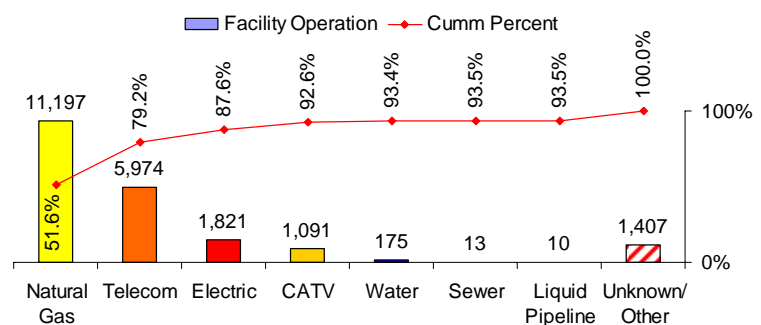
Stakeholders reported that 158 (0.7%) of the records were submitted as a near miss. All near-miss records were analyzed as part of the 21,688 damage records. In future years, near-miss records may be analyzed separately from the damages.

**Chart #7**  
**Facility Operation - 2004**



*Natural gas facility accounted for 51.6% of the data submitted by stakeholders in 2004.*

**Chart #8**  
**Facility Operation - 2004**



### Facility Type Affected

Stakeholders identified 91.0% of the damaged facilities as either service/drop or distribution facility type and 1.7% as either transmission or gathering facility type, as shown in Chart #9. The unknown/other option was selected for 7.3% of the records. Additional insight is gained by viewing the facility operation by facility type affected as shown in Chart #10. Natural gas, telecom, electric and water facility each were identified as approximately 60% service/drop and 40% distribution facility type affected. CATV facility was identified as 95% distribution facility type. Sewer facility damages were distributed across all four facility types affected. Liquid pipeline was identified as 90.0% transmission facility type. Liquid pipeline was identified as 90.0% transmission facility type.

Chart #9  
Facility Type Affected - 2004

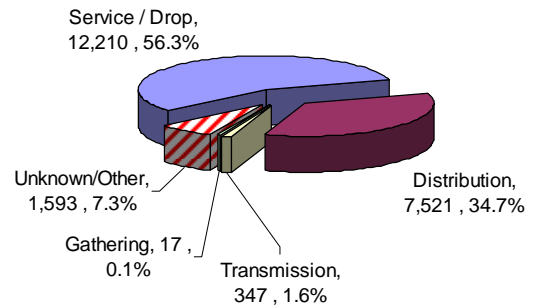
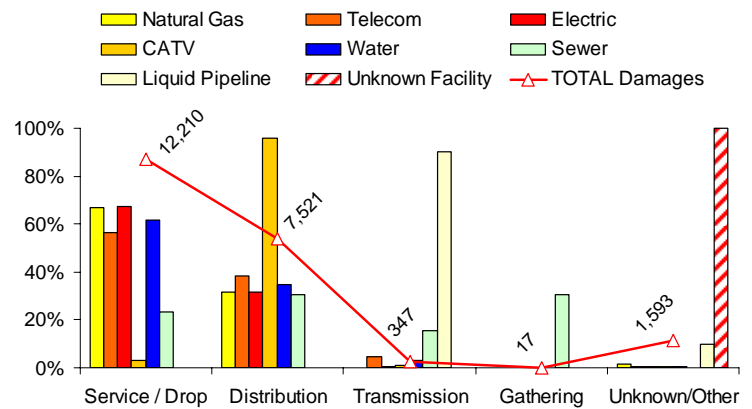
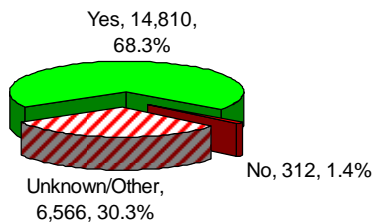


Chart #10  
Facility Type Affected vs. Facility Operation - 2004



Stakeholders reported that the One-Call membership was unknown/other for over 30% of the damage incidents.

Chart #11  
Facility Owner One-Call Membership - 2004



### Facility Owner One-Call Membership

Stakeholders reported the owner/operator was a One-Call notification center member for 68.3% of the records, while for 1.4% they were not. Chart #11 indicates that the remaining 30.3% were reported as unknown/other. Table #2 shows the regional distribution of One-Call membership for the data.

Table #2 - DIRT Region and One-Call Membership

CGA Region	Yes	No	Unknown/Other	TOTAL	PERCENT	CUMM PERCENT
Region-7	10,589		1	10,590	48.8%	48.8%
Region-4	718	2	3,931	4,651	21.4%	70.3%
Region-6	3,211	1	2	3,214	14.8%	85.1%
Region-2	191	288	1,610	2,089	9.6%	94.7%
Region-1		17	1,021	1,038	4.8%	99.5%
Region-5	68	3		71	0.3%	99.8%
Region-3	33	1	1	35	0.2%	100.0%
<b>TOTAL</b>	<b>14,810</b>	<b>312</b>	<b>6,566</b>	<b>21,688</b>	<b>100.0%</b>	
<b>PERCENT</b>	<b>68.3%</b>	<b>1.4%</b>	<b>30.3%</b>		<b>69.7%</b>	
<b>CUMM PERCENT</b>	<b>68.3%</b>	<b>69.7%</b>	<b>100.0%</b>			

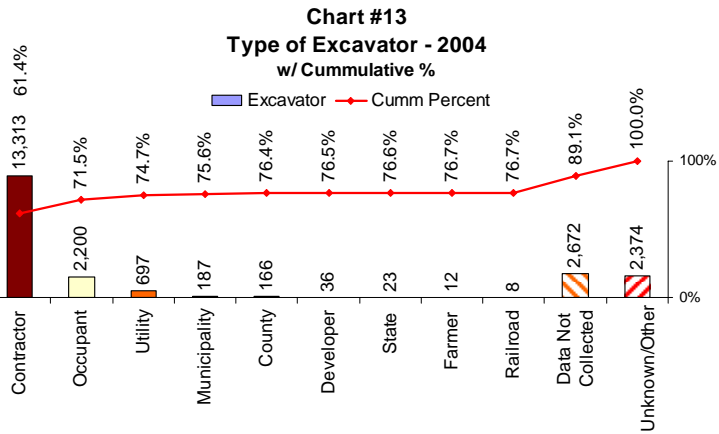
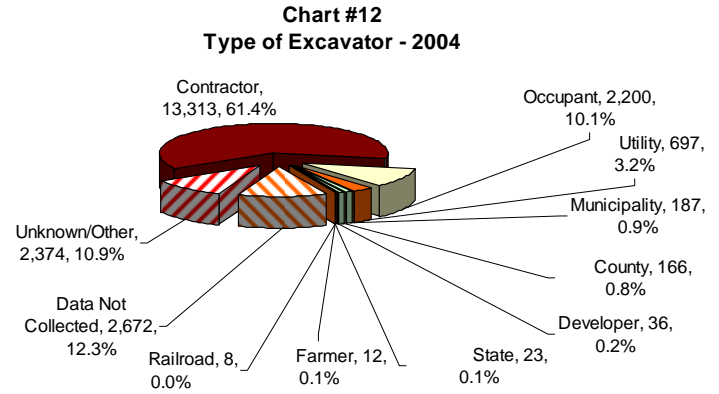
A large number of records were submitted without identifying if the facility owner/operator was a One-Call notification center member. When a facility damage or near miss occurs, this is a valuable piece of information that can help identify the general awareness of One-Call requirements by excavators, facility owner/operators, and the public. *Including this information in future DIRT data submissions will help develop and appropriately target more effective public awareness programs and campaigns.*

## Excavation Information – DIRT Data Form–Part D

### Type of Excavator

Contractors were identified as the excavating party for the majority, 61.4%, of the facility damage records, as Chart #12 shows. Occupants accounted for 10.1%, followed by utility companies with 3.2%. Municipal, county and state government, developers, farmers, and the railroad each accounted for less than 1%. Stakeholders chose the data not collected<sup>(9)</sup> and the unknown/other options for 12.3% and 10.9%, respectively, of the records.

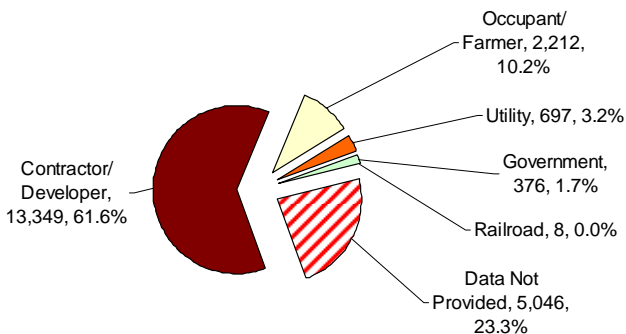
As Chart #13 shows, contractors, occupants and utility companies accounted for 74.7% of the data, while the type of excavator was not reported for 23.2% of the data.



**Table #3 - GROUPED Type of Excavator**

GROUP	TYPE OF EXCAVATOR
Contractor/Developer	Contractor, Developer
Occupant/Farmer	Occupant/Farmer
Utility	Utility
Government Organ.	Municipality, County, State
Railroad	Railroad
Data Not Provided	Data Not Collected, Unknown/Other

**Chart #14**  
Type of Excavator GROUPED - 2004

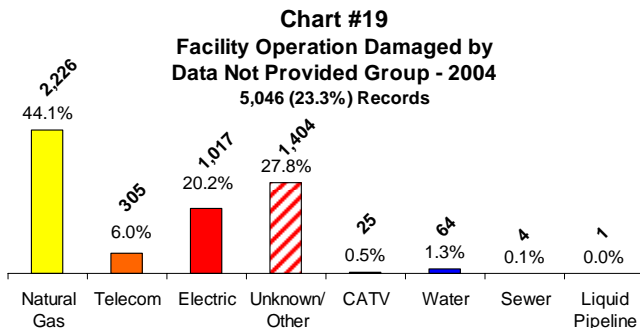
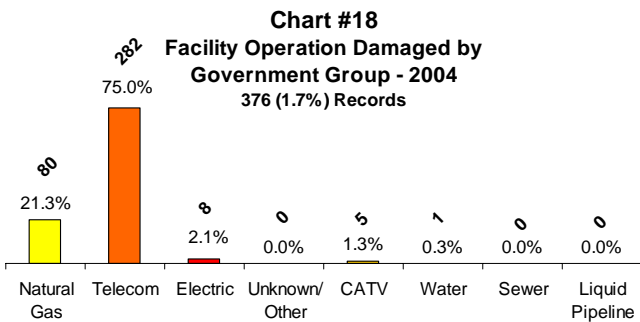
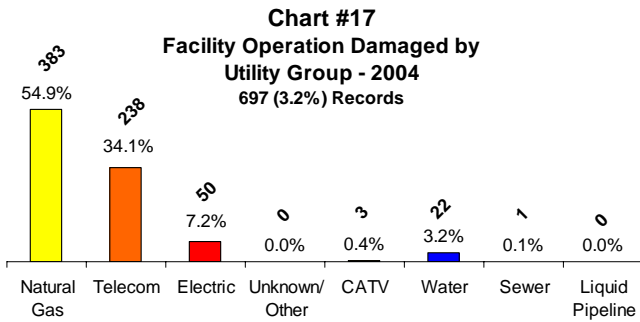
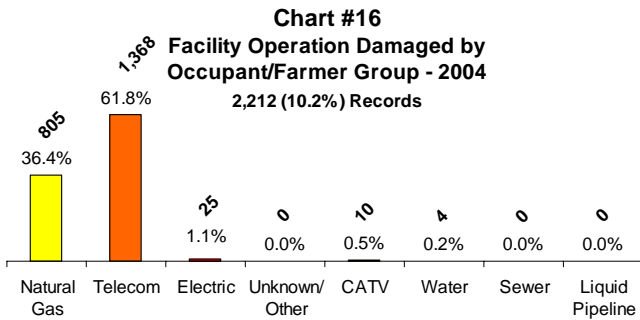
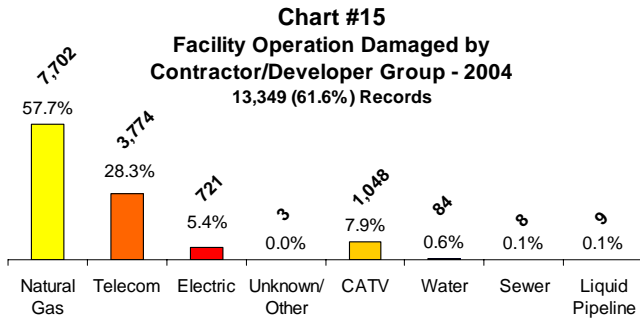


Grouping the data allows for more meaningful analysis by combining similar or related excavator types. Table #3 defines the six grouped categories and the type of excavator within each category.

Although the distribution of Chart #14 does not appear to change much relative to Chart #12 for 2004, it may in the future. The new groupings, especially government organization<sup>(10)</sup>, will simplify the analysis of the type of excavator versus the facility operation in the next section.

<sup>(9)</sup> Data Not Collected was added as an option to several fields in the DIRT tool in the spring of 2005. This facilitated and encouraged data submission by stakeholders whose damage incident investigation and reporting process was not currently aligned with the DIRT reporting specification.

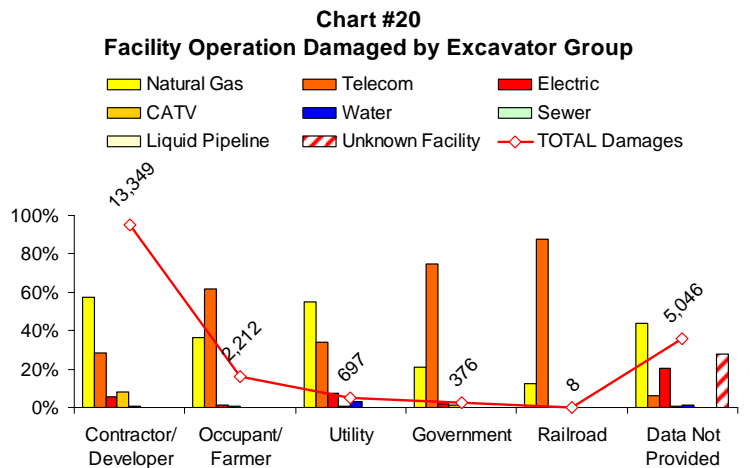
<sup>(10)</sup> Government organization includes municipal, county, and state agencies.



To gain additional insight into facility damage it is useful to identify the type of facility operation that was damaged by each excavator group. Charts #15-#20 provide this insight. Charts #15-#19 each represent the distribution of damages for one excavator group across the facility operation types. The percentages within a group sum to 100%. They each show the total number and percentage of damages reported for the excavator group as noted in the chart title. The railroad excavator type was not charted since only eight damage records submitted identified the railroad as the excavator.

Notice how the data shows there are significant differences in the distribution of which facility operation sustained damage from each excavator group. Natural gas facility was more often damaged by the contractor and the utility groups, while telecom facility was more often damaged by the occupant and the government groups.

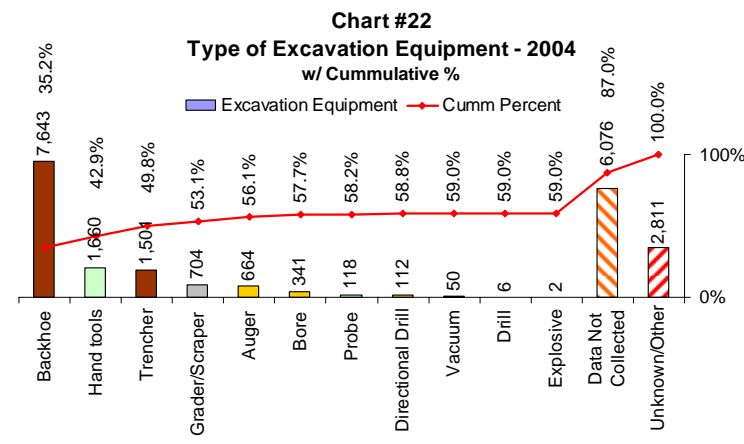
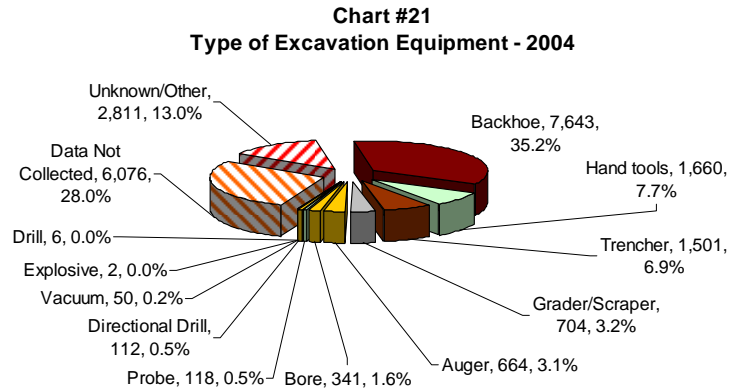
Chart #20 consolidates the type of excavator and facility operation type information into a single chart for easier comparison.



### Type of Excavation Equipment

Chart #21 identifies the use of backhoes as the excavation equipment type that accounted for the majority, 35.2%, of facility damages. Hand tools accounted for 7.7%, followed by trenchers with 6.9%, grader/scrapers with 3.2%, augers with 3.1%, and borers with 1.6%. The remaining equipment types each accounted for less than 1%. Stakeholders chose the data not collected and the unknown/other options for 28.0% and 13.0%, respectively, of the records.

As Chart #22 shows, the top six equipment types accounted for 57.7% of the data, while the equipment type was not reported for 41.0% of the records.



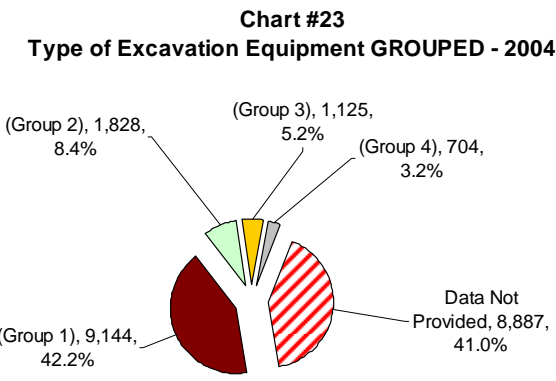
*The use of backhoes accounted for the greatest share of facility damages (35.2%), while use of hand tools accounted for 7.7%.*

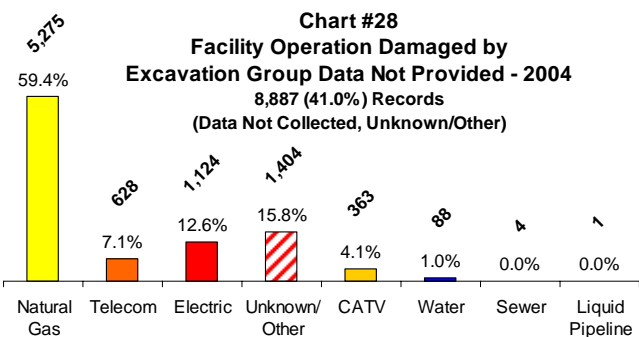
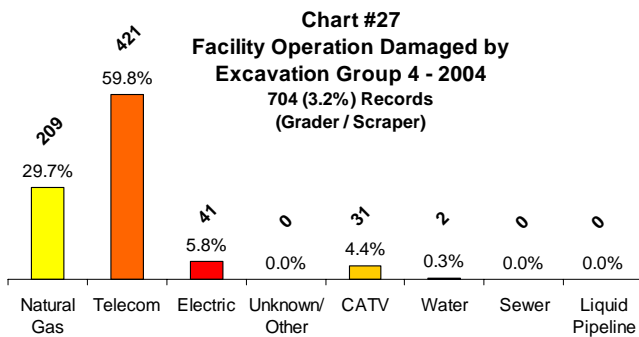
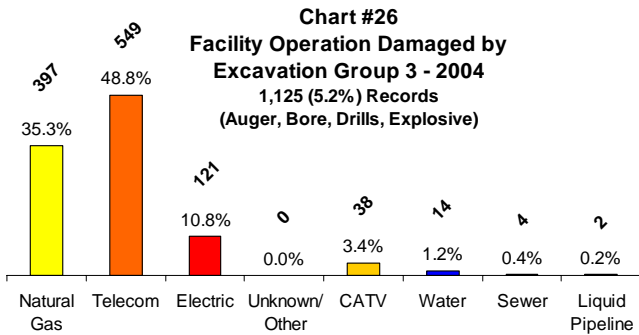
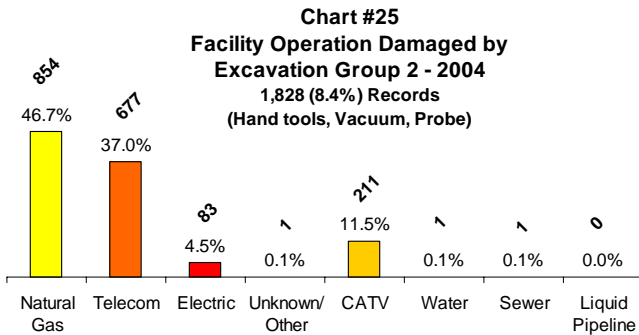
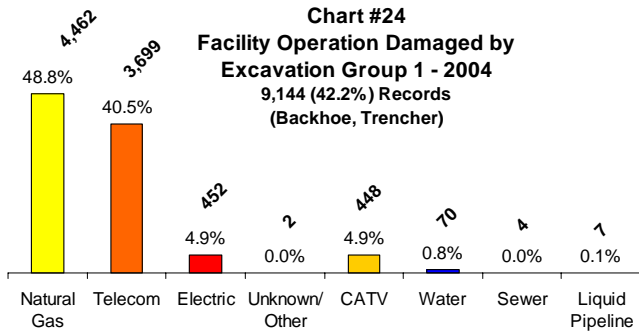
**Table #4 - GROUPED Type of Excavation Equipment**

GROUP	TYPE OF EQUIPMENT
Group 1	Backhoe, Trencher
Group 2	Hand tools, Vacuum, Probe
Group 3	Auger, Bore, Drills, Explosive
Group 4	Grader/Scrapper
Data Not Provided	Data Not Collected, Unknown/Other

Grouping the data allows for more meaningful analysis by combining similar or related types of excavation equipment. Table #4 defines the five grouped categories and the type of excavation equipment within each category.

The groupings include combining backhoe and trencher into Group 1 (deep digging); hand tools, vacuum and probe into Group 2 (hand tools); drilling equipment and explosives into Group 3 (below surface); grader/scrapper into Group 4 (surface); and grouping data not collected and unknown/other into data not provided. The distribution of Chart #23 changes significantly compared to Chart #21. The new groupings will simplify the analysis of the type of excavation equipment versus the facility operation in the next section.

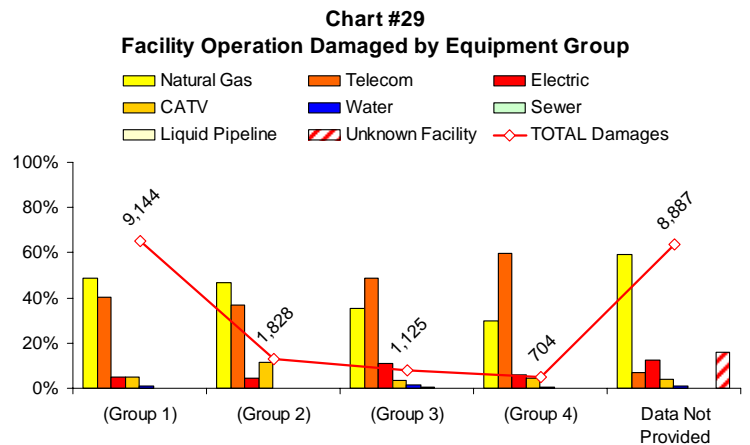




To gain additional insight into facility damage it is useful to identify the type of facility operation that was damaged by each excavation equipment group. Charts #24-#29 provide this insight. Charts #24-#28 each represent the distribution of damages for one equipment group across all facility operation types. The percentages within a group sum to 100%. They each show the total number and percentage of damages reported for the excavation equipment group as noted in the chart title.

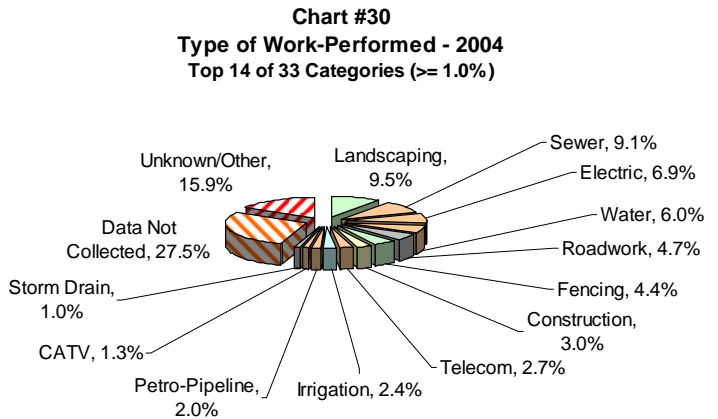
Notice how the data shows there are significant differences in the distribution of which facility operation sustained damage from each equipment group. Natural gas facility was more often damaged by Groups 1 and 2, while telecom facility was more often damaged by Groups 3 and 4.

Chart #29 consolidates the type of excavation equipment and facility operation type information into a single chart for easier comparison.



### Type of Work-Performed

Chart #30 represents the top 14 of 33 options that reported greater than 1% each for the work-performed category. Landscaping activity contributed 9.5% of the damage records, followed closely by sewer work with 9.1%. Stakeholders chose the data not collected and the unknown/other options for 15.9% and 27.5%, respectively, of the records. All 33 work-performed types are detailed in Table #5.



**Table #5 - Type of Work-Performed**

Type of Work-Perform	2004	2004%	Cumm%
Landscaping	2,068	9.5%	9.5%
Sewer	1,966	9.1%	18.6%
Electric	1,506	6.9%	25.5%
Water	1,304	6.0%	31.6%
Roadwork	1,013	4.7%	36.2%
Fencing	955	4.4%	40.6%
Construction	654	3.0%	43.6%
Telecom	577	2.7%	46.3%
Irrigation	528	2.4%	48.7%
Petro-Pipeline	430	2.0%	50.7%
CATV	276	1.3%	52.0%
Storm Drain	226	1.0%	53.0%
Data Not Collected	5,975	27.5%	80.6%
Unknown/Other	3,446	15.9%	96.5%
Lot Grading	183	0.8%	97.3%
Curb-Sidewalk	158	0.7%	98.0%
Natural Gas	99	0.5%	98.5%
Site Development	85	0.4%	98.9%
Pole	59	0.3%	99.2%
Driveway	44	0.2%	99.4%
Traffic Signal	32	0.1%	99.5%
Drainage	28	0.1%	99.6%
Agricultural	21	0.1%	99.7%
Street Light	9	0.0%	99.8%
Blading	8	0.0%	99.8%
Engineering	8	0.0%	99.9%
Railroad	8	0.0%	99.9%
Demolition	6	0.0%	99.9%
Trans-Pipeline	6	0.0%	100.0%
Traffic Sign	4	0.0%	100.0%
Transport Authority	3	0.0%	100.0%
Steam	2	0.0%	100.0%
Water-Way	1	0.0%	100.0%
<b>TOTAL</b>	<b>21,688</b>	<b>100.0%</b>	

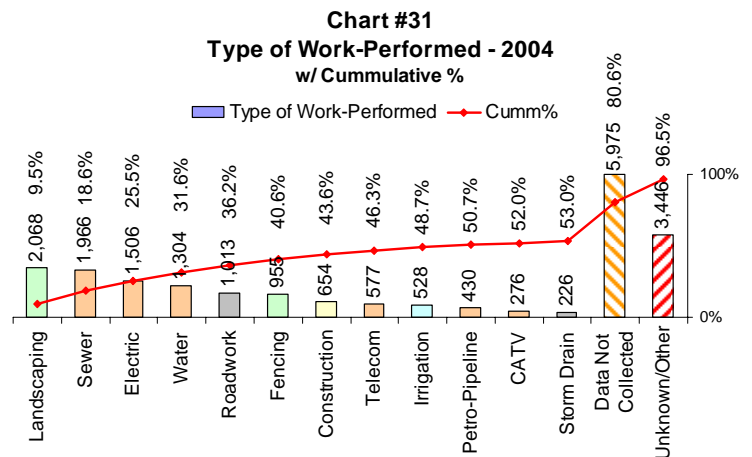
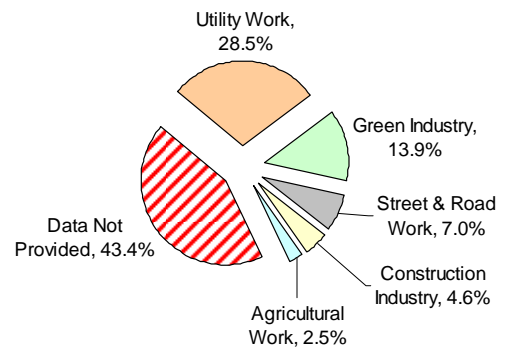


Chart #31 shows that the top 14 work-performed types accounted for 96.5% of the data. This includes the data not collected and the unknown/other options, which combined, accounted for 43.4% of the data. The remaining 19 work-performed types accounted for 3.5% of the records.

With 33 work-performed options, it is difficult to get an accurate feel for the work activity contributing to facility damage. It is interesting that the work-performed analysis changes significantly when the work-performed options are grouped into six broader categories. Table #6 below defines the six grouped categories and the type of work-performed within each grouped category. As Chart #32 shows, there is a significantly different distribution of damages from the original distribution shown in Chart #30 for the type of work-performed.

**Chart #32**  
**Type of Work-Performed GROUPED - 2004**



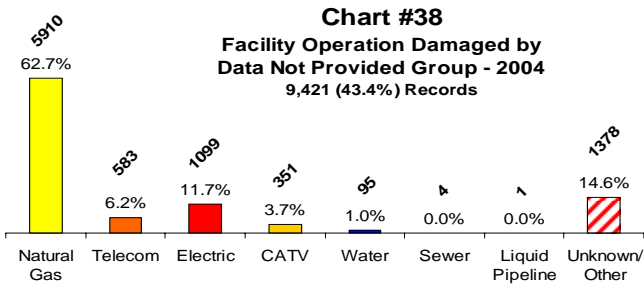
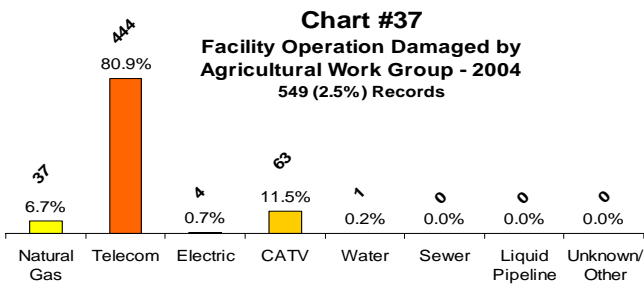
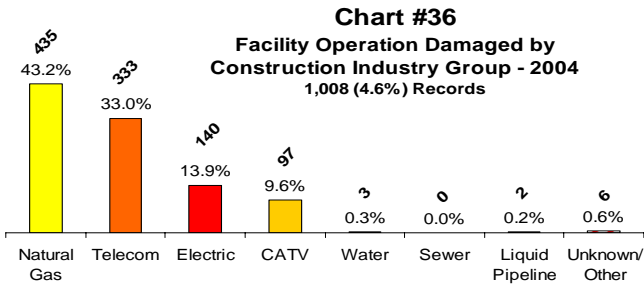
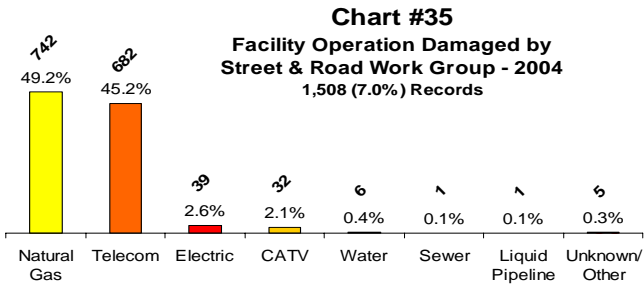
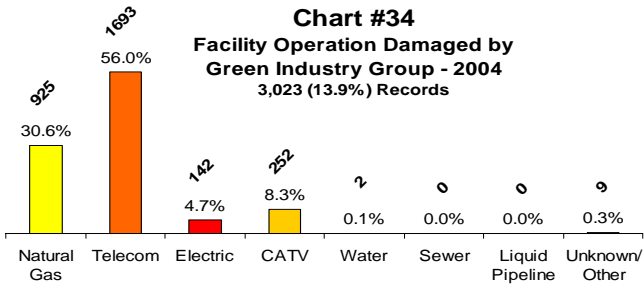
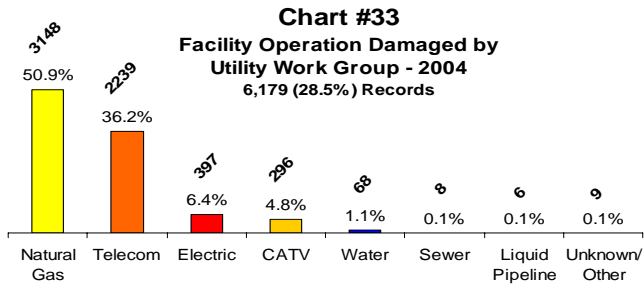
**Table #6 - GROUPED Type of Work-Performed**

GROUP	TYPE OF WORK-PERFORMED
Utility Work	Sewer, Electric, Water, Telecom, Petro-Pipeline CATV, Gas, Trans-Pipeline, Steam, Water-Way
Green Industry	Landscaping, Fencing
Street & Road Work	Road, Storm Drain, Curb, Pole, Traffic Signal, Blading, Streetlight, Traffic Sign, Transport-Authority
Construction Industry	Construction, Lot Grading, Site Development, Railroad Driveway, Drainage, Engineering, Demolition
Agricultural Work	Irrigation, Agriculture
Data Not Provided	Data Not Collected, Unknown/Other

With this grouping, excavation work performed by and for the utility industry contributed a significant 28.5% of the facility damages, while the green industry contributed 13.9%. Street and road work, the construction industry, and agricultural work combined contributed about as many damages as the green industry. It is interesting that work performed by and for the utility industry accounted for about half of the submitted facility damages where a work-performed option was chosen other than data not collected or unknown. This may suggest that the utility industry could influence the

level of facility damages by utilizing more direct oversight of the excavators they employ or contract with for excavation work. This influence could include more rigorous contractor and employee qualification processes, well defined contractual control and more aggressive civil enforcement, as well as more robust damage prevention awareness and dig safely training. Of course, there are significant issues and costs associated with exerting more direct control over excavators. But these costs must be weighed against the full cost of facility damage.

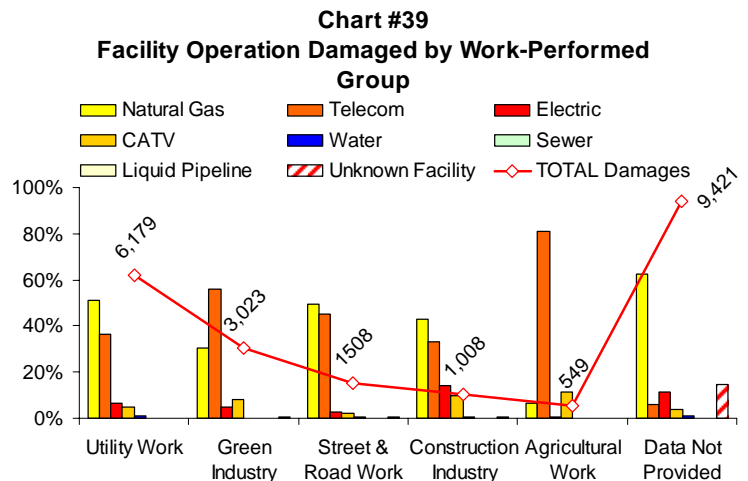
*Although landscaping work contributed the most facility damage (9.5%), work by and for the utility industry as a group accounted for 28.5% of the damages submitted by stakeholders in 2004.*



To gain additional insight into facility damage it is useful to identify the type of facility operation that was damaged by each work-performed group. Charts #33-#39 provide this insight. Charts #33-#38 each represent the distribution of damages for one work-performed group across all facility operation types. The percentages within a group sum to 100%. They each show the total number and percentage of damages reported for each work-performed group as noted in the chart title.

Notice how the data shows there are significant differences in the distribution of which facility operation sustained damage from each work-performed group. Natural gas facility was more often damaged by the utility, street and road, and construction industry groups, while telecom facility was more often damaged by the green industry and the agricultural work groups.

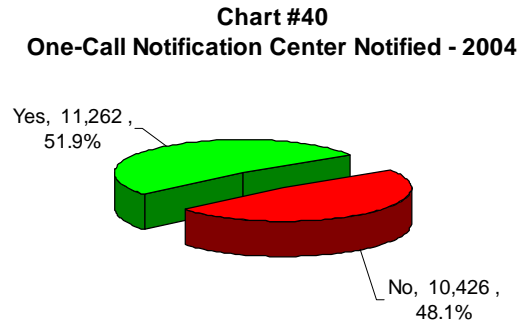
Chart #39 consolidates the type of work-performed and facility operation type information into a single chart for easier comparison.



## Notification – DIRT Data Form–Part E

### *One-Call Notification Center Notified*

As Chart #40 shows, stakeholders submitting data reported 51.9% of the excavators that damaged a facility notified the One-Call notification center, while 48.1% did not. This data field is similar to the description of root cause and is linked to root cause during data submission through a validation process.

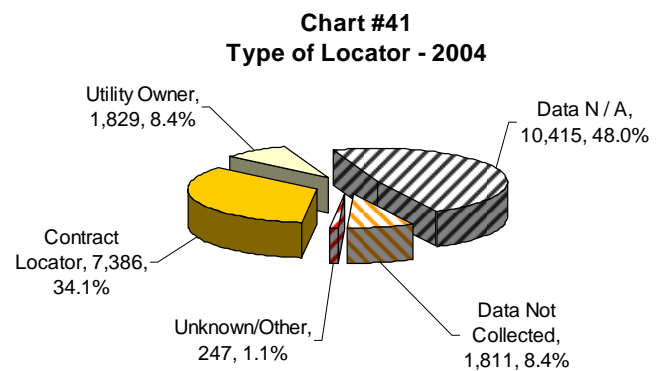


## Locating and Marking – DIRT Data Form–Part F

Note: Data for this section can only be submitted if the stakeholder responded yes to One-Call notification center notified in Part-E. It is possible in some situations for a facility to be located and marked without the excavating party having notified the One-Call notification center. For example, a subcontractor might be allowed under some One-Call laws to use another party’s locate. This may cause misleading or under-reporting of the data. The DR&EC will examine this issue and take appropriate action.

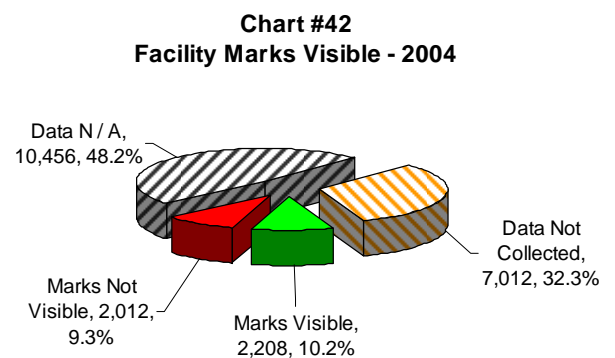
### *Type of Locator*

Chart #41 shows that 48.0% of records were reported as Data N/A based upon a no response in Part-E. The remaining 52.0% of the records (from Part-E) showed that a One-Call notification had been made. Stakeholders identified that 34.1% of the damaged facilities had a facility locate performed by a contract locator, 8.4% by the utility owner/operator, and for 9.5%, the data was either not collected or the locator type was unknown/other.



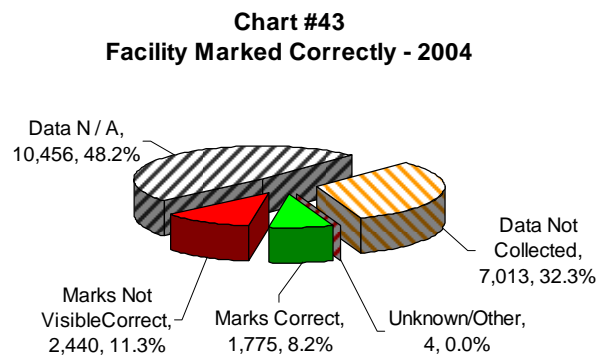
### *Facility Marks Visible*

Chart #42 shows that 48.2% of records were reported as Data N/A based upon a no response in Part-E. The remaining 51.8% of the records (from Part-E) showed that a One-Call notification had been made. Stakeholders identified that 10.2% of the damaged facilities had marks visible, 9.3% did not, and for 32.3%, the data was not collected.



### *Facility Marked Correctly*

Chart #43 shows that 48.2% of records were reported as Data N/A based upon a no response in Part-E. The remaining 51.8% of the records (from Part-E) showed that a One-Call notification had been made. Stakeholders identified that 8.2% of the damaged facilities were marked correctly, 11.3% were not, and for 32.3%, the data was not collected or unknown/other.

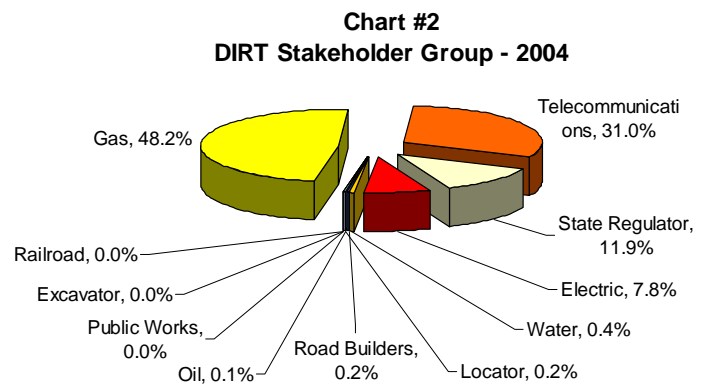


## Excavator Downtime – DIRT Data Form–Part G

Since stakeholders did not submit sufficient information in the three excavator downtime data fields, this data was not analyzed. Please refer to Miscellaneous Data Fields near the end of this report for additional information.

As Chart #2, duplicated here, indicates, most of the damage records were submitted by facility owner/operator stakeholder groups. It is neither likely nor common for the facility owner/operators to know or collect excavator downtime information during facility damage investigations. Stakeholders other than facility owner/operators submitted a total of 54 records: 2 by the excavator, 1 by the railroad, and 51 by the road builder stakeholder groups. Nevertheless, 1,199 damage records, (5.5%), were submitted with some indication of excavator downtime (e.g. downtime incurred or downtime not incurred).

The three excavator downtime fields have not been analyzed since less than 10% of the records submitted had useful excavator downtime information. *Stakeholders representing the excavation community are encouraged to submit their facility damage information in the future to facilitate the collection and analysis of excavator downtime information.*



## Description of Damage – DIRT Data Form–Part H

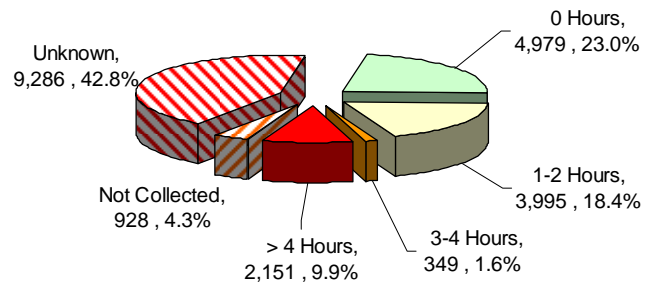
### *Was there damage to a facility?*

Stakeholders reported that for 99.3% (21,530) of the records submitted there was facility damage, while for 0.7% (158) there was a near-miss. In addition, there was a service interruption reported for 59.9% of the records.

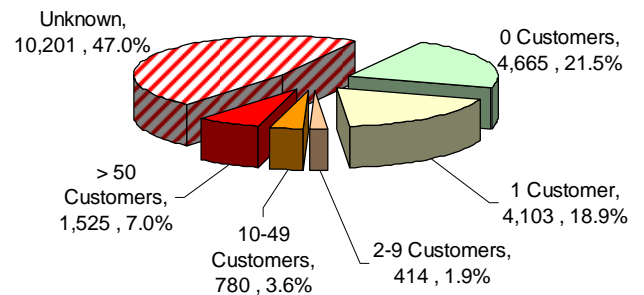
### *Service Interruption Duration*

Chart #44 shows that nearly half of stakeholders, 47.1%, either did not collect service interruption data or reported it as unknown. Zero (0) hours was reported for 23.0% of the damages. Stakeholders reported 20.0% lasted less than 4 hours and 9.9% lasted up to 24 hours. Eight damages led to interruptions of more than 24 hours.

**Chart #44  
Service Interruption Duration (Hours) - 2004**



**Chart #45  
Customers Affected by Service Interruption - 2004**



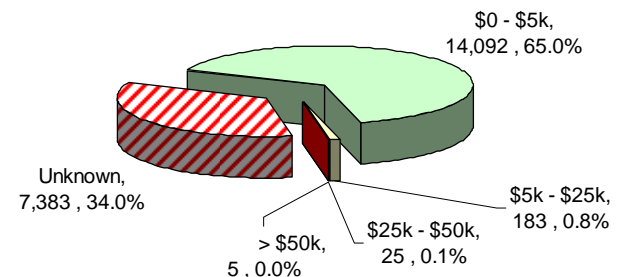
### *Customers Affected By Interruption*

Chart #45 shows that 47.0% of the stakeholders reported that the number of customers affected by the service interruption was unknown. In addition, stakeholders reported 21.5% of the damaged facilities did not affect any customers and 31.5% affected at least one customer.

### *Facility Damage Repair Cost*

As Chart #46 shows, stakeholders reported that 65.0% of the damaged facilities had a repair cost of between \$0 and \$5,000. In addition, stakeholders reported an unknown repair cost for 34.0% of the damages. One percent of the damages had a repair cost greater than \$5,000.

**Chart #46  
Facility Damage Repair Cost - 2004**



*Service interruption duration, customers affected by service interruption, and facility damage repair cost can all provide significant value in understanding and depicting the nature of facility damages. In addition, determining the average, median, and total of these data elements can provide a mechanism to estimate the scope and impact of facility damage. All stakeholders are encouraged to align their facility damage investigation and reporting process to the DIRT specification in future years to provide this value.*

### *Injuries and Fatalities*

Stakeholders reported no injuries or fatalities for 50.7% of the records submitted. However, there were 2 injuries and 1 fatality reported for 2004, which did not show up in the statistic due to math precision. This information was not reported for 49.3% of the records submitted.

## Description of Root Cause – DIRT Data Form–Part I

Description of root cause aims to identify the underlying cause of the facility damage. Its importance in understanding why damages occur was recognized and specified in the CGA Best Practices Handbook (Version 2.0), Reporting and Evaluation Best Practices. The Best Practice #19 recommends that, *“Root Causes are identified.”* This report concentrates on the five root causes that each contributed 1% or more and combined contributed 82.3% of the reported damages. In its simplest form, root cause identifies whether the excavator notified the One-Call notification center, or did not. If a facility notification was made, root cause can then identify whether sufficient facility owner/operator practices, sufficient location and marking practices, and/or sufficient excavation practices were employed by each of the stakeholders involved in the damage event. It is important to note that, although the root cause options within DIRT can identify what happened to cause the facility damage, a deeper level of analysis would be required to understand what factors contributed to that root cause. Five examples are provided:

- 1) Root cause may identify that a facility notification was not made by an excavator, but it does not establish whether the excavator was unaware of the legal requirement, or was aware and chose not to notify the One-Call notification center for some reason.
- 2) Root cause may identify that a facility locate was not performed by the facility owner, but it does not establish if and why the facility owner/operator chose not to or could not locate the facility.
- 3) Root cause may identify that a facility locate was performed but not marked sufficiently, but it does not establish why the marks were not sufficient. Possibly, the locator did not have complete excavation information or may not have been adequately trained.

- 4) Root cause may identify that the facility locate marks were sufficient and the excavator damaged a facility due to insufficient excavation practices, but it does not establish why the excavator did not use more care when digging near the facility.
- 5) Root cause may identify that a One-Call notification center error contributed to the damage, but it does not establish how the center contributed to the error.

Although root cause does not afford the opportunity to fully understand why facility damages occur, the information provided does allow the industry to identify which stakeholder practices contribute to facility damage. Once these are known, the industry can and does create appropriate damage prevention efforts to help improve these practices. The information also helps target these efforts to specific stakeholder groups.

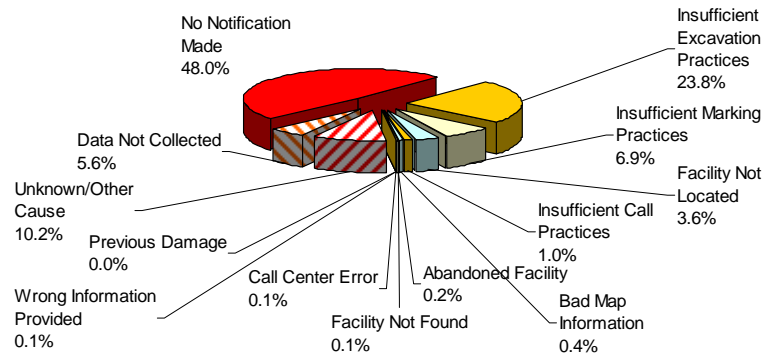
Chart #47 on the following page details the description of root cause. No notification made to the One-Call notification center was the largest root cause contributing to facility damage with 48.0% of the records. Insufficient excavation practices followed with 23.8%, then insufficient marking practices with 6.9%, and facility not located with 3.6%. The other root cause option accounted for 10.2%. The remaining eight root causes each accounted for 1% or less of the records. Stakeholders did not collect the root cause information for 5.6% of the records. While 48.0% of the damages reported occurred when a facility notification was not made by the excavator, 46.4% occurred when a facility notification was made.

No notification made to the One-Call notification center and insufficient excavating practices are both root causes attributable to the excavator, who may be a contractor, an occupant, or an employee of a facility owner/operator. Insufficient marking practices are attributable to the locator, who may be a contract locator or an employee of a facility

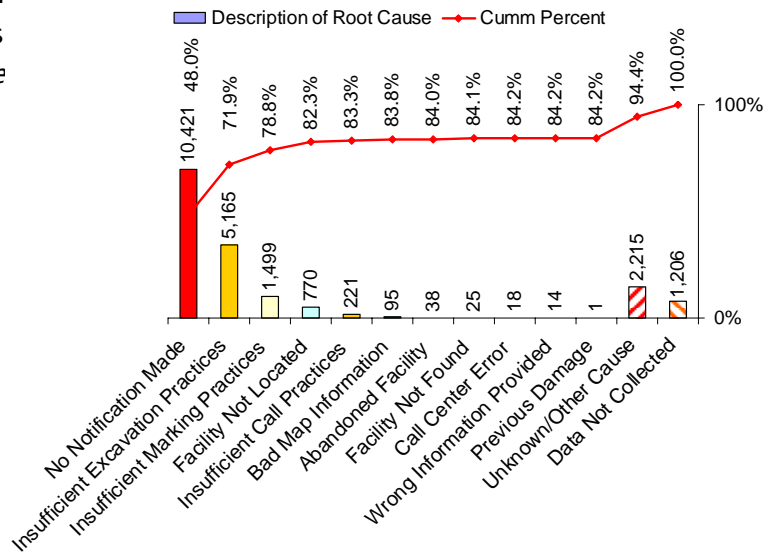
owner/operator. Facility not located may be attributable to either the locator or the facility owner/operator.

It is important to note that although the data submitted may suggest that most of facility damages were attributable to the excavator, (71.9%—no notification made and insufficient excavation practices), some damages (10.5%—insufficient marking practices and facility not located) were certainly attributable to both locating/marketing activity and the facility owner/operators themselves. As Chart #48 shows, these three stakeholder groups (as represented by the top four root causes) accounted for 82.3% of the data submitted. Since excavators, locators and facility owners all contribute to facility damage, it is clear why the CGA motto states: *Damage Prevention is a Shared Responsibility!*

**Chart #47**  
**Description of Root Cause - 2004**

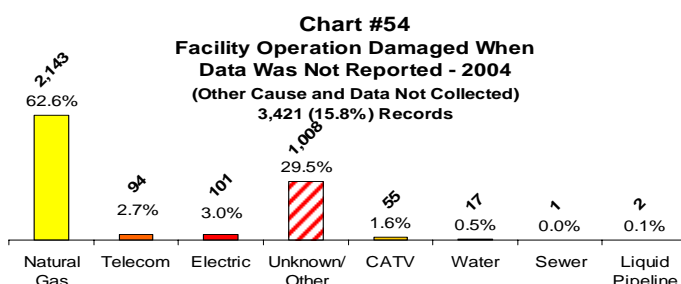
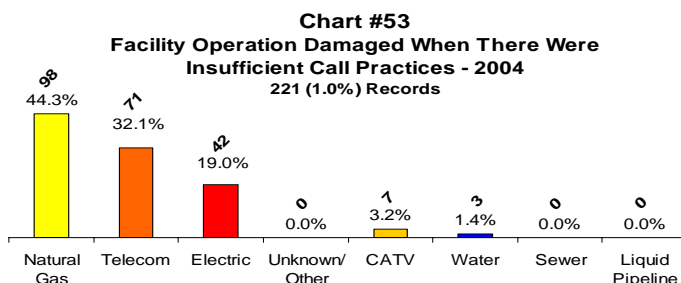
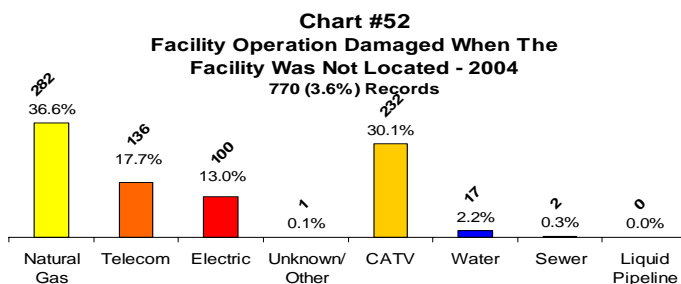
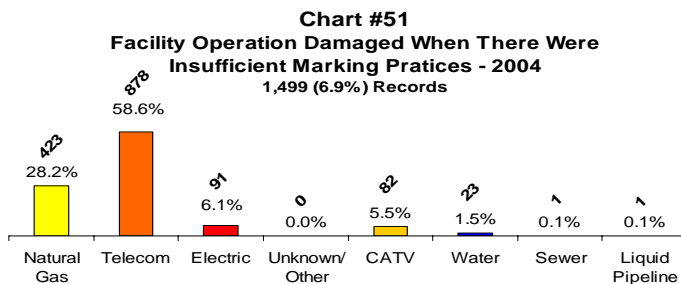
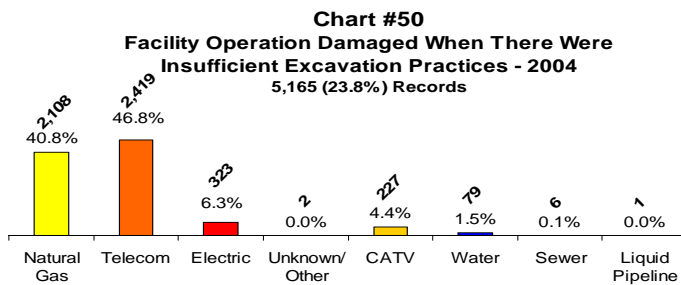
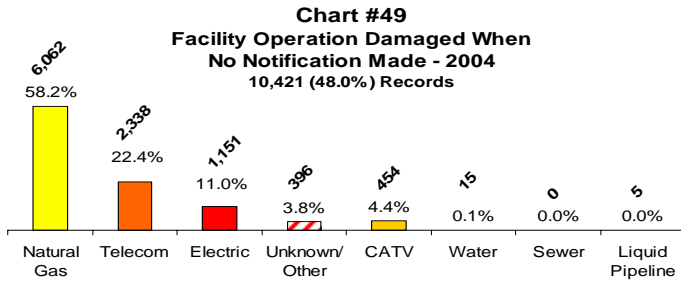


**Chart #48**  
**Description of Root Cause - 2004**  
**w/ Cummulative %**



*48% of the facility damages occurred when excavators did not notify the One-Call notification center, and another 23.8% occurred due to insufficient excavation practices.*

*The root cause data emphasizes the fact that*  
***Damage Prevention is a Shared Responsibility!***



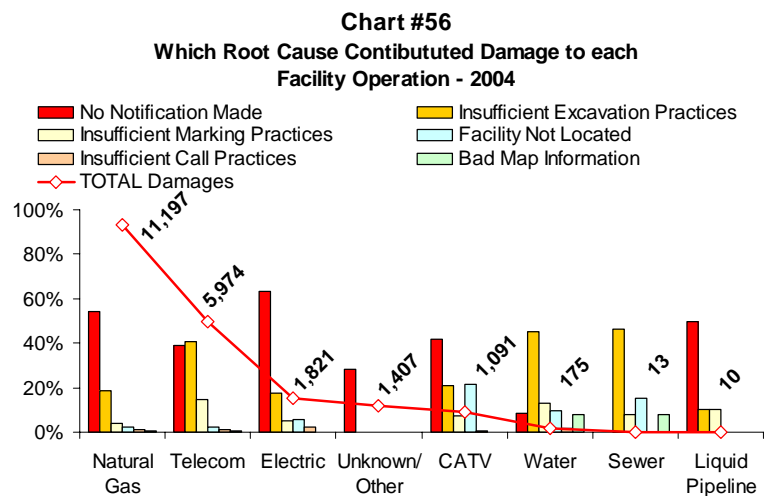
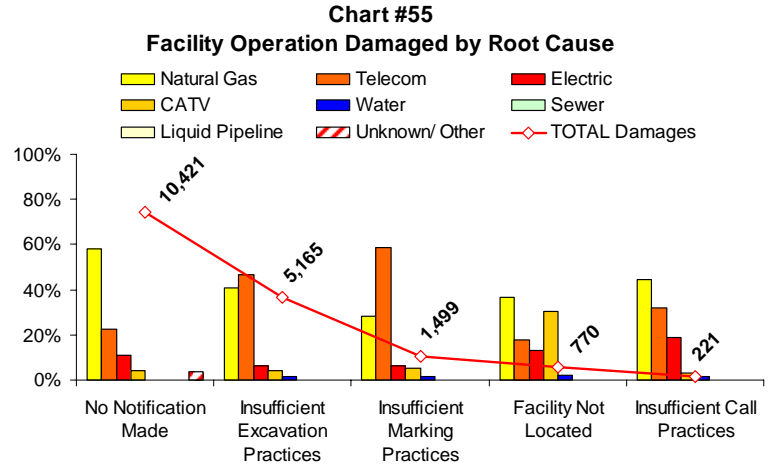
Instead of grouping the root cause options as in prior sections, the top six root causes contributing greater than 1% of the data will be analyzed versus the facility operation type to determine if the facility operation damaged differs between each of these root causes. Charts #49-#54 each represent the distribution of damages for one root cause across all facility operation types. The percentages for each root cause sum to 100%. They each show the total number and percentage of damages reported for each root cause as noted in the chart title.

Notice how the data shows there are significant differences in the distribution of which facility operation sustained damage from each root cause. Natural gas facility was more often damaged when a facility notification not made, the facility was not located, or there were insufficient call practices. Telecom facility was more often damaged when there were insufficient excavation practices or insufficient marking practices. CATV facility was also damaged frequently when the facility was not located.

Chart #55 consolidates the root cause versus facility operation type information into a single chart for easier comparison.

To gain additional insight into facility damage, it is useful to invert the analysis and analyze facility operation type versus root cause. This analysis will identify which root cause contributed the most damages to each facility operation type. Chart #56 provides this analysis. Notice that no facility notification made contributed the most damages to natural gas, electric, CATV, and liquid pipeline facility. Telecom facility sustained nearly the same number of damages when no facility notification was made and when there were insufficient excavation practices. Although there were not very many reported damages to sewer and water facility, the excavator did in fact notify the One-Call notification center prior to digging for the vast majority of these damages. Most of sewer and water facility damages occurred when the excavator employed insufficient excavation practices. Also, note that for both water and sewer facility, 20–30% of the damages occurred when the facility was not located by the facility owner/operator or the locator, or when bad map information was provided to the locator.

The analysis of root cause (for the damage records submitted) indicates that when damages occurred to a facility operation, they slightly more frequently occurred when no facility notification was made by an excavator prior to digging. And when a notification was made by the excavator prior to digging, insufficient excavation practices more frequently contributed to the damage; although facility locating and marking issues also contributed a good share of the facility damages.



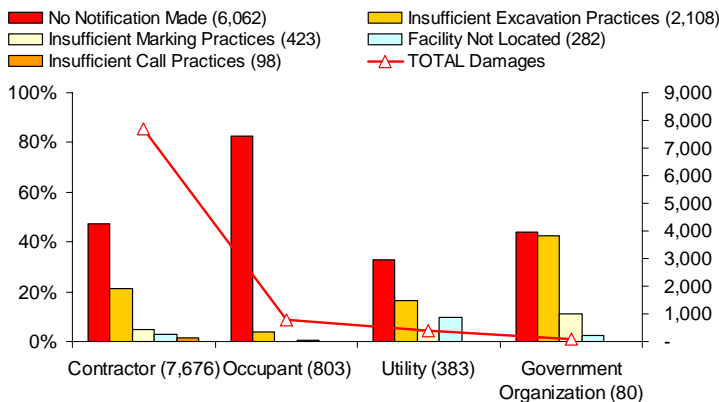
Charts #57-#60 drill deeper into the facility operation and root cause analysis for the two facility operation types that sustained the greatest share of damages. The number of damages reported for each facility operation is indicated in the chart title, while the number of damages reported for each excavator and root cause type is listed in the axis labels or the legend labels.

Charts #57 for natural gas facility operations and #59 for telecom facility operations depict the root cause versus the type of excavator. The bars for each excavator type sum to 100%. Notice the

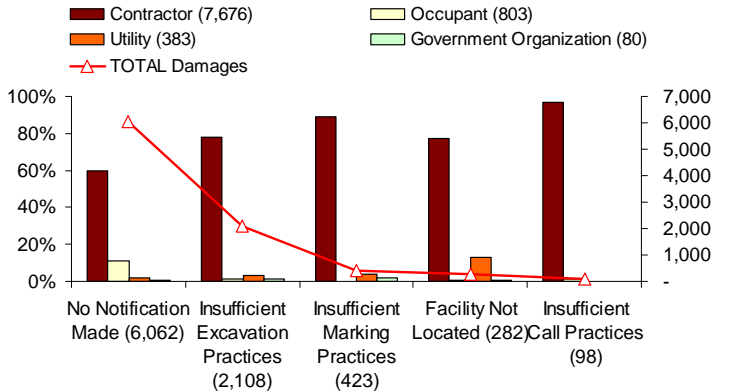
distinct difference in the distribution of root cause versus excavator type between the two facility types.

Charts #58 for natural gas facility operations and #60 for telecom facility operations depict the type of excavator versus the root cause. The bars for each root cause type sum to 100%. Notice the distinct difference in the distribution of excavator types versus root cause between the two facility types.

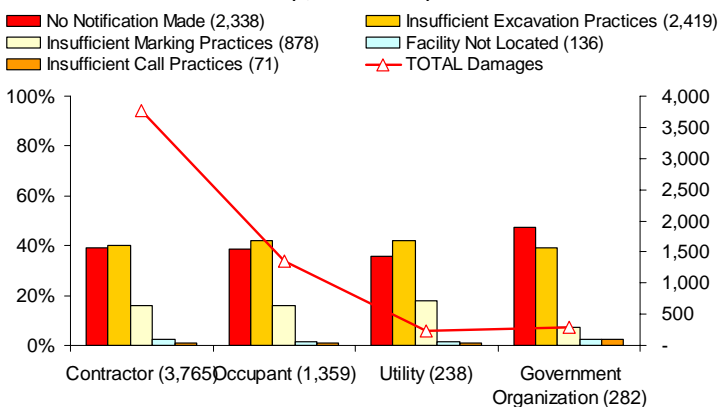
**Chart #57**  
Natural Gas Facility Operation - 2004  
Root Cause vs. Type of Excavator  
(11,197 Records)



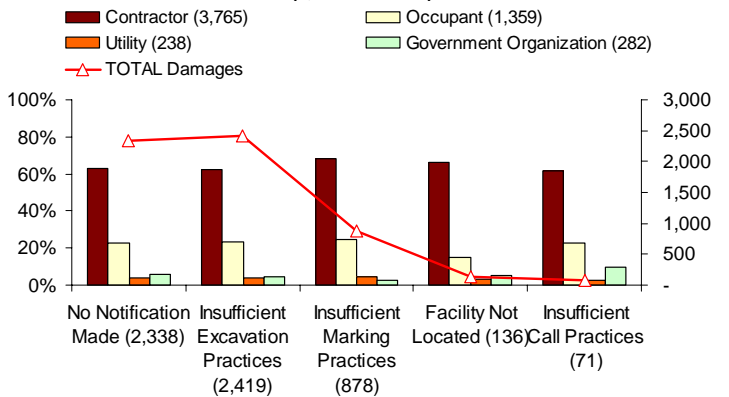
**Chart #58**  
Natural Gas Facility Operation - 2004  
Type of Excavator vs. Root Cause  
(11,197 Records)



**Chart #59**  
Telecom Facility Operation - 2004  
Root Cause vs. Type of Excavator  
(5,974 Records)



**Chart #60**  
Telecom Facility Operation - 2004  
Type of Excavator vs. Root Cause  
(5,974 Records)



## Miscellaneous Data Fields

The data fields presented below include those on the input form that were not analyzed in this report. Only those fields where the stakeholder submitted at least 10% of the records with a valid option (other than unknown/other and data not collected) were analyzed.

It should be noted that the right of way field in Part-B was added to the form in late 2004 after some stakeholders had already submitted data into DIRT. As defined in the CGA Best Practices (Version 2.0) Handbook, Reporting and Evaluation Best Practices, the Best Practice #5 specifies that, *“Requested information changes as additional or different data is deemed necessary for the evaluation process.”* This field was added to further define where damages were occurring.

Information about each of these fields can provide significant insight into facility damage and can aid in improving damage prevention efforts. Complete and accurate information will also improve the statistical analysis of the DIRT data and may provide insight into correlations between fields and as well as between the data and regions in which facility damages occur. In some cases, correlation between data may represent a causal factor that can be used to identify and improve public awareness, education and damage prevention programs.

*All stakeholders are encouraged to align their facility damage investigation and reporting process to the DIRT specification in future years to help improve damage prevention efforts in the industry and the usefulness of the analysis and reporting effort.*

### Location of the Event – Part B

#### *Right of Way*

Right of way was not reported for the vast majority (97.5%) of the records submitted. Stakeholders submitted only 549 records (2.5%). The right of way was reported as private on 63.7%, public on 33.2%, and reported as other on 3.1% of the 549 records.

### Affected Facility – Part C

#### *Part of Joint Trench*

Joint trench was not reported for the vast majority (95.0%) of the records submitted. Stakeholders submitted only 1,086 records (5.0%). The damaged facility was part of a joint trench on 2.4% and not part of a trench on 97.6% of the 1,086 records.

### Excavator Downtime – Part G

#### *Excavator Downtime Incurred*

Excavator downtime was not reported for the vast majority (94.5%) of the records submitted. Stakeholders submitted only 1,199 records (5.5%). The excavator incurred downtime on 29.2% and did not incur downtime on 70.8% of the 1,199 records.

#### *Excavator Downtime Duration*

Excavator downtime duration was not reported for the vast majority (99.7%) of the records submitted. Stakeholders submitted only 57 records (0.26%). The excavator incurred downtime duration of less than one hour on 57.9% and greater than one hour on 42.1% of the 57 records.

#### *Estimated Cost of Downtime*

Estimate cost of downtime was not reported for the vast majority (99.9%) of the records submitted. Stakeholders submitted only 3 records with this data.

## The Consultants

### *Dr. Susanne Aref*

Dr. Susanne Aref provided the statistical analysis for this report using the SAS software package. SAS was used for data management and for creating frequency tables. She received her Ph.D. from Cornell University.

Dr. Aref is Director of the Statistical Consulting Center in the Dept. of Statistics at Virginia Tech (VT). Prior to that, she was Manager of the Illinois Statistics Office in the Dept. of Statistics at University of Illinois at Urbana-Champaign (UIUC). She has collaborated with Dr. W.G. Buttlar, Dept. of Civil Engineering at UIUC, on projects for IDOT; with Dr. I. Al-Qadi, Dept. of Civil Engineering then at Virginia Tech now at UIUC, on several projects including some for VDOT; and with Dr. G. Flintsch, Dept. of Civil Engineering at VT on several projects. She also has been a statistical consultant for ERES Consultants on FHWA projects, and she is currently a statistical consultant for CTL and ERES Consultants on FHWA and NCHRP projects.

Dr. Aref is co-author of several papers published by Transportation Research Records, Proceedings of the annual Transportation Research Board, and Proceedings of the Canadian Technical Asphalt Association Conference. She has set up sampling strategies for surveys and analyzed the results for Dr. Dawn Ramsburg at UIUC for an evaluation of the Great Start program in IL. She has analyzed results of surveys for PACE (public transportation in Chicago), for Kelly Fike of the USDA Forest Service, and surveys conducted by Dr. Steve Lawson and Dr. Jeffrey Marion of Dept. of Forestry at VT.

Dr. Aref has taught courses on applied statistics, experimental design, methods of regression, and data analysis using SAS and given workshops on data analysis using SAS for the VT Transportation Institute and the Faculty Development Institute at VT.

### *Mr. Barry Miller*

Barry Miller authored this report utilizing the results of the statistical analysis by Dr. Aref. He earned a B.S. degree in Energy Economics and Finance from the Colorado School of Mines in Golden, Colorado.

Mr. Miller is currently an independent business consultant. In addition, he has extensive experience as an exploration geophysicist, a business software application developer, and an IT systems and infrastructure engineer. Since 2000, he has provided consulting services to Utility Notification Center of Colorado (UNCC) in the areas of business continuity, secure data center design, capital investment decision analysis, cash flow analysis and business activity forecasting.

Mr. Miller authored the UNCC Damage Data Report, *"Perspective on Facility Damage"*, in 2001, 2002, 2003 and 2004. He has also developed several business models that UNCC uses to improve its business and financial operations. These include a call center staffing model that determines optimal daily staffing requirements, a revenue and notification activity forecasting model based on local economic and business conditions, and a "what-if" income and cash flow analysis that can be used to assess and plan the impact of various ticket levels, member ticket fees, operational costs, and capital expenditures over future years.

In 2005, Mr. Miller assisted UNCC in developing new public awareness campaigns and marketing programs, promoted One-Call awareness at a number of industry and consumer trade shows in Colorado, worked closely with damage prevention councils around the state, and designed and presented a damage prevention awareness and safety course for stakeholders.

## Appendix–A

### Ratio estimation of the total number of facility damages for the U.S.

By Dr. Susanne Aref

#### *Overview*

Colorado is used as the model for the number of facility damage records to be expected in the U.S., since it has a legislatively mandated facility damage reporting process in place. The total population number of a state is multiplied by an estimated ratio of damage records per population determined from the counties in Colorado. The estimation assumes the following:

1. The ratio of the number of damage records (under a system of mandatory reporting) and population is fairly constant across states, and
2. The Colorado counties reflect the same pattern of ratio of the number of damage records and population as the whole state.

The reason the ratio estimation is not performed using the number of damage records and the population of all of Colorado state is that a variance estimate cannot be obtained and therefore confidence limits can not be created. At the county level an estimate of the variance can be obtained (and therefore the confidence limits).

#### *Method of Estimation*

The following description provides a technical explanation for the method of estimation:

- r = the ratio estimate
- X = total U.S. population (274,635,000)
- Y = total # damage reports for U.S. – unknown – what we want to estimate
- N = total # counties in all states (3,139)
  
- x = population of a Colorado county – known
- y = # damage reports for a Colorado county – known
- n = # counties in Colorado (63)

The ratio estimator used is:

$$r = \frac{\bar{Y}}{\bar{X}}, \quad \text{where } \bar{X} = \frac{X}{N} (= 274,635,000 / 3,139 = 87,491.21) \text{ and } \bar{Y} = \frac{Y}{N}$$

An unbiased (for large n) estimator is:

$$\hat{r} = \frac{\bar{y}}{\bar{x}}, \quad \text{where } \bar{x} = \frac{x}{n} (= 68,274.0) \text{ and } \bar{y} = \frac{y}{n} (= 167.9) \text{ so } \hat{r} = 0.00246$$

$$\text{Var}(\hat{r}) \doteq \frac{s_d^2}{n\bar{X}^2},$$

where  $s_d^2$  is the sample variance computed for the difference,  $\doteq$  means is approximately equal to. Usually the assumption is that  $\bar{X} \doteq \bar{x}$  and use  $\bar{x}$  in the expression for the variance, but here  $\bar{X}$  is known.

To obtain the variance of the ratio the difference between the actual number of damage records and estimated number of damage records is needed,  $d_i = y_i - rx_i$ . The estimated number of damage records is obtained using the estimated ratio,  $\hat{r}$  :

$$\hat{d}_i = y_i - \hat{r} x_i, \quad i = 1, \dots, n$$

The variance of this difference is

$$s_d^2 = \frac{1-f}{n-1} \sum_{i=1}^n (y_i - \hat{r}x_i)^2,$$

where  $f = \frac{n}{N}$  is the finite population correction (0.02).

The expected value of  $\hat{r}$  is approximately  $r$  and therefore unbiased for  $n$  not too small:

$$E(\hat{r}) = E\left(\frac{\bar{y}}{\bar{X}}\right) \doteq E\left(\frac{\bar{y}}{\bar{X}}\right) = \frac{E(\bar{y})}{\bar{X}} = \frac{\bar{Y}}{\bar{X}} = r, \text{ where } \bar{X} \text{ is substituted for } \bar{x}.$$

The variance of  $\hat{r}$  is then approximately:

$$\text{Var}(\hat{r}) = E(\hat{r} - r)^2 \doteq E\left(\frac{\bar{y}}{\bar{X}} - r\frac{\bar{x}}{\bar{X}}\right)^2 = \frac{E(\bar{y} - r\bar{x})^2}{\bar{X}^2} = \frac{1}{\bar{X}^2} E\left(\frac{1}{n} \sum_{i=1}^n (y_i - rx_i)\right)^2 \doteq \frac{s_d^2}{n\bar{X}^2}.$$

The estimate of  $Y$ , the total number of damage records for a year is

$$\hat{Y} = \hat{r} X = 0.0025 * 274,635,000 = 675,276$$

The estimated variance for  $\hat{Y}$  is

$$\text{Var}(\hat{Y}) = \text{Var}(\hat{r}) X^2 \doteq \frac{s_d^2}{n\bar{X}^2} X^2 \doteq N^2 s_d^2 / n = 3,363,740,403.2$$

The half-width of the 95% confidence interval centered at  $\hat{Y}$  is approximately

$$\text{HW}(\hat{Y}) = 2\sqrt{\text{Var}(\hat{Y})} \doteq 2Ns_d / \sqrt{n} = 2 * 57,997.76 = 115,995.52$$

The precision is only 17.2%. The confidence limits are [559,280.8 , 791,271.9]

In this case we do not have random sample of a number of counties from all the counties in the U.S. We have all counties in Colorado. Colorado is fortunately a state that is fairly close to the median for both population size and number of counties, so simply using the Colorado counties as if they were random samples from the whole population may not be too far a stretch. At least the estimated ratio should be reasonably close, while the variance may well be larger than found here.

In the case of stratified sampling of several subpopulations, here states, the estimated total number of damage records  $\hat{Y}$  is the sum of the states estimated total number of damage records  $\hat{Y}_i$ , where  $i = 1, \dots, 51$ . Then in this particular case, because we only have data from Colorado the estimate is the same as before:

$$\hat{Y} = \sum_{i=1}^K \hat{Y}_i = \sum_{i=1}^K \hat{r}_i X_i = \hat{r} \sum_{i=1}^K X_i = \hat{r} X = 675,276$$

and the variance of  $\hat{Y}$  is

$$\text{Var}(\hat{Y}) = \text{Var}\left(\sum_{i=1}^K \hat{Y}_i\right) = \sum_{i=1}^K \text{Var}(\hat{r}) X_i^2 \doteq \sum_{i=1}^K N_i^2 s_{d_i}^2 / n_i = 44,753,409.03$$

75 times smaller than at the US level.

The half-width of the 95% confidence interval centered at  $\hat{Y}$  is approximately

$$\text{HW}(\hat{Y}) = 2\sqrt{\text{Var}(\hat{Y})} \doteq 2 * 6,689.8 = 13,379.6$$

The precision is only 2.0%. The confidence limits are [661,896.7 , 688,655.9]

This confidence interval is more than 100,000 records narrower on each side of the estimate.

Since some states have very few counties (5 states less than 10, 6 more states less than 20) which is too little for proper ratio estimation, the best way to estimate the confidence interval may be to use regions rather than either the whole country or all individual states.

If the regions defined by OCSI and used for this report are used in the estimation, the confidence limits are [634,193.8 , 716,358.8] The number of counties in these regions range from 217 to 578.

There are other possible measures that could be used instead of population size, such as the number of housing starts. Other measures may be considered in future years.

Reference: W.G. Cochran, 1953, "Sampling Techniques", 2<sup>nd</sup> ed., Wiley

## Appendix-B

Current as of 12/05/2005

Check the Appropriate Response on the Form  
 “\*” indicates a Required Field

### Damage Information Reporting Tool (DIRT) - Field Form

#### **Part A – Who is Submitting This Information**

<b>Who is providing the information:</b>		<input type="checkbox"/> Electric	<input type="checkbox"/> Engineer/Design	<input type="checkbox"/> Equipment Manufacturer
<input type="checkbox"/> Excavator	<input type="checkbox"/> Gas	<input type="checkbox"/> Insurance	<input type="checkbox"/> Locator	<input type="checkbox"/> Oil
<input type="checkbox"/> Public Works	<input type="checkbox"/> Railroad	<input type="checkbox"/> Road Builders	<input type="checkbox"/> State Regulator	<input type="checkbox"/> Telecommunications
<input type="checkbox"/> One Call Center	<input type="checkbox"/> Private Water	<input type="checkbox"/> Unknown/Other		

**Name of the person providing the information:** \_\_\_\_\_

#### **Part B - Date and Location of Event**

<b>*Date of Event:</b>		(MM/DD/YYYY)	
<b>*Country</b>	<b>*State</b>	<b>*County</b>	<b>City</b>
<b>Street address</b>		<b>Nearest Intersection</b>	
<b>*Right of Way where event occurred</b>			
Public:	<input type="checkbox"/> City Street	<input type="checkbox"/> State Highway	<input type="checkbox"/> County Road
	<input type="checkbox"/> Private Land Owner	<input type="checkbox"/> Private Business	<input type="checkbox"/> Private Easement
	<input type="checkbox"/> Power / Transmission Line	<input type="checkbox"/> Dedicated Public Utility Easement	<input type="checkbox"/> Federal Land
	<input type="checkbox"/> Data not collected	<input type="checkbox"/> Unknown/Other	<input type="checkbox"/> Interstate Highway
			<input type="checkbox"/> Other
			<input type="checkbox"/> Pipeline
			<input type="checkbox"/> Railroad

#### **Part C – Affected Facility Information**

<b>*What type of facility operation was affected?</b>				
<input type="checkbox"/> Cable Television	<input type="checkbox"/> Electric	<input type="checkbox"/> Natural Gas	<input type="checkbox"/> Liquid Pipeline	<input type="checkbox"/> Sewer
<input type="checkbox"/> Steam	<input type="checkbox"/> Telecommunications	<input type="checkbox"/> Water	<input type="checkbox"/> Unknown/other	
<b>*What type of facility was affected?</b>				
<input type="checkbox"/> Distribution	<input type="checkbox"/> Gathering	<input type="checkbox"/> Service/Drop	<input type="checkbox"/> Transmission	<input type="checkbox"/> Unknown/Other
<b>Was the facility part of a joint trench?</b>				
<input type="checkbox"/> Unknown	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
<b>Was the facility owner a member of One Call?</b>				
<input type="checkbox"/> Unknown	<input type="checkbox"/> Yes	<input type="checkbox"/> No		

#### **Part D – Excavation Information**

<b>*Type of Excavator</b>				
<input type="checkbox"/> Contractor	<input type="checkbox"/> Farmer	<input type="checkbox"/> Municipality	<input type="checkbox"/> Occupant	<input type="checkbox"/> Railroad
<input type="checkbox"/> County	<input type="checkbox"/> Utility	<input type="checkbox"/> Developer	<input type="checkbox"/> Data not collected	<input type="checkbox"/> State
<input type="checkbox"/> Unknown/Other				
<b>*Type of Excavation Equipment</b>				
<input type="checkbox"/> Auger	<input type="checkbox"/> Backhoe/Trackhoe	<input type="checkbox"/> Boring	<input type="checkbox"/> Drilling	
<input type="checkbox"/> Directional Drill	<input type="checkbox"/> Explosives	<input type="checkbox"/> Farm Equipment	<input type="checkbox"/> Grader/Scraper	
<input type="checkbox"/> Hand Tools	<input type="checkbox"/> Vacuum Equipment	<input type="checkbox"/> Probing Device	<input type="checkbox"/> Trencher	
<input type="checkbox"/> Data Not Collected	<input type="checkbox"/> Unknown/Other			
<b>*Type of Work Performed</b>				
<input type="checkbox"/> Agriculture	<input type="checkbox"/> Blading and Lot Grade	<input type="checkbox"/> Cable Television		
<input type="checkbox"/> Building Construction	<input type="checkbox"/> Curb/Sidewalk	<input type="checkbox"/> Building Demo		
<input type="checkbox"/> Drainage	<input type="checkbox"/> Driveway	<input type="checkbox"/> Electric		
<input type="checkbox"/> Engineering/Surveying	<input type="checkbox"/> Fencing	<input type="checkbox"/> Gas		
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Landscaping	<input type="checkbox"/> Petroleum Pipeline		
<input type="checkbox"/> Pole Placement	<input type="checkbox"/> Public Transit Authority	<input type="checkbox"/> Railroad Maintenance		
<input type="checkbox"/> Road Work	<input type="checkbox"/> Sewer	<input type="checkbox"/> Site Development		
<input type="checkbox"/> Steam	<input type="checkbox"/> Storm Drain/Culvert	<input type="checkbox"/> Street Light		
<input type="checkbox"/> Phone	<input type="checkbox"/> Traffic Signal	<input type="checkbox"/> Traffic Sign		
<input type="checkbox"/> Fiber Optic	<input type="checkbox"/> Water	<input type="checkbox"/> Waterway Improvements		
<input type="checkbox"/> Transmission Pipeline	<input type="checkbox"/> Data Not Collected	<input type="checkbox"/> Unknown/Other		

Check the Appropriate Response on the Form  
 "\*" indicates a Required Field

**Part E&F – Notification, Locating and Marking**

**\*Did the excavator notify the one call notification center?**  
 Yes  No  
 If Yes which One Call center \_\_\_\_\_  
 If Yes, please provide the One Call ticket number \_\_\_\_\_

**\*Type of Locator**  
 Utility Owner  Contract Locator  Data Not Collected  Unknown/other

**\*Were facility marks visible in the area of excavation?**  
 Yes  No  Data Not Collected  Unknown/other

**\*Were facilities marked correctly?**  
 Yes  No  Data Not Collected  Unknown/other

**Part G – Excavator Downtime**

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

**If yes, how much time?**  
 Unknown  Less than 1 hour  1 to 2 hours  2 to 3 hours  More than 3 hours Exact Value \_\_\_\_\_

**Estimated cost of down time?**  
 Unknown  \$0 to 5000  \$5000 to 25,000  \$25,000 to 50,000  Over \$50,000 Exact Value \_\_\_\_\_

**Part H – Description of Damage**

**\*Was there damage to a facility?**  
 Yes  No (i.e. near miss)

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

**If yes, duration of interruption**  
 Data Not Collected  Less than 1 hour  1 to 2 hrs  2 to 4 hrs  4 to 8 hrs  8 to 12 hrs  12 to 24  
 1 to 2 days  2 to 3 days  more than 3 days  Unknown Exact Value \_\_\_\_\_

**Approximately how many customers were affected?**  
 Zero  One  2 to 10  10 to 50  50 or more  Unknown Exact Value \_\_\_\_\_

**Estimated cost of repair/restoration**  
 \$ 0 to 5,000  \$5,000 to 25,000  \$25,000 to 50,000  \$50,000 or more  Unknown Exact Value \_\_\_\_\_

**Number of people injured**  
 Unknown  Zero  One  2 to 9  10 to 19  20 to 49  50 to 99  
 100 or more Exact Value \_\_\_\_\_

**Number of fatalities**  
 Unknown  Zero  One  2 to 9  10 to 19  20 to 49  50 to 99  
 100 or more Exact Value \_\_\_\_\_

**Part I – Description of the Root Cause**

**\*Please choose one**

<input type="checkbox"/> Facility was not located or marked	<input type="checkbox"/> Facility marking or location not sufficient
<input type="checkbox"/> One call notification center error	<input type="checkbox"/> No notification made to the one call center
<input type="checkbox"/> Facility could not be found or located	<input type="checkbox"/> Abandoned facility
<input type="checkbox"/> Incorrect facility records/maps	<input type="checkbox"/> Wrong information provided
<input type="checkbox"/> Deteriorated facility	<input type="checkbox"/> Notification to one call center, made but not sufficient
<input type="checkbox"/> Excavation practices not sufficient	<input type="checkbox"/> Previous damage <input type="checkbox"/> Data Not Collected
<input type="checkbox"/> None of the above, Please Explain _____	

**Part J – Additional Comments**