

PERSPECTIVE ON FACILITY DAMAGE

Damage Data Analysis
and Recommendations

TURNING DATA INTO KNOWLEDGE,
KNOWLEDGE INTO ACTION,
AND ACTION INTO SUCCESS!

2004



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About UNCC

The Utility Notification Center of Colorado (UNCC) is a Colorado 503c nonprofit organization mandated by state law under CRS 9.1.5-101-106. Established in 1987, UNCC is funded by its 1,100 member underground facility owners and operators throughout Colorado. Our purpose is to act as a messaging Center between excavators and underground facility operators for locate requests when excavation activity is needed. UNCC has three additional legislative mandates:

- 1) To establish and maintain damage prevention safety programs and awareness campaigns,
- 2) To create and publicize a damage data collection process to its membership,
- 3) To prepare and publish an annual report on facility damages for the membership and the Colorado Public Utilities Commission.

The UNCC Board of Directors, employees and the membership have worked hard for nearly two decades to fulfill our purpose —

“To protect underground facilities and prevent injury and loss of human life . . .”

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The Value of Facility Damage Reporting

In 2000, the Colorado One-Call law was changed to include the requirement for all facility operators to report specific information about all damaged underground facility to UNCC within ninety days after service had been restored. UNCC has been collecting, analyzing and reporting this valuable data since 2001. As the only state with this rigid requirement, UNCC has demonstrated its continued leadership within the industry and its commitment to damage prevention efforts.

Over the past several years, UNCC, the Common Ground Alliance (CGA) and One Call Systems International (OCSI) have endeavored to build a framework upon which to combine One-Call statistics and legislative elements, underground facility damage reporting, and industry best practices to understand and characterize the state of damage prevention and stakeholder performance. Our vision is to measure and demonstrate the effectiveness of our nation's One-

Call damage prevention programs. As we move forward, our collaborative work will focus upon utilizing information to identify, initiate and participate in industry efforts to improve stakeholder responsibilities. Much of this effort will come through education, training, marketing and advertising programs. The on-going 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.

UNCC thanks all member organizations that complied with the state reporting requirement and submitted their underground facility damage information for 2004.



One Call Systems
International



Photo courtesy of Underground Focus Magazine.

CGA
Common Ground Alliance



Photo courtesy of Underground Focus Magazine.

About This Report

The underground facility owners and operators in the state of Colorado have provided the information compiled in this report in accordance with CRS 9.1.5-101-106. UNCC has collected, summarized, and published this report to fulfill its mandate and to facilitate improvements in excavation and location practices. We anticipate industry leaders will utilize this information to create positive transformation. The intended audience includes the following stakeholders: underground facility owners and operators, underground facility locators, One-Call centers, excavators, regulatory and compliance agencies and related industry associations.

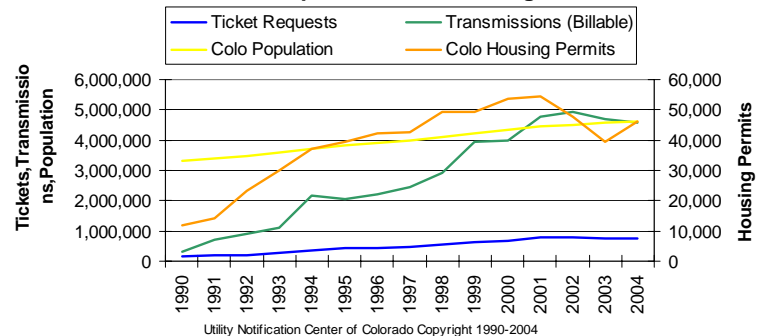
Dig | Safely.

Executive Summary

The intent of the damage data collection and reporting effort in Colorado is to both ask and answer two important questions: *Why are facility damages happening and how might this knowledge impact the occurrence of damages?* Ideally, the answer would help the industry, the membership and UNCC develop better public awareness campaigns, improve stakeholder education and training, and possibly direct appropriate legislative efforts, where appropriate. These combined efforts would aid in reducing the number of facility damages and their negative impact on the industry, the local community, and the general public. Certainly, UNCC has shown that, with the assistance of the membership, useful facility damage data can be collected, analyzed and reported.

It is important to realize that this data collection and reporting project is an evolutionary process. At times, the analysis can get lost in the sheer quantity of that data. Interpreting what the data or trends in the data mean is not always a straightforward task. Understanding what any specific data means must be taken in the context of current industry practices and attitudes of members, locators, and excavators in the field. Understanding why a trend is occurring requires knowledge of public awareness and training programs that have been put in place by members and other industry stakeholders. Unfortunately, the current data collection and reporting process does not capture the psychological elements of the stakeholders. An important next step to understanding why facility damages occur might be to implement field investigations and conduct in-depth surveys of a random sample of the damages. By examining and understanding the psychology of how and why damages are occurring, the industry may better respond to the challenge of creating more effective public awareness campaigns and stakeholder training programs as well as direct more appropriate legislative efforts.

UNCC Ticket and Transmission Activity with Colorado Population and Housing Permits



One Call – A Colorado Success!

Since its creation in 1987, UNCC has worked diligently to comply with two important responsibilities under the One-Call Law: 1) to make the public and the excavation industry aware of the dual requirements to *Call Before You Dig* and to *Dig Safely*, and 2) to encourage facility owners and operators to comply with the 1993 mandatory One-Call membership requirement. The graph above demonstrates the success that the membership and UNCC have had in meeting these responsibilities.

The steady increase in the number of ticket requests (blue line) indicates the growing increase in public awareness (both homeowners and professional excavators) and the success of the public awareness campaigns by UNCC and the membership. Since 1990, the number of ticket requests per 1000 residents has risen from 51 to 174 in 2001. It dropped back to 161 in 2003 due to the economic and residential construction slowdown after 2001— while the population continued to grow.

The increase in the number of transmissions to billable members (green line) indicates the growing compliance with the One-Call membership requirement by facility owner/operators and the success of the Member Services efforts at UNCC. Since 1993, the year before One-Call membership

was mandated under the 1994 state law change, total membership (Tier I & Tier II) has grown from 405 voluntary members to 1,126 compliant members in 2004. Billable (Tier I) membership has grown from 204 in 1993 to 593 in 2004.

From a demographic and economic perspective, the underlying population and the demand for residential, commercial, and industrial space, as well as public and private infrastructure, drives the need for construction activity around the state and the need for the One-Call service. The Colorado population has steadily grown since 1990, averaging 2.7% growth from 1990-2001 and 1.2% growth from 2001-2004. The underlying population base and its growth, along with the strength of the local economy, create and drive the demand for new residential housing as measured by residential building permits. The graph indicates this demand was strong from 1990-2001, then fell off into 2003. It is interesting to note that the number of ticket requests per housing permit has grown steadily from 10 in 1994 to 19 in 2003, and then dropped off to 16 in 2004. Since ticket request growth outpaced housing permit growth over the period, this measure also demonstrates the effectiveness of the One-Call public awareness effort.

In comparison to the measures of both demographic and economic growth since 1993, as measured by population growth at 28% and housing permit growth at 55%, ticket requests, billable transmissions, and UNCC membership have grown considerably faster; 167%, 312% and 178%, respectively.

That is Success!

Facility Damages Decrease in 2004!

If we acknowledge that the intent of the One-Call law is to "*prevent damage to underground facilities*", and consider the fact that only 1.4 in 100 locate requests resulted in a damaged facility, then we can surmise that the One-Call process is doing an excellent job of fulfilling the intent of the law. Add to that the sharp 22% reduction in facility damages in 2004 (as the damage data analysis will show) after the increasing trend from 2001-2003. We can also surmise that many One-Call members and other stakeholder groups have implemented programs that have been effective at reducing the number of facility damages. But still, the 2004 data shows that 58% of those excavators that damaged a facility had requested a locate within the time specified under the law! This means that these excavators are complying with the One-Call law, but due to insufficient excavating, locating, or marking practices, the facility is still getting damaged. What is telling about this metric is that it has been steadily decreasing from 74% in 2001, when damage data was first collected.

So what does this mean about the state of damage prevention efforts in Colorado?

- 1) It means that more excavators are complying with the One-Call law.
- 2) It means that more excavators are using greater care when digging near underground facility.
- 3) It means that a greater share of the facility damages (which are now decreasing) occur when excavators do not request a locate.

This certainly validates both the critical need for and the on-going success of One-Call in Colorado. And this is a positive result of UNCC, member, and industry damage prevention programs and efforts!

One-Call — A Colorado Success!

What Does The Future Hold?

Since the creation of UNCC in 1987, the public awareness campaign has been *“Call Before You Dig”*. As evidenced by the increasing One-Call membership and the increasing number of excavators (both professionals and the general public) requesting locates prior to digging, the membership campaign and the public awareness campaigns have been extremely successful.

In 1997 UNCC adopted the Department of Transportation/Office of Pipeline Safety national *“Dig Safely”* campaign. The campaign’s successful impact in Colorado is still growing and requires additional support and resources to help reduce the occurrence of facility damage within the defined tolerance zone. This success is evidenced by both the decreasing number of facility damages and the decreasing, but still significant, share of One-Call compliant excavators that damage underground facility.

Certainly, there is a continuing need to support and expend resources on the public awareness campaign. Infrequent use of the One-Call system by the general public requires periodic reminders of the value and legal requirement to *“Call Before You Dig”*. And the quality of life that Colorado affords will continue to attract non-residents unfamiliar with the state One-Call requirements. The growing population and the robust, though often cyclical, housing, commercial, and infrastructure growth will also attract new utility providers, developers, and professional excavators to the state. These stakeholders must be introduced, educated, and trained on the legal requirement of Colorado One-Call law, the use of the One-Call system, and in locating, marking and excavating best practices.

To this end, both UNCC and the membership can utilize the damage data to identify and target industries and geographic areas of the state for specific marketing, education, and training on One-Call requirements and Best Practices.

There are at least three questions that deserve additional consideration:

- 1) Would a better understanding of the psychological reasons why facility damages occur help improve damage prevention efforts?
- 2) Are better programs needed to improve public awareness, education and training programs?
- 3) Would more consistent and aggressive enforcement of the current One Call law help to reduce facility damages? And who might provide that enforcement?

If these questions can be openly discussed by industry stakeholders and viable initiatives defined, the industry might better respond to the challenge of creating more effective public awareness campaigns and stakeholder training programs, as well as direct more appropriate legislative efforts.

The following sections provide a detailed look at the facility damage data for 2004. The format has been significantly changed this year to focus on the analysis of the data for each of the eight facility types. Since the characteristics of each facility type are different, the many factors that impact why (root cause), who (excavator), what (equipment), how (work performed), and where (county) are surely different. For the analysis of several of the categories, the options have been grouped into fewer and broader option sets. This has interestingly provided both a different and clearer perspective and understanding of facility damage in Colorado. In addition, a justification is offered to explain why the damages significantly decreased in 2004.

Important Findings

Has the trend in the number of facility damages changed?

Yes. Total damages decreased 21.9% from 13,540 in 2003 to 10,573 in 2004. The trend had been increasing from 2001-2003; from 11,094 to 13,540.

Does the trend in facility damages correlate with trends in locate requests or ticket transmissions?

No. Locate requests increased from 2001-2002, decreased from 2002-2003, then increased from 2003-2004. Ticket transmissions increased from 2001-2002 and then decreased from 2002-2004. Damages increased from 2001-2003 and then decreased from 2003-2004.

Does the trend in facility damages correlate with the growth in population or construction activity?

No. Population grew steadily from 2001-2004. Construction activity, as measured by housing permits, decreased significantly in 2002 and 2003 and then increased significantly in 2004.

How many facility damages occurred per 1,000 locate requests?

14. Damages per 1,000 locate requests grew steadily from 14 in 2001 to 18 in 2003, then decreased back to 14 in 2004. In relation to Tier I transmissions, there were 2.3 damages per 1,000 transmissions in 2001, 2.9 in 2003, and 2.3 in 2004.

Were there any injuries or fatalities in 2004?

Yes. There were 2 injuries and no fatalities.

How many members reported damages?

40 Tier I and 8 Tier II members. This represents 4.2% of the total membership and 6.6% of the Tier I membership. The 40 Tier I members represent a large share of the corresponding ticket transmissions though.

What was the impact of the facility damage?

Damages affected 521,566 Colorado residents with a total service outage of 15,732 hours. The cost to repair these damaged exceeded \$3.4 million. The average outage lasted 2.5 hours, affected 91 customers, and cost \$577 to repair. This cost did not include lost service revenue, excavator related costs and revenue losses, related property damage, civil penalties, regulatory fines, or other public costs.

Which facility type was damaged most frequently?

Communication facility (excluding CATV) accounted for 49% and gas facility accounted for 25% of the damages. Both decreased from 2003 (19% and 42%), but the decrease in gas facility was significant — possibly due to recent damage prevention efforts by gas facility owner/operators and regulatory efforts in the industry. Electric facility accounted for 15% and CATV facility accounted for 10% of the damages. Electric damages decreased 6% and CATV damages increased a significant 27% from 2003.

Were facilities more frequently damaged when locates were not requested by excavators prior to digging?

Yes. The percentage of damages occurring without a locate request has steadily increased from 25.6% in 2001 to 42.0% in 2004. Damages that occur when a locate is requested prior to digging has steadily decreased from 74.4% in 2001 to 58.0% in 2004. This means that an increasing number of damages are occurring when the excavator does not request a locate. Insufficient marking, locating, and excavating practices still contribute a large, but decreasing, share of the damages when excavators comply with the One-Call law and request a locate.

When locates were requested by excavators, what was the root cause of the facility damage?

Insufficient excavating practices — damaging the facility within the 18" tolerance zone — accounted for 35%, insufficient marking practices accounted for 13%, and insufficient member practices accounted for 10% of the damages when a locate was requested by the excavator within the 3 days required by the Colorado One-Call law.

What type of excavator was more frequently digging when facility was damaged?

Contractors were more frequently identified by stakeholders as the excavating party when facilities were damaged, comprising nearly 71% of the damage records. Occupants comprised nearly 14% and facility owner/operators comprised nearly 6% of the damage records. Interestingly, occupants more frequently damaged telecommunication facility, while contractors and facility owner/operators more frequently damaged natural gas and potable water facility.

What type of equipment contributed the most facility damage?

Backhoes and trenchers contributed over 58% of facility damages. Surprisingly, hand tools, vacuums and probes contributed nearly 12% of damages. Drills, borers and augers contributed about 8% of damages.

What type of work contributed the most facility damage?

Landscaping work contributed the greatest share (over 15%) of facility damages. This has been a consistent trend each year since the damage data was first reported. Facility damages caused by landscaping work occur mostly to telecom and CATV facility. Interestingly, when work types are grouped by industry, work performed by and for the utility industry contributed the most facility damages, 39.3%. Utility work contributed the greatest share of damages to natural gas and potable water facility.

Where did the facility damages occur?

Facility damages were reported throughout the state; in 59 of 64 counties. The nine Front Range counties (El Paso to Larimer) contributed over 73% of the facility damages. El Paso County contributed 18.6% of the damages, with Arapahoe, Jefferson and Larimer counties following with 9.9%, 8.4%, and 7.8%, respectively. The damages decreased in each of the nine Front Range counties except Weld, which had 6.2% of the damages and increased 1.9% in 2004. Mesa County (#10) had 4.2% of the damages and decreased in 2004. Pueblo County (#11) had 2.5% of the facility damages, but increased 31.4% in 2004.

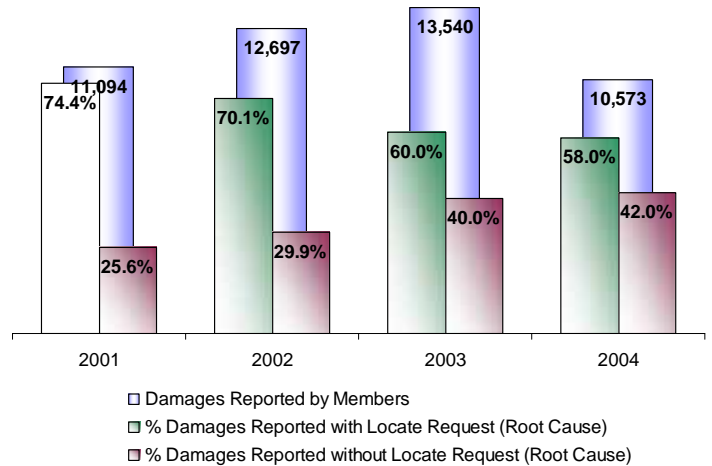
Have the owner/operators improved the reporting quality of the damage data?

Overall, the quality of the damage information reported to UNCC continues to improve. The facility owner/operators that reported telecom facility data did an exceptional job providing complete information. Unfortunately, some of the owner/operators that reported electric facility damage have significantly increased their use of the unknown option on many fields. This is also true of the CATV owner/operators, who were not well represented in the data set.

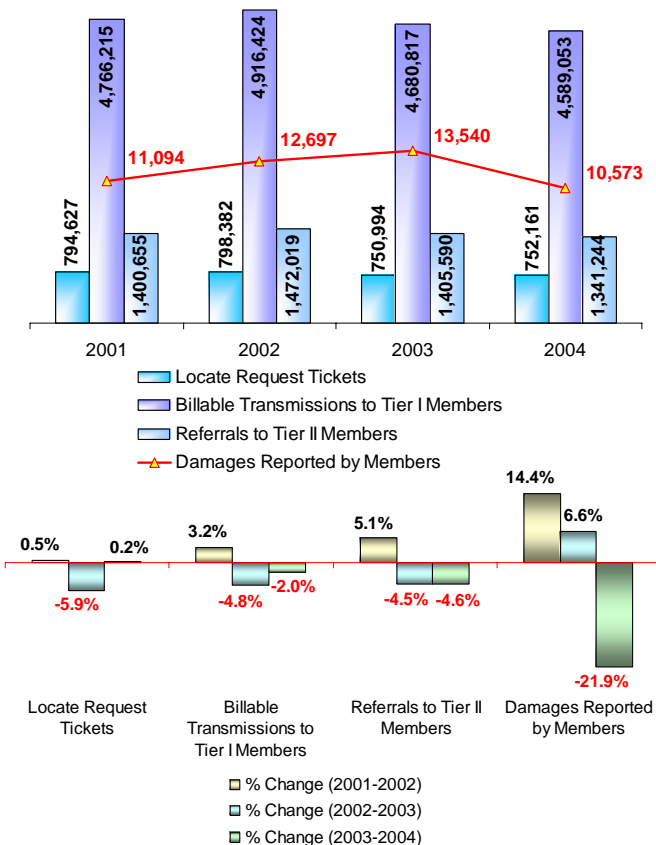
UNCC is not responsible for any action taken based upon the information or the interpretation of any information in this report.

Damage Data Overview

Facility owner/operators reported 10,573 facility damages in 2004. This 21.9% decrease in 2004 came after increases in 2002 and 2003. Facility damages with a locate request steadily decreased from 74.4% in 2001 to 58.0% in 2004. This positive trend demonstrates the effectiveness of “Dig Safely” awareness and training. Facility damages without a locate request steadily increased from 25.6% in 2001 to 42.0% in 2004. A damage with a locate request indicates One-Call compliance but insufficient marking, locating, or excavating practices. A damage without a locate request indicates One-Call non-compliance. Although neither situation is desired, damaging a facility when the excavator has demonstrated a willingness to comply with the law is certainly less desirable — and possibly avoidable through better education and training in excavation best practices.



After increasing 22% from 2001-2003, underground facility damages decreased 21.9% in 2004!

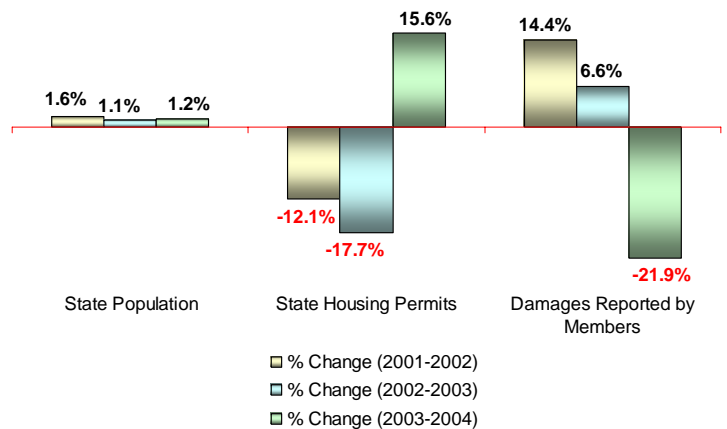
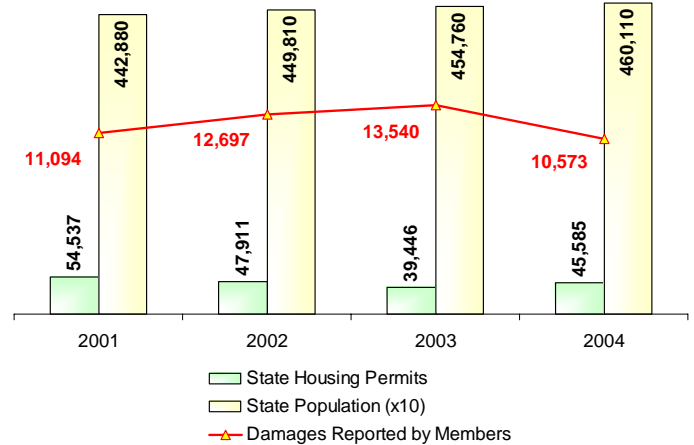


NOTE: 99.6% of the damages were reported by Tier I members, so Referrals to Tier II members is not a useful metric.

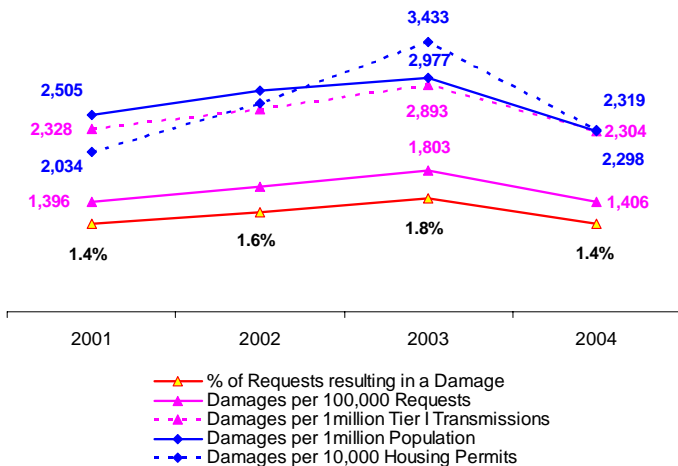
To create a clearer perspective of facility damage, it is necessary to compare the damage data to some metric or baseline to assess its absolute size, its trend and its relative behavior. The One-Call center provides three such operational metrics: 1) excavator locate requests, 2) Tier I member transmissions, and 3) Tier II member referrals. Although locate requests and member transmissions increased in 2002 (0.5% and 3.2%) and then decreased in 2003 (-5.9% and -4.8%) and 2004 (0.2% and -2.0%), facility damages continued to increase through 2003 (14.4% and 6.6%), and then decreased a significant 21.9% in 2004. Was this pattern of change in facility damages influenced by a change in request activity, transmission activity, economic conditions, or UNCC’s and facility owner’s damage prevention programs and educational efforts? Although there is a direct causal relationship between locates requested by excavators and transmissions sent to members, their correlation with facility damage has proved to be weak. A review of two economic conditions may provide some additional insight.

Additionally, the US Census Bureau provides two useful economic metrics: 1) state population as a measure of underlying growth and demand for public infrastructure, and 2) residential building permits as a measure of private construction demand within the state. The data shows that population and the underlying demand grew slowly from 2001-2004, while building permits decreased significantly in 2002 and 2003 (-12.1%, -17.7%), then increased sharply in 2004 (15.6%) — when damage experienced its largest annual decline. The correlation then between economic demand and facility damage has also proved to be weak.

Baseline metrics provide a clearer indication of the relative behavior between facility damages and excavator locate requests, member transmissions, state population and residential building permits. A baseline metric provides a value that is relative to the change in the underlying measure and provides a more accurate depiction of the trend and relationship between facility damages and the metric. The data clearly shows that for all baseline metrics, the trend in facility damages increased from 2001 through 2003, and then abruptly and significantly decreased in 2004.



Public awareness campaigns and contractor safety programs played a significant role in reducing facility damages in 2004.



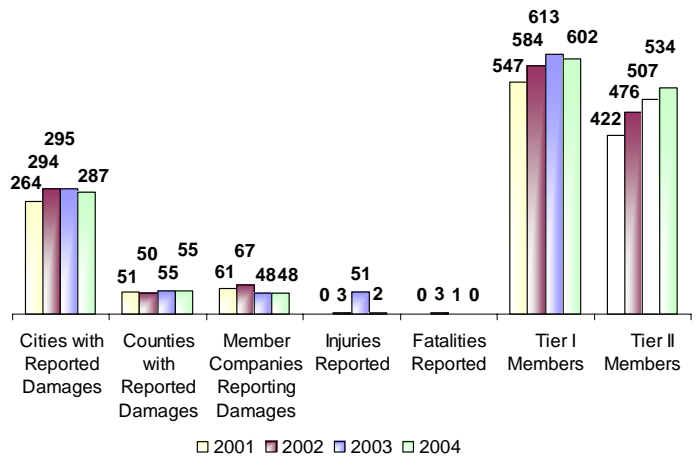
Since facility damages are not directly influenced by operational activity or economic demand, damage prevention efforts within the industry most likely played a significant role in suddenly reducing the level of damages in 2004. The increased public awareness efforts of UNCC, local damage prevention councils, and facility owner/operators made a positive impression on the general public. Additionally, contractor safety seminars, tailgate talks, and other innovative training programs initiated by UNCC and other facility owner/operators helped drive down both total facility damages and the ratio of damages that occurred even with a locate request. It should also be acknowledged that many contractors are improving their excavation practices and this helped contribute to this positive trend.

Damage Data Demographics

Forty eight member organizations complied with the mandatory damage reporting requirement and reported underground facility damages in 2004. This small group represents 4.2% of the 1,136 members. The number of members reporting has decreased from a high of 67 (6.3%) in 2002. Of these 48 members, 40 were Tier I (6.6% of 602 members) and eight were Tier II (1.5% of 534 members). Although the number of members reporting damages is a small part of the total membership, these 40 Tier I members represented about 35% of Tier I transmissions in 2004. In addition, in June 2005, UNCC requested Tier I members to positively respond if they did not have facility damages in 2004. Of the 602 Tier I members, 120 additional members positively responded with no facility damage. It is not known if the remaining 442 Tier 1 members (73%) had facility damages in 2004. The 20 Tier I members reporting the most damages (1/2 of the 40) represented 99.5% of the reported damages and 32.3% of Tier I member transmissions. This may suggest that a large portion of the damages are being reported.

No fatalities and two injuries were reported in 2004. In comparison, there were 51 injuries and one fatality in 2003. The two injuries occurred when a contractor operating a backhoe damaged an electric facility while working on a pipeline. A locate was requested and the utility owner responded by marking the location, but the facility markings were insufficient to properly identify the location of the facility.

Considering the opportunity for accident and disaster that excavating near dangerous underground facility provides, Colorado excavators

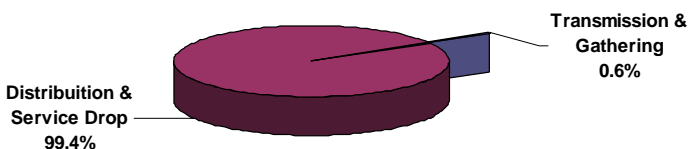


Just 9 member organizations accounted for over 98% of reported facility damages in 2004.

and facility owners do an excellent job of providing a safer environment for their workers.

The 10,573 reported facility damages occurred in 55 of 64 Colorado counties and in 287 cities. The 40 Tier I members reported 10,531 (99.6%) damages, while the eight Tier II members reported 42 (0.4%) damages. The nine telecommunication members who reported damages accounted for 49.3% of the damages, while the thirteen gas and/or electric service members who reported damages accounted for 34.8%. Just nine of the 48 member organizations accounted for over 98% of the reported facility damages.

Nearly all (99.4%) of the reported facility damages were to distribution or service drop type facility. The low incident of damage to transmission and gathering facility speaks to the exceptional effort these companies perform in public awareness, locating, marking, and excavating oversight. It also speaks to the care qualified and conscientious excavators can take when digging near underground facility that is both dangerous and very expensive to repair.



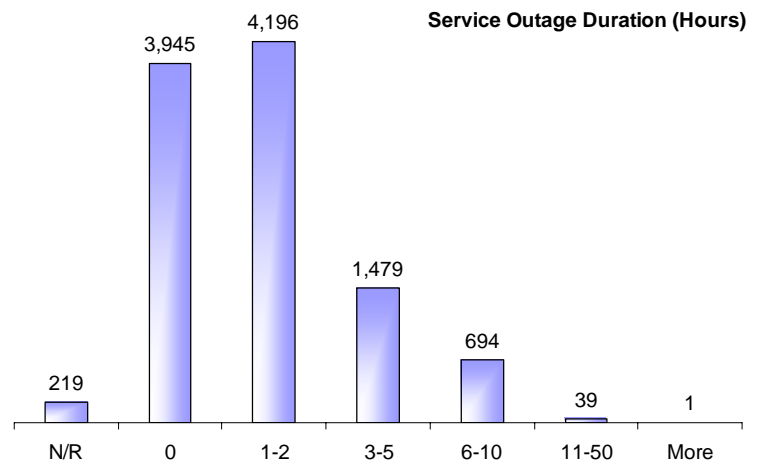
Impact of Facility Damage

Members were optionally asked to submit information about 1) duration of the service outage, 2) number of customers affected by the service outage, and 3) cost to restore the service. Whenever "0" was reported in a data field, it was assumed that "0" was the actual value for that field. It does not mean the value was not reported.

Service outage duration was not reported (N/R) for 2.1% and was reported as 0 (zero) hours for 37.1% of the damages. Members reported outage duration greater than 0 for 60.6% of the damages. The histogram represents the frequency of the outage duration in hours.

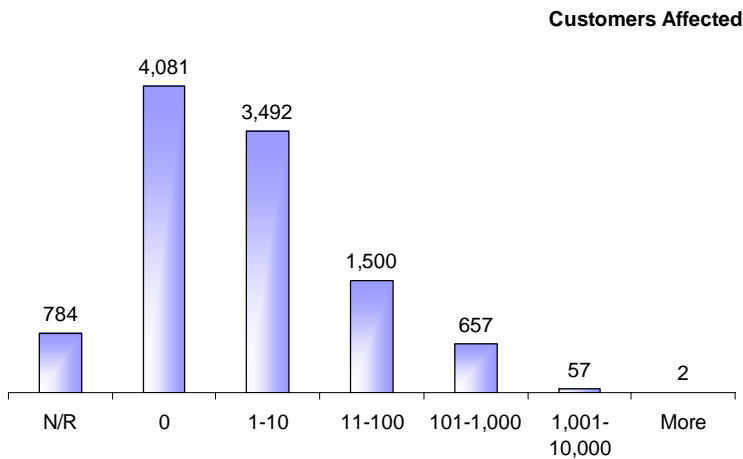
The maximum outage was 96 hours. This potable water facility was damaged when a municipal employee was using a drill rig on an expired locate. In 2004, the total duration of all damages (with duration > 0) was 15,732 hours.

Service Outage Duration		
	Frequency	Percent
Not Reported	219.	2.1%
Reported 0 hrs	3,945.	37.3%
Reported >= 1 hr	6,409.	60.6%
Maximum	96.0 hours	
Average	2.5 hours	
Median (half above/below)	1.0 hours	
StDev (67% above/below Ave)	2.8 hours	
Total Duration	15,732.0 hours	



Customers Affected		
	Frequency	Percent
Not Reported	784.	7.4%
Reported 0 customers	4,081.	38.6%
Reported >= 1 customer	5,708.	54.0%
Maximum	30,000. customers	
Average	91. customers	
Median (half above/below)	1. customers	
StDev (67% above/below Ave)	572. customers	
Total Customers Affected	521,566. customers	

521,566 Colorado residents were affected by a damaged underground facility, resulting in 15,732 hours out service outage!



Customers affected was not reported for 7.4% and was reported as 0 for 38.6% of the damages. Members reported that at least one customer was affected for 54.0% of the damages. The histogram represents the frequency of the number of customers affected.

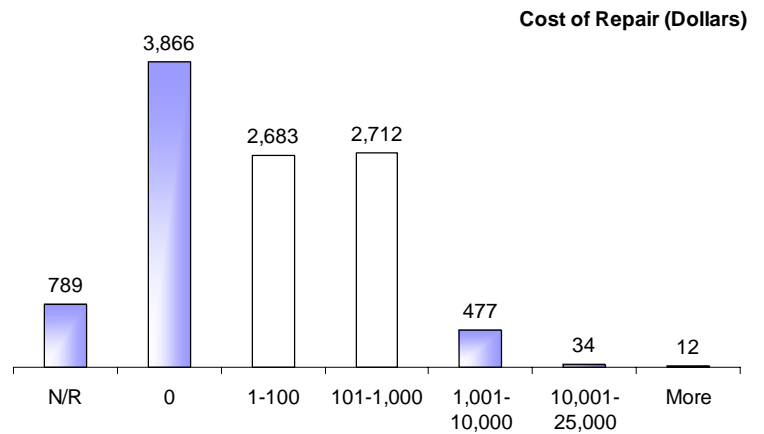
The maximum number of customers affected was 30,000. This communication facility was damaged when a contractor was using a trencher to perform irrigation work without a locate request. In 2004, at least 521,566 Colorado residents were affected by a damaged facility.

Cost of facility repair was not reported for 7.5% and was reported as \$0 for 36.6% of the damages. Members reported that the cost of the facility repair was at least \$1 for 56.0% of the damages. The histogram represents the frequency of the cost of the facility repair.

The maximum cost was \$47,000. This gas transmission facility was damaged when a utility worker using a grader was performing electric work without a locate request. Three additional damages each cost \$40,000 to repair. Two communication facilities were damaged when farmers were using backhoes while performing agricultural work on a located facility (marked correctly). The third was a communication facility damaged when a contractor was using a backhoe while performing pipeline work on a located facility (inaccurate markings).

The total cost of repair for all damages (with > \$0) was at least \$3,414,544. It is important to note that this cost does not include lost service revenue, contractor down time, other property damage, legal and collection fees, lawsuit settlements, or civil and regulatory fines. The table below identifies the multi-year trend of facility damage impact in Colorado. The data includes the total, average, largest, and % of records not reporting data for each of these data elements.

Cost of Repair		
	Frequency	Percent
Not Reported	789.	7.5%
Reported \$0	3,866.	36.6%
Reported >= \$1	5,918.	56.0%
Maximum	47,000. dollars	
Average	577. dollars	
Median (half above/below)	215. dollars	
StDev (67% above/below Ave)	2,116. dollars	
Total Cost of Repair	3,414,544. dollars	



Members reported that it cost \$3,414,544 to repair damaged underground facility in Colorado in 2004!



In 2001, a horizontal drill ruptured a buried gas line serving a resident in Golden, Colorado. A locate was requested for the property on the right, but not for the property on the left. One home was totally destroyed and the other sustained some damage. Although no human lives were lost, a cherished pet was killed.

IMPACT TREND	2001	2002	2003	2004
Total Hours Outage Duration	3,422	4,033	220,877	15,732
Average Hours Outage Duration	2.1	2.7	28.5	2.5
Longest Outage Duration	171	800	999	96
% Damages Not Reporting Outage	31.3%	10.7%	1.2%	2.1%
Total Customers Affected	524,579	1,049,782	553,883	521,566
Average Customers Affected	83.0	129.0	77.0	91.0
Largest Customers Affected	24,454	250,000	25,000	30,000
% Damages Not Reporting Customers Affected	37.9%	15.8%	5.6%	7.4%
Total Service Restoral Cost	\$ 1,492,453	\$ 3,967,771	\$ 4,211,018	\$ 3,414,544
Average Service Restoral Cost	\$ 1,875	\$ 492	\$ 596	\$ 577
Highest Service Restoral Cost	\$ 190,388	\$ 170,000	\$ 293,645	\$ 47,000
% Damages Not Reporting Restoral Cost	39.2%	16.8%	6.5%	7.5%

Damage Analysis – Facility Type

Communication facility (excluding CATV) accounted for nearly half (49.3%) of all reported facility damages in 2004. Communication facility damages decreased 18.8% from 2003 to 2004 compared to the 21.9% overall decrease.

Gas facility damages accounted for 24.8% of the 2004 total and decreased 41.5% from 2003 to 2004. This decrease was both significant and the largest of any facility type.

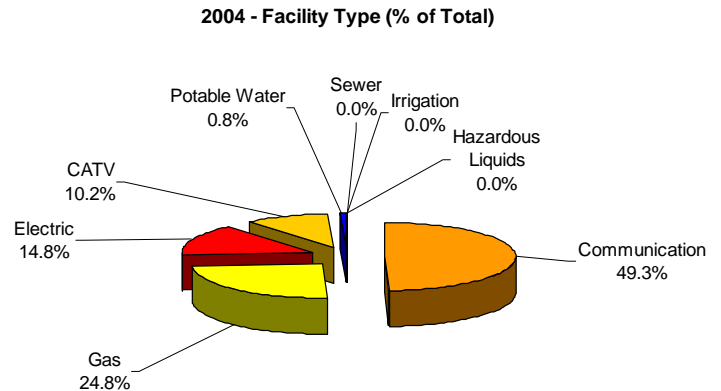
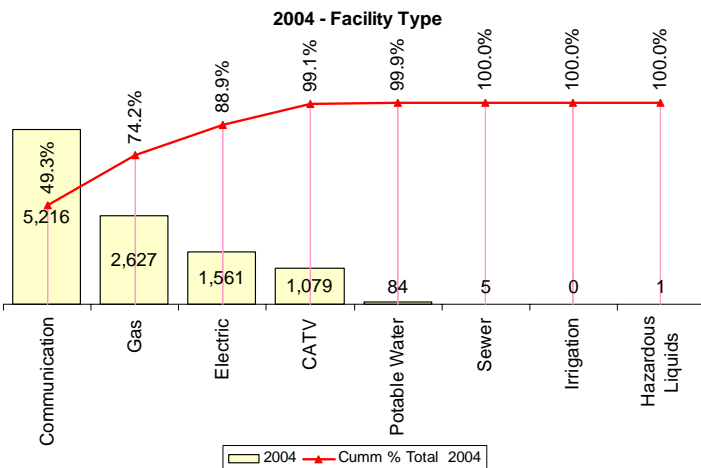
Electric facility damages accounted for 14.8% of the 2004 total and decreased 6.3% from 2003 to 2004. This decrease was the smallest of any facility type.

CATV facility damages accounted for 10.2% of the 2004 total and increased 27.4% from 2003 to 2004.

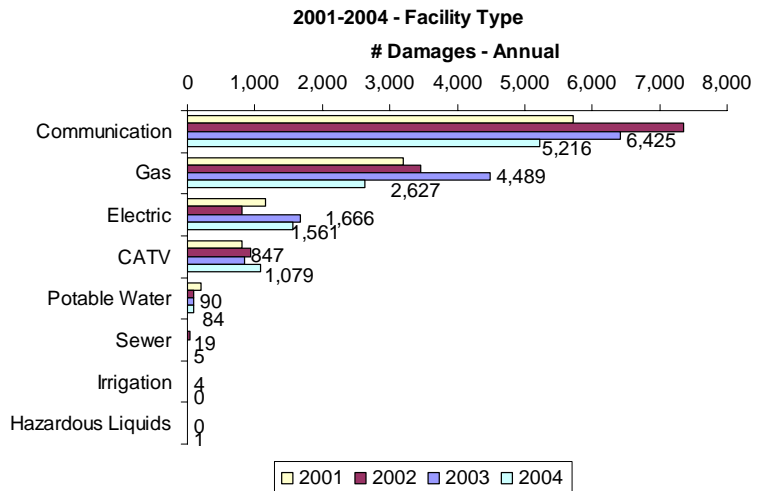
The top four facility types accounted for 99.1% of the 2004 damages while the remaining four facility types accounted for less than 1% of the damages.

Of note, there was one hazardous liquid facility damage in 2004 (none reported from 2001-2003). This pipeline transmission facility was hit by a contractor using a backhoe while performing sewer work without a locate request. The cost to repair this facility was estimated at \$10,000. There were no injuries or fatalities reported.

Although there are many factors that contribute to underground facility damage, there is some subjective evidence in the data of correlation



Communication facility continues to account for nearly 50% of all facility damages.

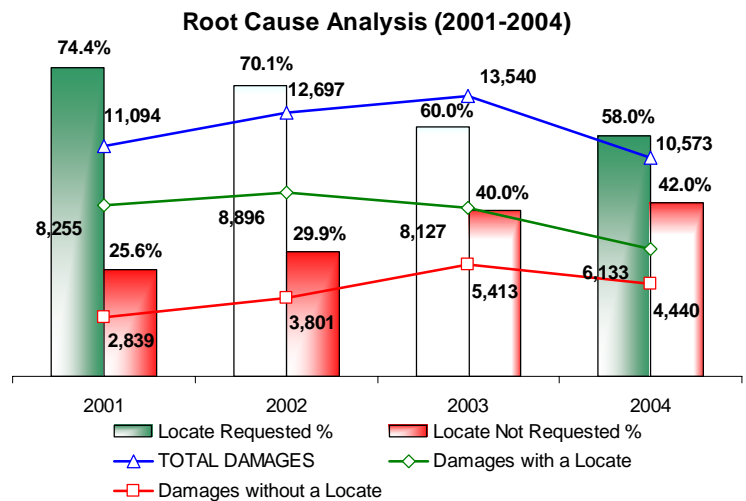


between the number of damages and the depth of the facility. It is worth noting that there is no guarantee that each facility type is buried at a standard or regulated depth in all areas of the state. Since depth is not reported, this precludes the ability to accurately measure this correlation. CATV facility does not appear to fit the correlation. Two specific issues may contribute to this: 1) only three CATV members reported damages and they do not significantly cover the state, and 2) CATV damages are easily repaired by excavators and may not be accurately reported to the CATV facility owner/operators.

Damage Analysis – Root Cause

At the highest level of root cause analysis, the question is simple: “Did the excavator request a locate prior to digging?” Although that question cannot be accurately answered for every excavation project that occurred in the state, a glimpse of the answer is obtained by looking at the data collected when a facility is damaged. Note: it is not known when an excavator digs without a locate — unless they damage the facility and the damage is discovered and reported. The interpretation of any single year’s damage data is sometimes counter-intuitive. Although it is preferable to not have any facility damaged, when the facility is damaged, is it preferable that the excavator request a locate, or is it preferable that the excavator did not request a locate? Depending upon one’s perspective, one option or the other is preferable — but which?

In 2004, excavators requested locates for 58% of the facilities that reported damage. Conversely, excavators did not request locates for 42% of the facilities that reported damage. Is this good or bad? Consider that requesting a locate prior to digging indicates an excavator is complying with the One-Call law, versus not complying when a locate request is not made. Certainly, it is preferable that an excavator comply with the legal requirement and request a locate. If this excavator then damages a facility, safe and sufficient excavating practices are in question, as well as possibly other member, locator and/or One-Call practices. Addressing root cause in this instance requires awareness and training on safe and sufficient locating, marking and excavating practices. Addressing the root cause of not requesting a locate and also damaging a facility requires the same locating, marking and excavating awareness and training as well as One-Call awareness and possible enforcement through civil court. As a positive, the data clearly shows that when facilities are damaged, more (58%) of the excavators are complying with the One-Call law. As a negative, it also shows that insufficient locating, marking,



More facility damages were caused by unsafe and insufficient excavation and location practices than by not requesting a locate.

and/or excavating practices contribute significantly to facility damage.

To gain additional perspective, the trend since 2001 can be observed. When facilities are damaged and reported, the trend of both the number of damages with a locate and the share of damages with a locate is decreasing; and the trend of damaging a facility without a locate is continuing to increase. These positive trends demonstrate the effectiveness of industry damage prevention efforts. Clearly, the trend is showing that, while facility damages have decreased, an increasing share of the damages are caused by not requesting a locate.

The impact of facility damages should continue to decrease if UNCC, the membership, and other industry stakeholders continue to:

- 1) Promote “Call Before You Dig” awareness,
- 2) Embrace the “Dig Safely” message, and
- 3) Implement and utilize CGA Best Practices.

The 58% of facility damages that had a locate request can be further analyzed to reveal specific root causes related to:

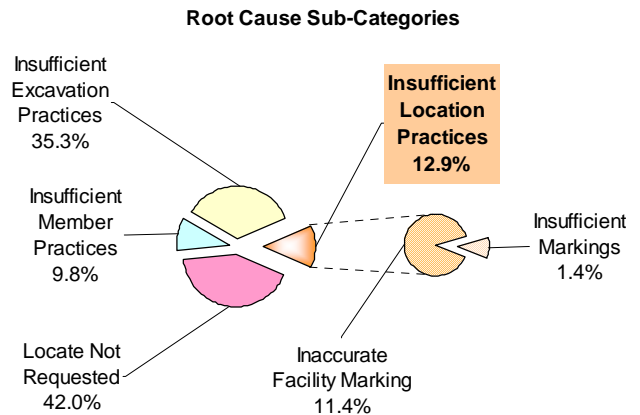
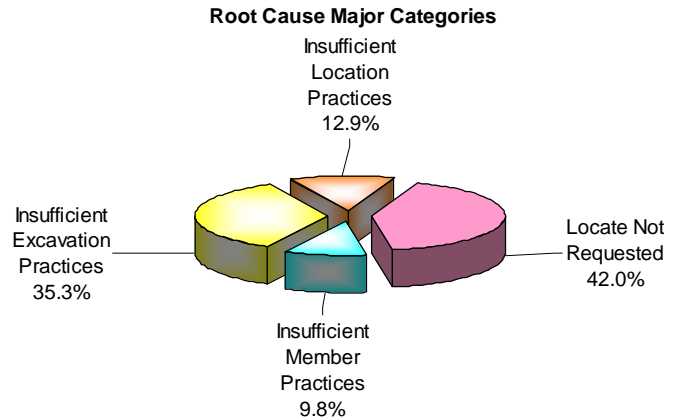
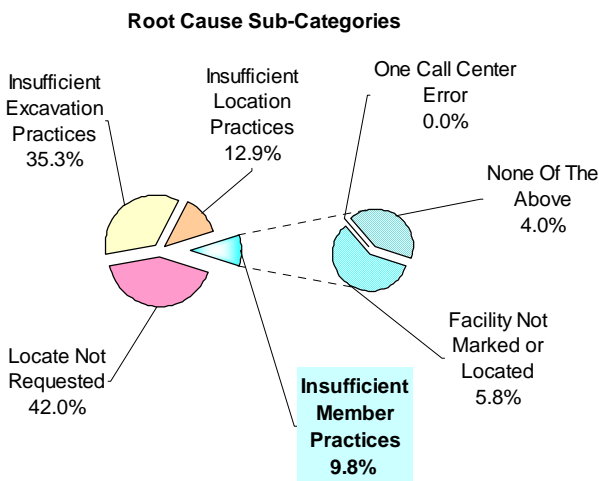
- 1) insufficient locating practices,
- 2) insufficient excavating practices, and
- 3) insufficient member reporting or One-Call center ticketing practices.

Each of these will be reviewed.

Insufficient locating practices accounted for 12.9% of facility damages. These damages can be further categorized as:

- 1) 11.4% of damages due to inaccurate facility markings — 91% of these performed by contract locators, and
- 2) 1.4% of damage due to markings insufficient to properly identify the facility location — 93% of these performed by contract locators.

Although insufficient locating practices contribute to facility damage, they are not a major cause of facility damage. It is not know if these insufficient locating practices are due to inaccurate locating technology, inadequate training, or quality of work. Unfortunately, excavators cannot know when the facility location marks are insufficient until after a facility has been damaged. Nevertheless, additional care and safe digging practices by excavators might reduce the number of facility damages caused by insufficient locating practices. In addition, improved training and oversight of locators might also reduce the damages caused by insufficient locating practices.



Insufficient member practices accounted for 9.8% of facility damages. These damages can be further categorized as:

- 1) 5.8% of the damages due to facility not marked or located by the facility owner — 84% of these utilizing contract locators,
- 2) 4.0% of the damages were categorized by the facility owner as none of the above, and
- 3) 0.03% of the damage due to One-Call center ticketing errors.

Although insufficient member practices contribute to facility damage, they are not a major cause of facility damage. It is not known if these insufficient member practices are due to a lack of enough

locating personnel (facility not located or marked) or investigating personnel (none of the above). Unfortunately, if a facility is not located or marked, it is not usually evident to excavators that a facility is buried within the defined dig area. Nevertheless, excavators are encouraged to use additional care to reduce the number of facility damages caused by insufficient member practices. These steps are recommended: 1) request a 2nd notice, 2) request a positive response from the facility owner, 3) perform a more thorough visual inspection of the dig area prior to excavation, and 4) use safe digging practices. In addition, facility owner/operators are encouraged to complete all locate requests within the three days specified under the law and do their best to accurately locate and properly mark the facility. Facility owners should also work to improve the quality of the damage investigation and collect and report all required data within the ninety days specified under the law.

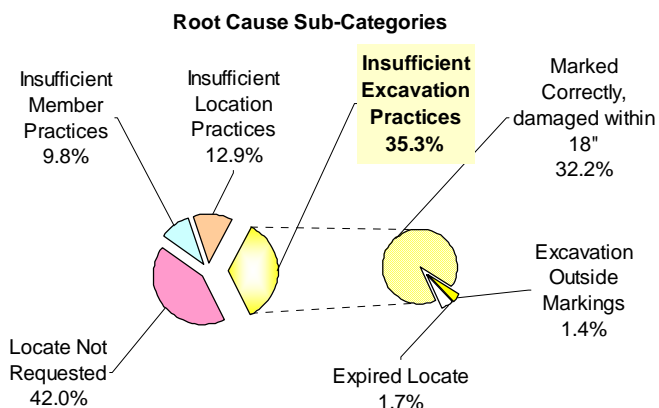
Facility owners should accurately locate and properly mark all valid locate requests within the three days specified under the law.

Insufficient excavating practices accounted for 35.3% of facility damages. These damages can be further categorized as:

- 1) 32.2% of the damages due to facility marked correctly-damaged within 18" of the marks,
- 2) 1.7% of the damages due to expired locates, and
- 3) 1.4% of the damages due to excavation outside locate markings.

Insufficient excavating practices are the second largest contributor of facility damages. It is not known if these insufficient excavating practices are due to tight project schedules, changing project specifications, or lack of operator care when digging in close proximity to underground facility. In some of these instances, the facility damage was probably avoidable. Excavators should use additional care to request a new locate prior to the locate expiration date or when it is necessary to dig outside of the previously located dig area.

Since the largest share for this category was facility marked correctly, excavators should use reasonable care when digging within the defined tolerance zone (18 inches from the exterior sides of the facility). Excavators are strongly encouraged to use safe digging techniques (hand tools, vacuum, probe), to visually verify the facility and to use safe digging practices within the tolerance zone.



Excavators MUST use reasonable care when digging within the tolerance zone – visually verify, hand dig, and dig safely!

Damage Analysis by Facility Type

The nature of each facility type lends itself to more thorough analysis separate from the combined analysis of all facility types together, as has been performed in the past. Since there are many factors that characterize an underground facility, it is likely that the characteristics of the facility damage are different for the various facility types.

A summary overview for the top five of eight facility types is presented in the table for quick comparison. Sewer, hazardous liquid and irrigation facility types had only five, one and zero damages

respectively and are not included in the table.

When performing this type of damage analysis, it is useful to assess how well the data represents the membership, the facility type, and the geographic disbursement around the state, as measured by the percentage of counties and cities that are represented in the dataset. Although there are no specific thresholds offered to validate that the data accurately represents the membership, the facility type, or the state, the data is presented for the readers' own review and assessment.

	Facility= All		Communication		Gas		Electric		CATV		Potable Water	
	#	%	#	%	#	%	#	%	#	%	#	%
Damages	10,573.		5,216.	49.3%	2,627.	24.8%	1,561.	14.8%	1,079.	10.2%	84.	0.8%
Members Reporting (48)**	57.		17.	29.8%	8.	14.0%	14.	24.6%	6.	10.5%	8.	14.0%
Tier I Member-Facility (40)	48.		14.	29.2%	7.	14.6%	11.	22.9%	6.	12.5%	7.	14.6%
Tier II Member-Facility (8)	9.		3.	33.3%	1.	11.1%	3.	33.3%	0.	0.0%	1.	11.1%
**Nine members operated two or more facility types.												
Counties Represented (64)	55.		47.	73.4%	41.	64.1%	31.	48.4%	19.	29.7%	9.	14.4%
Cities Represented	287.		222.		145.		107.		67.		10.	
Distribution Facility vs.	10,506.		5,195.	99.6%	2,608.	99.3%	1,555.	99.6%	1,067.	98.9%	79.	94.0%
Transmission Facility	67.		21.	0.4%	19.	0.7%	6.	0.4%	12.	1.1%	5.	6.0%

The primary four damage characteristics collected (highlighted in bold) are then presented within the context of each facility type in seven ways:

- 1) **Root Cause**
 - 2) **Excavator Type**
 - 3) Excavator and Root Cause
 - 4) **Excavation Type (equipment)**
 - 5) Excavation and Excavator Type
 - 6) **Worked Performed Type**
 - 7) Worked Performed and Excavation Type
- 1 - Root Cause is assessed to answer the question: "Why was the facility damaged?"
 - 2 - Excavator Type is assessed to answer the question: "Who damaged the facility?"
 - 3- Excavator and Root Cause are assessed to answer the question: "Why did the excavator damage the facility?"

- 4 - Excavation Type is assessed to answer the question: "What equipment type damaged the facility?"
- 5 - Excavation and Excavator Type are assessed to answer the question: "What equipment type was used by the excavator?"
- 6- Worked Performed Type is assessed to answer the question: "What work was performed when the facility was damaged?"
- 7 - Worked Performed and Root Cause are assessed to answer the question: "Why did each work type damage the facility?"

This level of analysis should provide some useful insight to help direct public awareness, stakeholder training, and appropriate legislative efforts to help improve damage prevention efforts in future years.

Facility Type and Root Cause

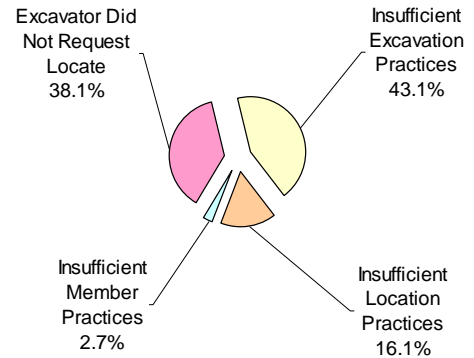
- Why was the facility damaged?

COMMUNICATION FACILITY

Communication facility accounted for 49.3% (5,216) of facility damages with 17 members reporting.

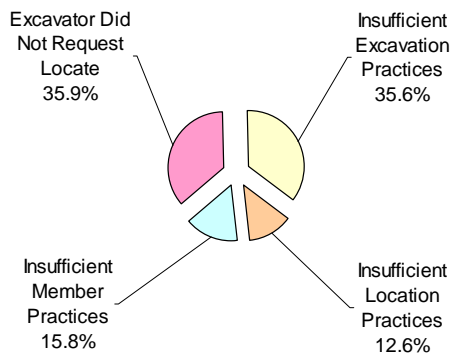
Excavators did not request a locate for 38.1% and did request a locate for 61.9% of the damages. When excavators did request a locate, insufficient excavating practices accounted for the largest share of facility damages (43.1%). Communication facility had very low insufficient member practices (2.7%) because they did a good job responding to locate requests and marking the facility. They also did the most complete job of investigating and reporting root cause — as evidenced by the lowest use of the none of the above root cause.

Communication Facility - 2004 Root Cause Sub Categories



Major Root Cause	All Facilities	Comm Facility
No Locate Requested	42.0%	38.1%
Marked Correctly - damaged 18"	32.2%	41.0%
Inaccurate Facility Marking	11.4%	15.9%
Facility Not Located / Marked	5.8%	1.8%
All Others	8.6%	3.2%

Gas Facility - 2004 Root Cause Sub Categories



Major Root Cause	All Facilities	Gas Facility
No Locate Requested	42.0%	35.9%
Marked Correctly - damaged 18"	32.2%	29.7%
Inaccurate Facility Marking	11.4%	8.8%
Facility Not Located / Marked	5.8%	7.6%
All Others	8.6%	18.0%

GAS FACILITY

Gas facility accounted for 24.8% (2,627) of facility damages with eight members reporting.

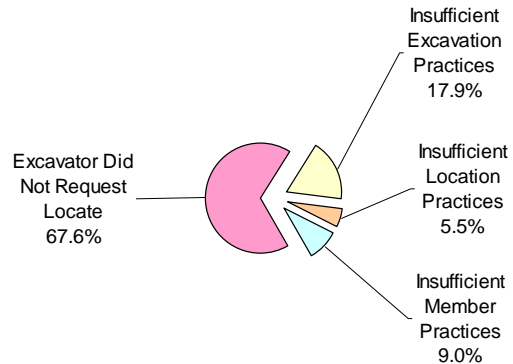
Excavators did not request a locate for 35.9% and did request a locate for 64.1% of the damages. When excavators did request a locate, insufficient excavating practices accounted for the largest share of facility damages (35.6%). Gas facility had a high percentage (and the largest number) of insufficient member practices (15.8%), ½ due to not responding to locate and mark the facility and the other ½ due to selecting the none of the above option. Only CATV had a larger number of damages with facility not located or marked. This underscores the need for the gas facility owner/operators to respond, locate, and mark facility within the time allowed under the law and to improve their damage investigation and data collection, especially root cause.

ELECTRIC FACILITY

Electric facility accounted for 14.8% (1,561) of facility damages with 14 members reporting.

Excavators did not request a locate for 67.6% and did request a locate for 33.4% of damages. When excavators did request a locate, insufficient excavating practices accounted for the greatest share of facility damage (17.9%). It is not known why electric facility had the highest contribution of excavators not requesting a locate (67.6%) and the lowest contribution of insufficient excavating practices (17.9%). Electric facility had the lowest number of damages due to facility not located or marked.

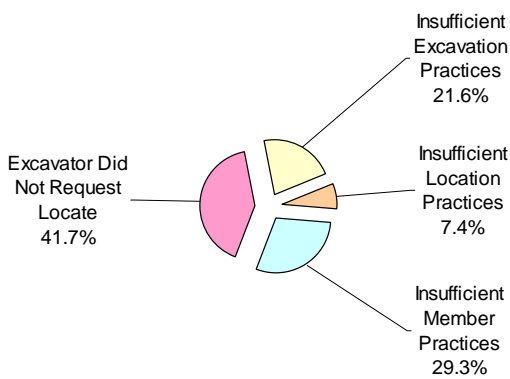
Electric Facility - 2004 Root Cause Sub Categories



Excavators did not request a locate for nearly 68% of electric facility damages.

Major Root Cause	All Facilities	Electric Facility
No Locate Requested	42.0%	67.6%
Marked Correctly - damaged 18"	32.2%	14.5%
Inaccurate Facility Marking	11.4%	3.7%
Facility Not Located / Marked	5.8%	5.0%
All Others	8.6%	9.2%

CATV Facility - 2004 Root Cause Sub Categories



CATV FACILITY

CATV facility accounted for 10.2% (1,079) of facility damages with six members reporting.

Excavators did not request a locate for 41.7% and did request a locate for 58.3% of damages. When excavators did request a locate, insufficient member practices accounted for the greatest share of facility damages (29.3%). CATV facility had the highest percentage and largest number (228) of insufficient member practices, ¾ due to not responding to locate and mark the facility and the other ¼ due to selecting the none of the above option. This underscores the need for the CATV owner/operators to respond, locate and mark facility within the time allowed under the law.

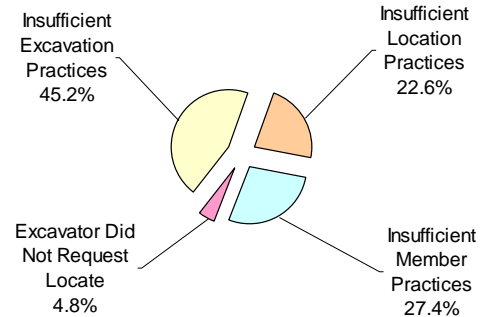
Major Root Cause	All Facilities	CATV Facility
No Locate Requested	42.0%	41.7%
Marked Correctly - damaged 18"	32.2%	21.0%
Inaccurate Facility Marking	11.4%	6.2%
Facility Not Located / Marked	5.8%	21.1%
All Others	8.6%	10.0%

POTABLE WATER FACILITY

Potable Water facility accounted for 0.8% (84) of facility damages with eight members reporting.

Excavators did not request a locate for 4.8% and did request a locate for 95.2% of damages. When excavators did request a locate, insufficient excavation practices accounted for the greatest share of facility damages (45.2%). It is not known why potable water facility had the lowest contribution of excavators not requesting a locate (4.8%). Potable water had the highest contribution of inaccurate facility marking (22.6%), due to the difficult nature of locating water facility. Also, potable water had a high contribution of insufficient member practices, primarily due to facility not marked or located.

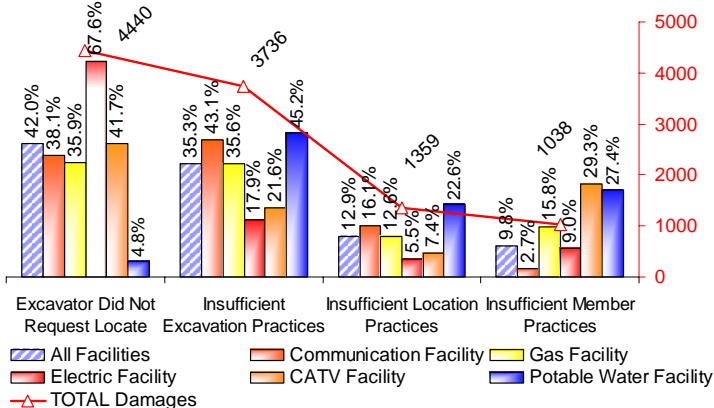
Potable Water Facility - 2004 Root Cause Sub Categories



Insufficient excavation practices caused the greatest share of facility damages when excavators requested a locate.

Major Root Cause	All Potable Water Facilities	Potable Water Facility
No Locate Requested	42.0%	4.8%
Marked Correctly - damaged 18"	32.2%	41.7%
Inaccurate Facility Marking	11.4%	22.6%
Facility Not Located / Marked	5.8%	10.7%
All Others	8.6%	20.2%

Facility Type - 2004 Root Cause Sub Categories



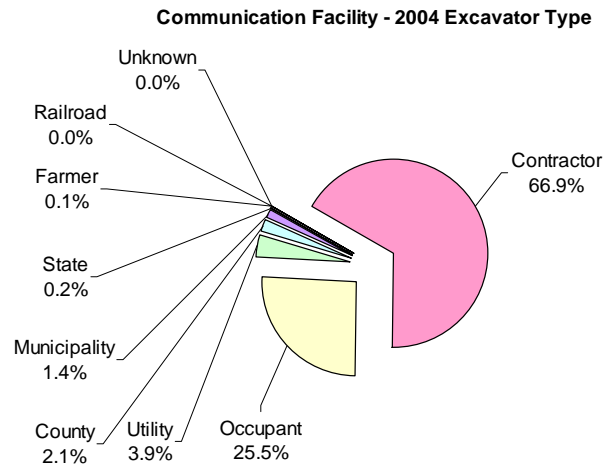
FACILITY TYPE AND ROOT CAUSE SUMMARY

The bar chart directly compares the four root cause sub categories across each facility type. The first bar (blue hatch) shows the all-facilities value for reference. It is clear that the majority of damages occur when excavators do not request a locate (42.0%), but that insufficient excavating practices also contribute a large share of damages (35.3%). As noted, electric facility had a significantly higher contribution of no locate requested, while potable water had a very low contribution of no locate requested. Potable water and CATV facility also had a higher contribution of insufficient member practices, primarily due to the facility owner not locating or marking the facility.

Facility Type and Excavator Type - Who damaged the facility?

COMMUNICATION FACILITY

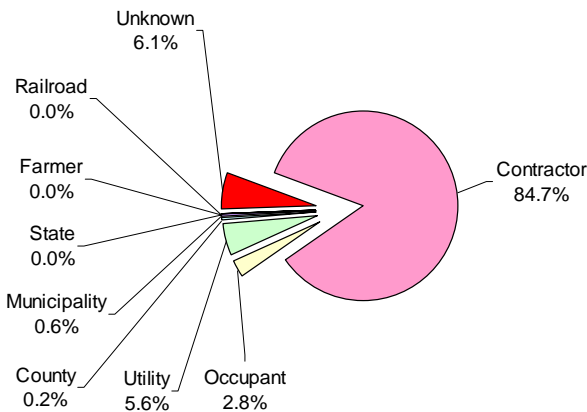
Professional contractors accounted for 66.9% of communication facility damages. Residential and commercial occupants accounted for another 25.5%, most likely due to landscaping activities combined with the shallow depth of facility. Facility owner/operators (utility and government organizations) accounted for 7.5% of facility damages — meaning a facility owner damaged their own facility or another facility owner’s facility while they were excavating. This stresses the need for improved damage prevention efforts, even amongst facility owner/operators. Communication facility owner/operators did an excellent job reporting as evidenced by the very low use of the unknown excavator option.



GAS FACILITY

Professional contractors accounted for 84.7% of gas facility damages. Residential and commercial occupants accounted for a very low 2.8%. Facility owner/operators accounted for 6.4%. Gas facility owner/operators reported the unknown excavator option for 6.1% of gas facility damages.

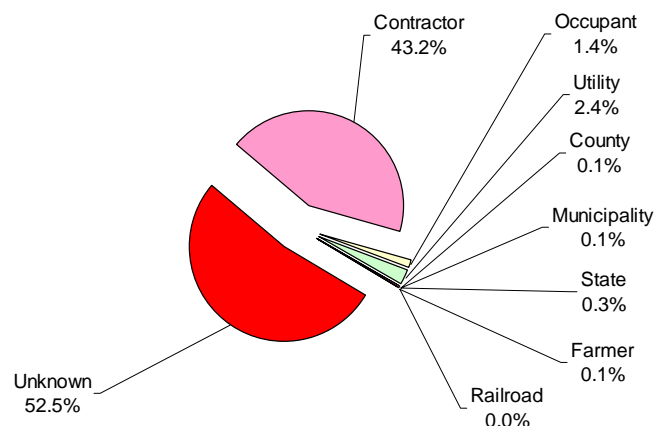
Gas Facility - 2004 Excavator Type



ELECTRIC FACILITY

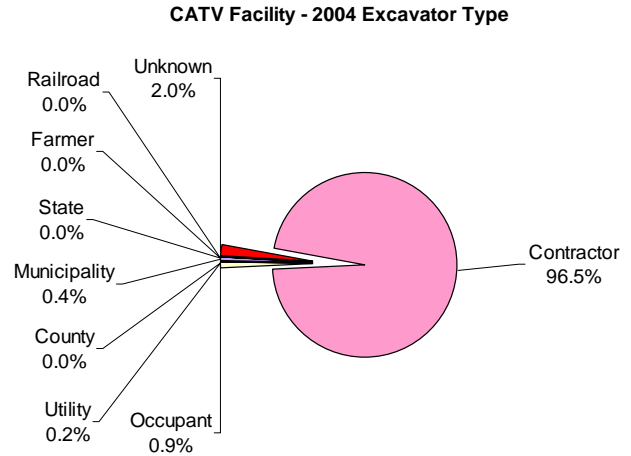
Professional contractors accounted for 43.2% of electric facility damages, while facility owner/operators accounted for 2.9%. Electric facility owner/operators reported the unknown excavator option for 52.5% damages, making it difficult to ascertain the true nature of facility damage. There is a need for improved investigation and reporting by some electric facility owner/operators.

Electric Facility - 2004 Excavator Type



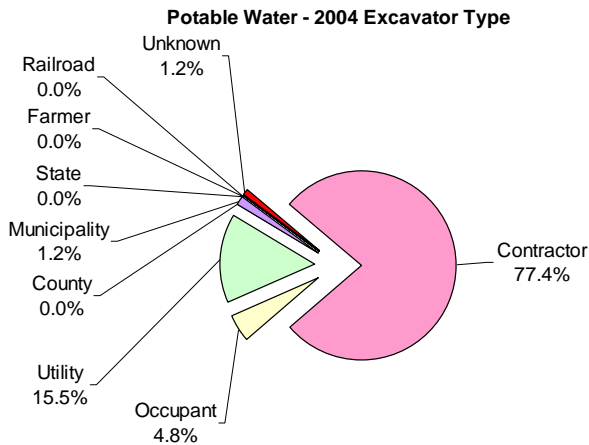
CATV FACILITY

Professional contractors accounted for 96.5% of CATV facility damages. Residential and commercial occupants accounted for a very low 0.9%. Considering the shallow depth of most CATV facility and the landscaping activity of occupants, this small contribution to CATV facility damage does not make sense. CATV facility owner/operators reported the unknown excavator option for 2.0% of damages.



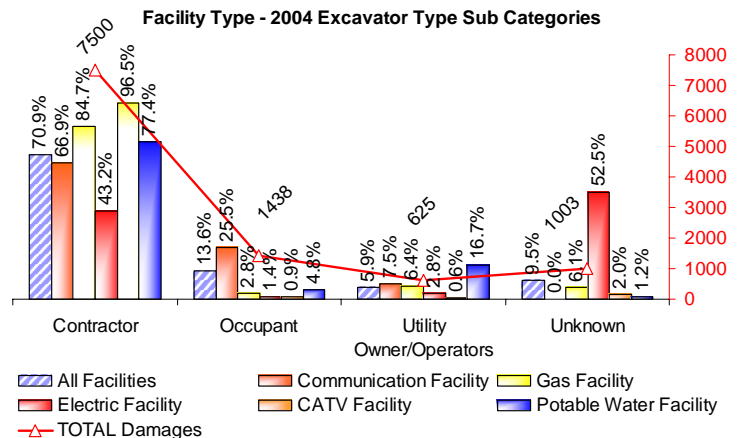
POTABLE WATER FACILITY

Professional contractors accounted for 77.4% of potable water facility damages. Residential and commercial occupants accounted for a low 4.8%. Facility owner/operators as a group accounted for 16.7% of the damages. Specifically, utility owners performing their own excavation work contributed 15.5%. This underscores the need for better locating, marking and excavating practices for potable water facility. Potable water facility owner/operators reported the unknown excavator option for only 1.2% of damages.



FACILITY TYPE AND EXCAVATOR SUMMARY

The bar chart directly compares the excavator type across each facility type. The first bar (blue hatch) shows the all-facilities value for reference. It is clear that contractors damaged the majority of facilities (70.9%), while occupants damaged 13.6%. As noted, the unknown excavator type was reported for 52.5% of electric facility damages.



Excavator and Root Cause

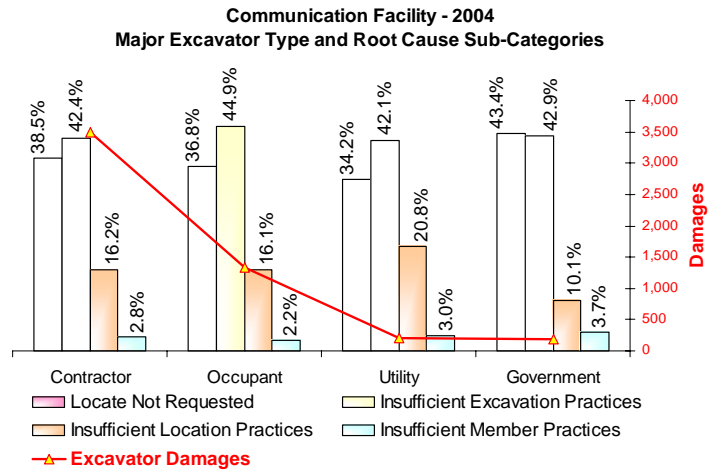
- Why did the excavator damage the facility?

COMMUNICATION FACILITY

To gain additional perspective on communication facility damage, it is useful to determine the root cause for each excavator group.

As previously shown, contractors accounted for 66.9% of communication facility damages, while occupants accounted for 25.5%.

Insufficient excavating practices contributed the largest share of communication facility damages (42%-45%) for all excavator types. A locate was not requested for 34%-43% of damages for all excavator types. There are two observations. First, the root cause is very consistent among the excavator types. And second, all excavators had a high percentage of their facility damages caused by both not having a locate request and insufficient excavating practices.

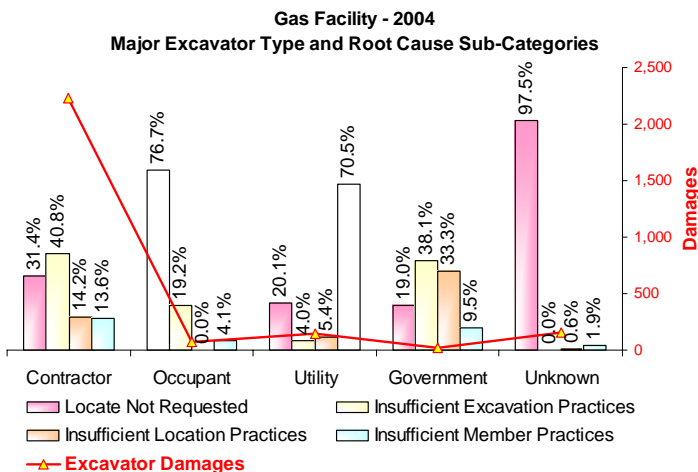


For all excavator types, more communication facility damages are caused by insufficient excavation practices than by not requesting a locate.

GAS FACILITY

As previously shown, contractors accounted for 84.7% of gas facility damages, while utility owners accounted for 5.6%.

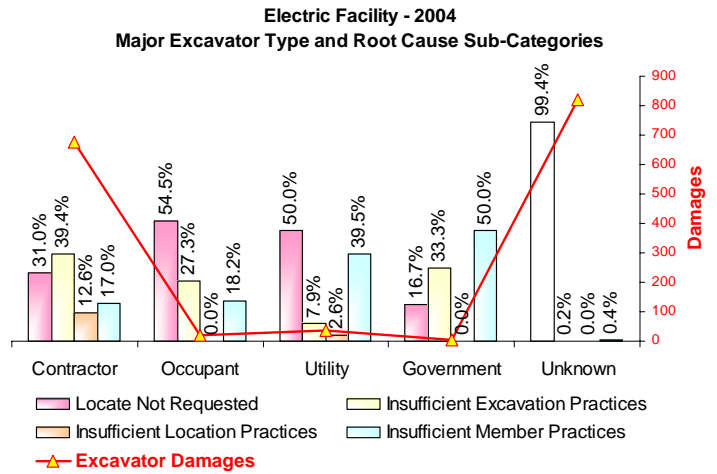
There is no similar pattern to the root cause versus excavator relationship for gas facility. Insufficient excavating practices contributed the largest share of gas facility damages for contractors (40.8%), followed by locate not requested with 31.4%. There are two observations. First, 76.7% of occupants that damaged a gas facility while performing excavation work did not request a locate. Second, insufficient member practices contributed the largest share of damages for utility owners (about ¼ due to facility not marked and ¾ reported as none of the above).



ELECTRIC FACILITY

As previously shown, contractors accounted for 43.2% of electric facility damages, while utility owners accounted for 2.9%.

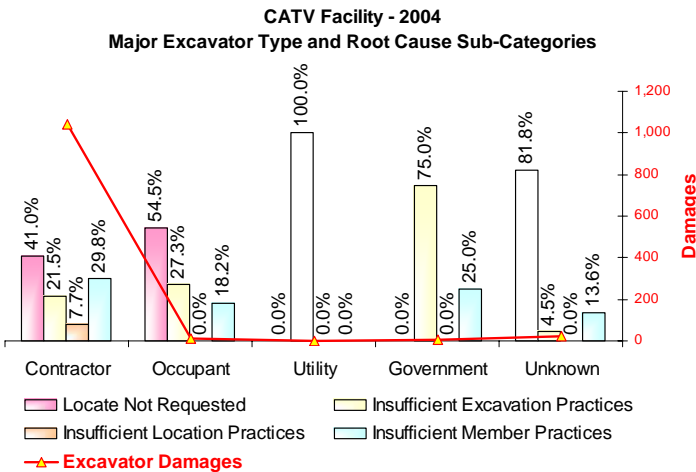
Insufficient excavating practices contributed the largest share of electric facility damages for contractors (39.4%), followed by locate not requested with 31.0%. There are three observations. First, over half (52.5%) of electric facility damages were reported with the excavator type unknown. Of these damages, a locate was not requested for 99.4%. Second, 54.5% of occupants that damaged electric facilities while performing excavation work did not request a locate. Third, the largest root cause reported for utility owners was locate not requested (50.0%), followed closely by insufficient member practices (about 1/3 facility not marked and 2/3 reported as none of the above).



CATV FACILITY

As previously shown, contractors accounted for 96.5% of CATV facility damages, while occupants accounted for 0.9%.

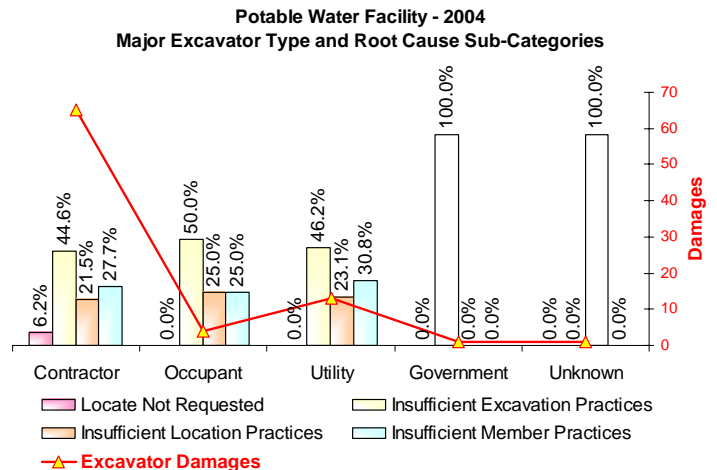
Locate not requested contributed the largest share of CATV damages for contractors (41.0%), followed by insufficient member practices with 29.8%. CATV facility owner/operators not marking or locating their facilities contributed 3/4 of these insufficient member practices. Considering the shallow depth of CATV facility and the landscaping activities of occupants, it is surprising occupants did not contribute more CATV facility damages.



POTABLE WATER FACILITY

As previously shown, contractors accounted for 77.4% of potable water facility damages, while utility owners accounted for 15.5%.

Insufficient excavating practices contributed the largest share of damages for contractors (44.6%), followed by insufficient member practices with 27.7%. Nearly 1/2 of the facilities that utility owners damaged were caused by insufficient excavating practices.

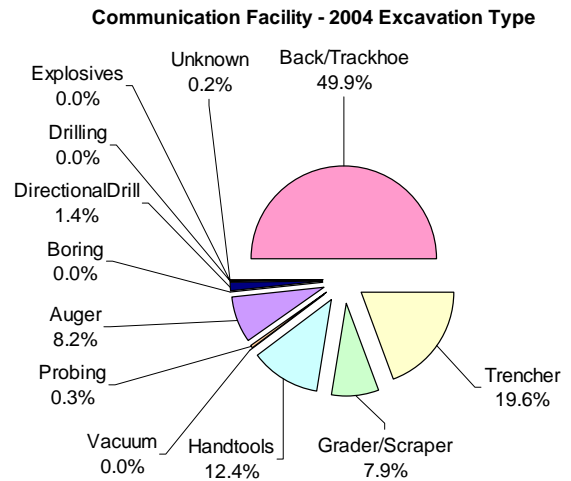


Facility Type and Excavation Type

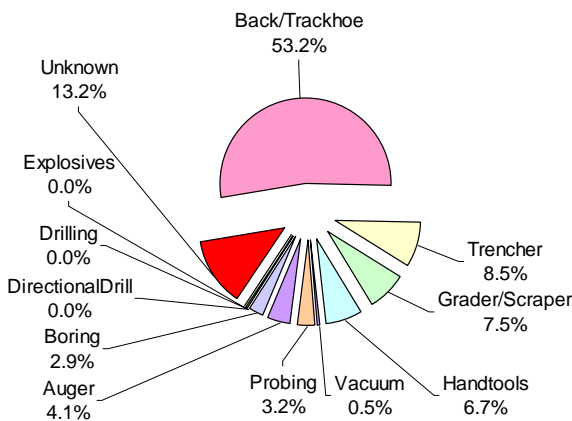
- What equipment damaged the facility?

COMMUNICATION FACILITY

Backhoes/Trackhoes accounted for 49.9% of communication facility damages. Trenchers and grader/scrapers accounted for another 19.6% and 7.9%, respectively. Hand tools accounted for 12.4% of the damages; underscoring the need to use care even when digging with non-mechanized tools in the tolerance zone. Augers and drills accounted for 8.2% and 1.4%, respectively. Mechanized equipment contributed nearly 88% of the damages. An important question to ask is —: Do equipment operators damage facilities because they do not utilize sufficient excavation techniques within the tolerance zone, or because facility owner/operators do not utilize sufficient marking and location practices?



Gas Facility - 2004 Excavation Type



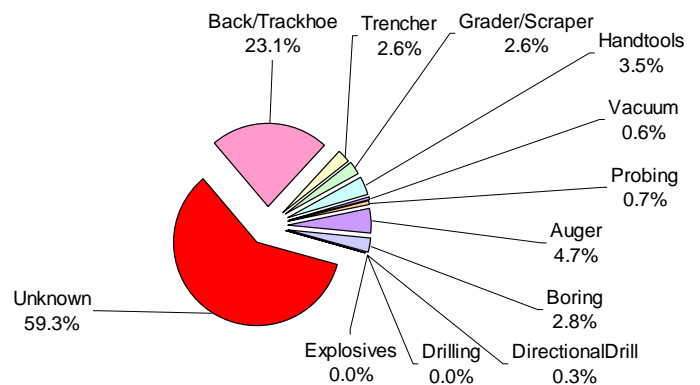
GAS FACILITY

Backhoes/Trackhoes accounted for 53.2% of gas facility damages. Trenchers, grader/scrapers, and hand tools accounted for another 8.5%, 7.5%, and 6.7%, respectively. Gas facility owner/operators reported the unknown excavation option for 13.2% of gas facility damages.

ELECTRIC FACILITY

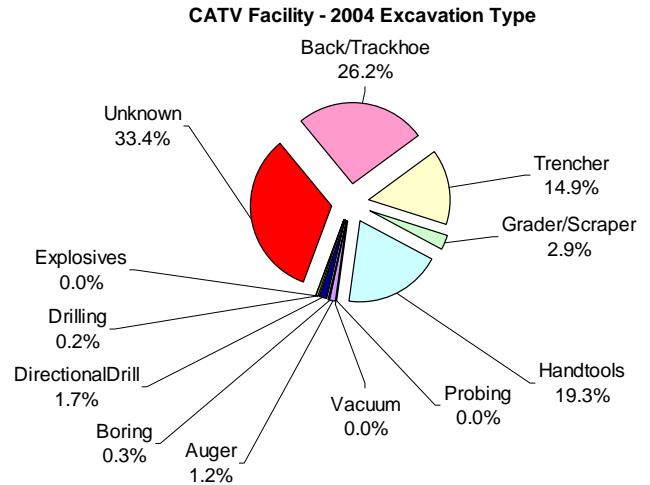
Backhoes/Trackhoes accounted for only 23.1% of electric facility damages. Electric facility owner/operators reported the unknown excavation option for 59.3% of electric facility damages, making it difficult to ascertain the true nature of the facility damage.

Electric Facility - 2004 Excavation Type

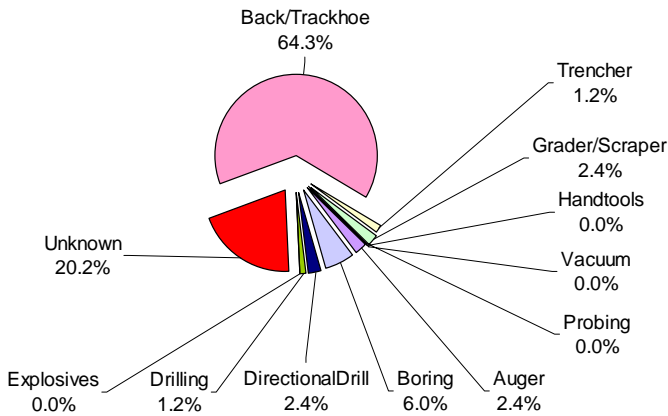


CATV FACILITY

Backhoes/Trackhoes accounted for 26.2% of CATV facility damages. Trenchers and hand tools accounted for another 14.9% and 19.3%, respectively. CATV facility owner/operators reported the unknown excavation option for 33.4% of facility damages.



Potable Water Facility - 2004 Excavation Type



POTABLE WATER FACILITY

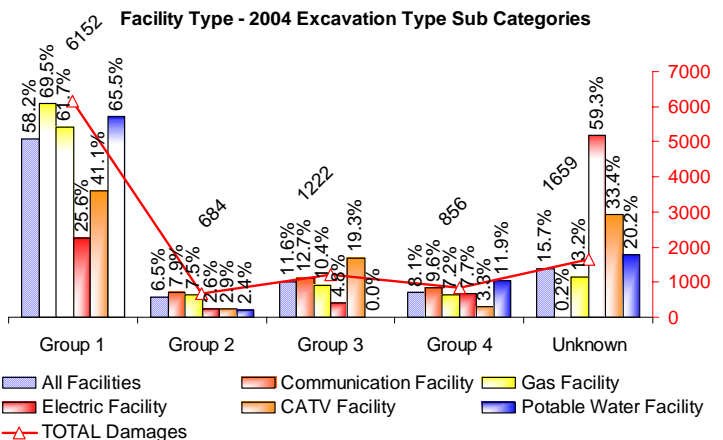
Backhoe/Trackhoes accounted for 64.3% of potable water facility damages. Augers and boring and drilling equipment accounted for another 11.8% of damages. Potable water facility owner/operators reported the unknown excavation option for 20.2% of damages.

FACILITY TYPE AND EXCAVATION SUMMARY

The bar chart directly compares the excavation type across each facility type. The first bar (blue hatch) shows the all-facilities value for reference. The excavation types have been grouped for easier comparison. Group 1 includes backhoe/trackhoe and trencher machines. Group 2 includes grader/scrapper machines. Group 3 includes hand tools, vacuum, and probing equipment. Group 4 includes augers, bores, and drilling machines, and explosives. It is clear that Group 1 machines damaged the majority of all facility types reported (58.2%). As noted, 59.3% of electric facility damages were reported as unknown excavation type. Group 3 equipment (hand tools) damaged 11.6% of the facilities. This underscores the need to use extreme care when digging within the tolerance zone, even when using hand tools.

GROUPED Excavation Equipment

GROUP	TYPE OF Excavation Equipment
Group 1	Backhoe/Trackhoe & Trencher Machines
Group 2	Grader/Scraper Machines
Group 3	Hand tool, Vacuum, & Probe Equipment
Group 4	Auger, Bore, & Drilling Machines, Explosives
Unknown	Unknown/Other



Excavation and Excavator

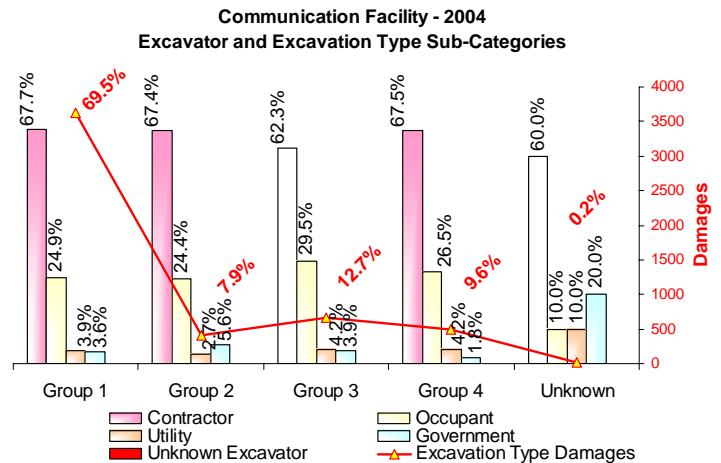
- What equipment was used by each excavator type?

COMMUNICATION FACILITY

The excavation equipment groupings defined in the prior summary allow for a simpler and clearer analysis of the excavation equipment and the excavator type.

Group 1 machines accounted for 69.5% of communication facility damages, while Group 3 equipment accounted for 12.7%. Group 4 and Group 2 machines accounted for 9.6% and 7.9%, respectively.

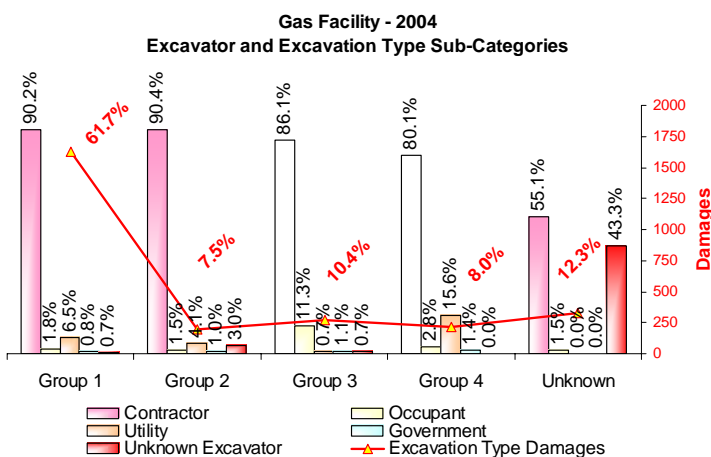
Contractors damaged the largest share of facility using all types of machines (62%-68%). Occupants damaged 24%-30% of facility using all type of machines. Utility owners and government organizations each damaged 2%-4% of facility using all types of machines. There are two interesting observations. First, the share of facilities damaged by each type of excavation equipment was consistent among the excavator types. Second, contractors damaged a good portion of the facilities using hand tools.



GAS FACILITY

Group 1 machines accounted for 61.7% of gas facility damages, while Group 3 equipment accounted for 10.4%. Group 4 and Group 2 machines accounted for 8.0% and 7.5%, respectively.

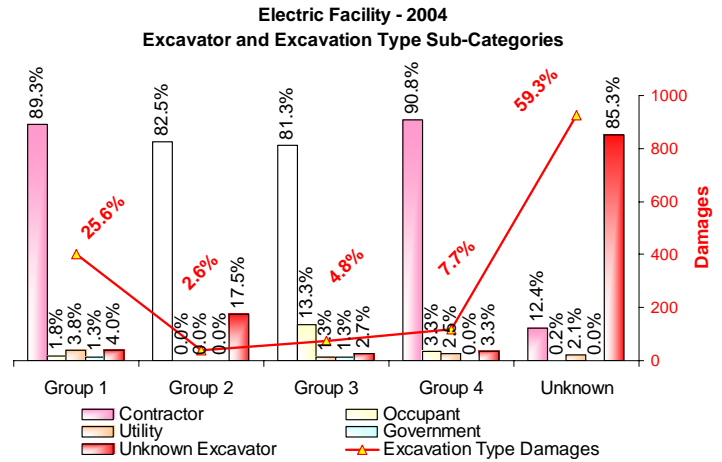
Contractors damaged the largest share of facility using all types of machines (80%-90%). There are two observations. First, 11.3% of the facilities damaged with Group 3 equipment (hand tools) were damaged by occupants. Second, 15.6% of the facilities damaged with Group 4 equipment (augers, bores, and drills) were damaged by utility owners.



ELECTRIC FACILITY

Group 1 machines accounted for 25.6% of electric facility damages, while Group 5 machines accounted for 7.7%. Group 3 equipment and Group 2 machines accounted for 4.8.0% and 2.6%, respectively. Electric owner/operators reported unknown excavation equipment for 59.3% of damages.

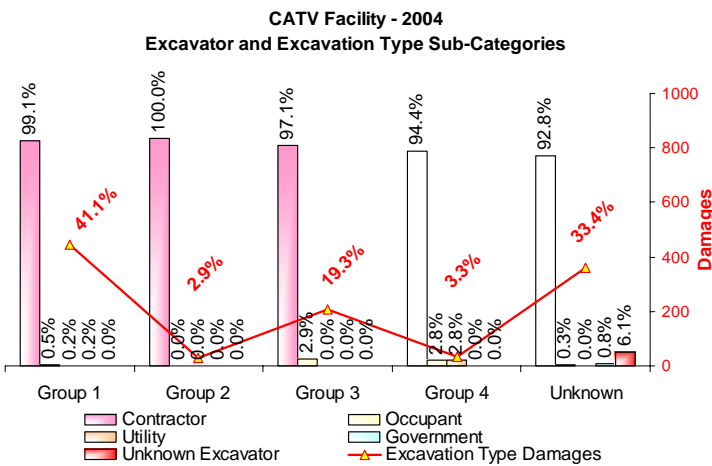
Contractors damaged the largest share of facility using all types of machines (8%1-91%). There are two observations. First, 13.3% of the facilities damaged with Group 3 equipment (hand tools) were damaged by occupants. Second, electric facility owner/operators reported the unknown excavation option for 59.3% of the damages; 85.3% of these because the excavator type was unknown. Third, 17.5% of the facility damages with Group 2 machines (graders) were damaged by an unknown excavator.



CATV FACILITY

Group 1 machines accounted for 41.1% of CATV facility damages, while Group 3 equipment accounted for 18.3%. Group 4 and Group 2 machines accounted for 3.3% and 2.9%, respectively.

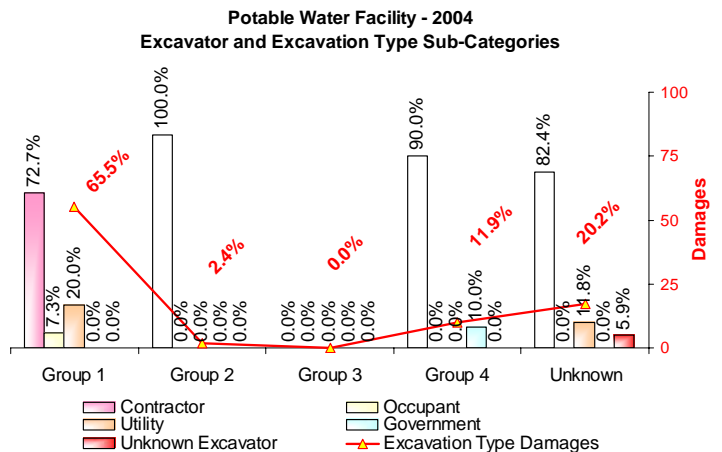
Contractors damaged nearly all facility using all types of machines (93%-100%). CATV owner/operators reported the unknown excavation equipment option for 33.4% of the damages; 92.8% of these because the excavator type was unknown.



POTABLE WATER FACILITY

Group 1 machines accounted for 65.5% of potable water facility damages, while Group 4 machines accounted for 11.8%. Group 2 machines and Group 3 equipment accounted for 2.4% and 0%, respectively.

Contractors damaged nearly all facilities using all types of machines except Group 3 (hand tools) (73%-100%). 20% of the facilities damaged with Group 1 machines were damaged by utility owners.



Facility Type and Worked Performed Type

- What work was performed when the facility was damaged?

OVERVIEW

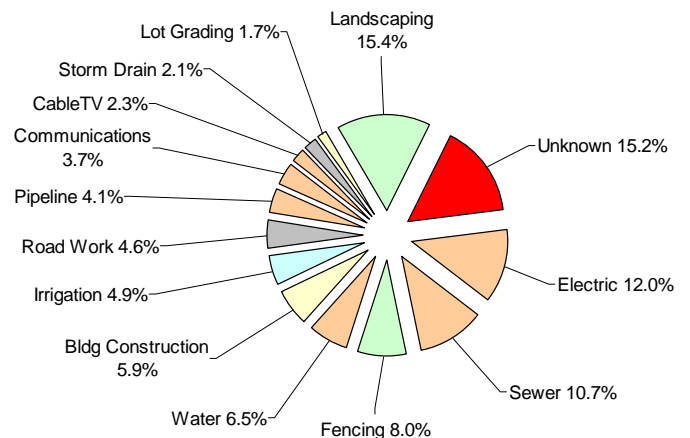
The pie chart represents the top 14 of 29 options reported for worked performed (over 1% contribution to facility damages). Landscaping activity contributed the most facility damages (15.4%), followed by electric, sewer, fencing, water and building construction activity. Owner/operators reported the unknown work performed option for 15.2% of damages, underscoring the need to improve damage investigation and reporting. With 29 work performed type options, it is difficult to get an accurate feel for the work activity contributing to facility damage.

Interestingly, the work performed analysis changes significantly when the work performed options are grouped into six broader categories:

1. Landscape and fencing work
2. Utility work
3. Construction work
4. Agricultural work
5. Street and road work
6. Unknown work performed

A deeper analysis of the individual facility type and the work performed groupings will provide a different perspective on what work was performed when the facility was damaged.

Worked Performed - 2004 All Facilities

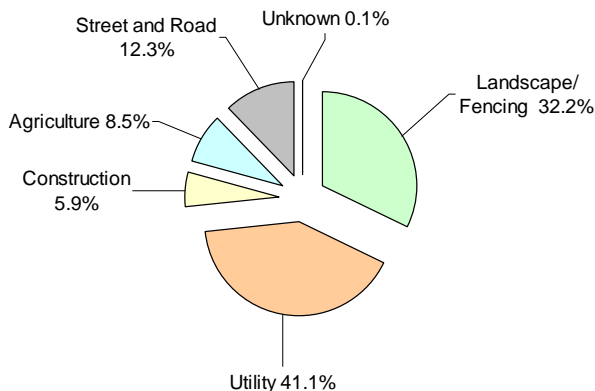


GROUPED Work Performed

GROUP	TYPE OF WORK PERFORMED
Utility Work	Sewer, Electric, Water, Communication, CATV, Pipeline, Trans-Pipeline, Steam
Green Industry	Landscaping, Fencing
Street & Road Work	Road, Storm Drain, Curb, Pole, Traffic Signal, Blading, Streetlight, Traffic Sign, RTD, Railroad
Construction Industry	Bldg Construction, Lot Grading, Site Development, Driveway, Bldg Demolition, Engineering
Agricultural Work	Irrigation, Agriculture
Unknown	Unknown/Other

Although landscaping work contributed the most facility damages (15.4%), the combined work by and for the utility industry accounted for an even larger share (41.1%) of facility damages!

Communication Facility - 2004 Work Performed

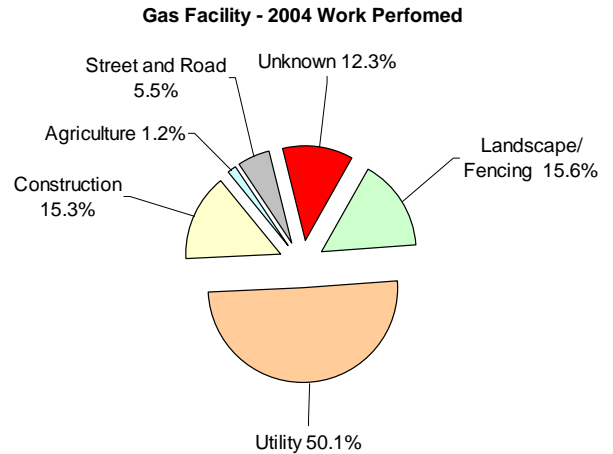


COMMUNICATION FACILITY

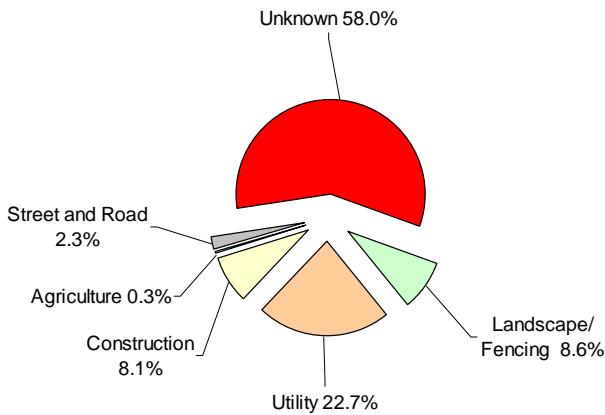
The new groupings show that the combined work activity of the utility industry contributed the majority (41.1%) of communication facility damages in 2004. Half of these damages occurred during electric and water facility work. Landscaping and fencing work accounted for 32.2%, followed by street and road work with 12.3%.

GAS FACILITY

The combined work activity of the utility industry contributed the majority (50.1%) of gas facility damages. Half of these damages occurred during sewer and electric facility work. Landscaping and fencing work accounted for 15.6%, followed by construction work with 15.3%. Facility owner/operators reported the unknown work performed option for 12.3% of gas facility damages.



Electric Facility - 2004 Work Performed



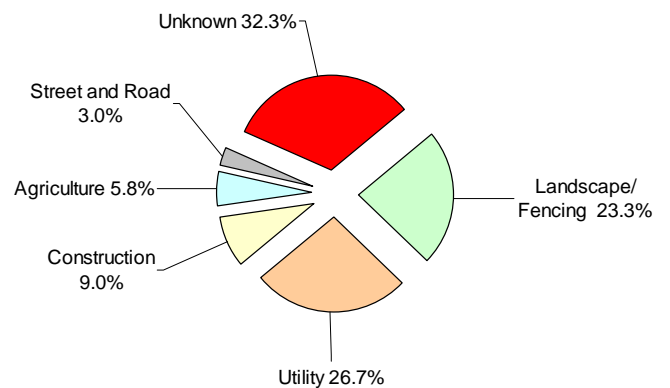
ELECTRIC FACILITY

The combined work activity of the utility industry contributed the majority (22.7%) of electric facility damages. Most of these damages occurred during sewer and electric facility work. Landscaping and fencing work accounted for 8.6%, followed by construction work with 8.1%. Facility owner/operators reported the unknown work performed option for 58.0% of electric facility damages.

CATV FACILITY

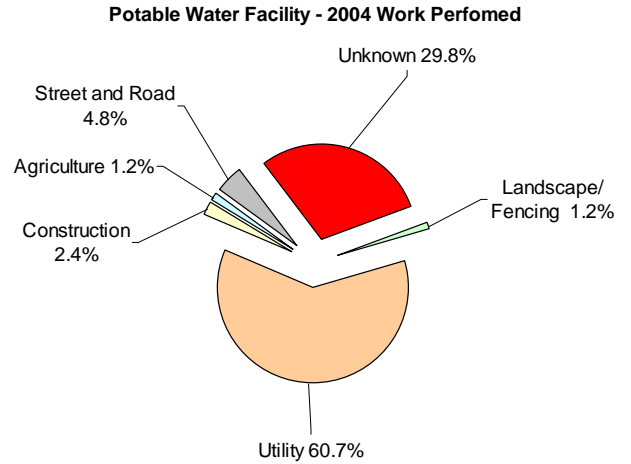
The combined work activity of the utility industry contributed the majority (26.7%) of CATV facility damages. One-third of these damages occurred during electric facility work and ¼ occurred during water facility work. Landscaping and fencing work accounted for 23.3%, followed by construction work with 9.0%. Facility owner/operators reported the unknown work performed option for 32.3% of CATV facility damages.

CATV Facility - 2004 Work Performed



POTABLE WATER FACILITY

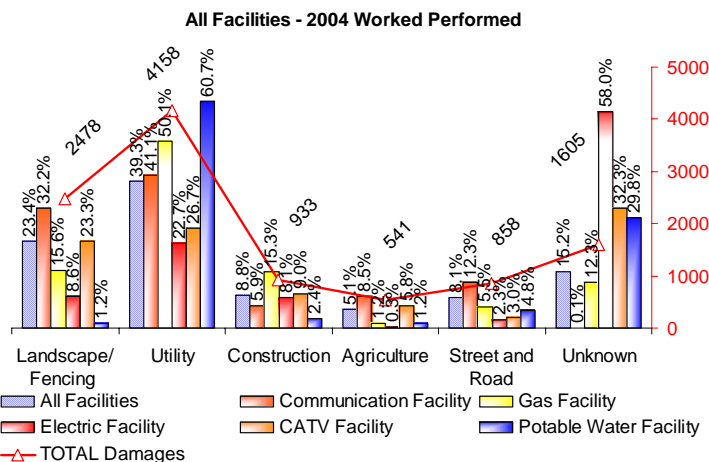
The combined work activity of the utility industry contributed the majority (60.7%) of potable water facility damages. Half of these damages occurred during sewer facility work and 1/5 occurred during water facility work. Street and road work accounted for 4.8%, followed by construction work with 2.4%. Facility owner/operators reported the unknown work performed option for 29.8% of potable water facility damages. Landscaping and fencing work contributed very little water facility damage.



Utility work more frequently damaged deeper gas and potable water facility, while landscaping work more frequently damage shallower communication and CATV facility.

FACILITY TYPE AND WORKED PERFORMED SUMMARY

The bar chart directly compares the worked performed type across each facility type. The first bar (blue hatch) shows the all-facilities value for reference. It is clear that utility industry work contributed the greatest share of all facility damages (39.3%). As noted, electric facility owners reported a high contribution (58.0%) of the unknown work performed type, as did the CATV and potable water facility owners with 32.3% and 29.8%, respectively. Facility owner/operators reporting communication facility damages did a good job of damage investigation and reporting as evidenced by the low occurrence of the unknown work performed option. It is interesting to note that landscaping and fencing work more frequently damaged communication and CATV facility and less frequently damaged gas, electric, and water facility. On the other hand, utility work more frequently damaged water, gas and communication facility and less frequently damaged electric and CATV facility. The fact that the work performed by and for the utility industry contributed such a significant share of facility damages should encourage the industry to improve educational and training efforts.



Work Performed and Root Cause

- Why did each work type damage the facility?

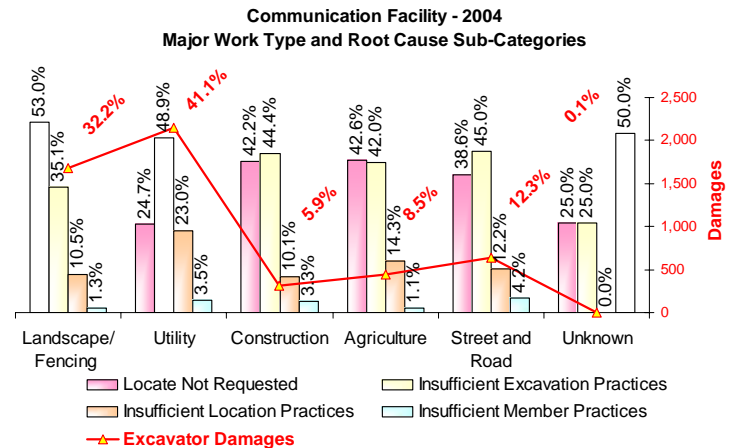
COMMUNICATION FACILITY

To gain additional perspective on communication facility damage, it is useful to determine the root cause for each major work performed type. Utility work accounted for 41.4% of communication facility damages, while landscaping and fencing work accounted for 32.2%.

The root cause insufficient excavation practices contributed the largest share of communication facility damages (42-49%) for all work performed types except landscaping work, which contributed 35.1%. Locate not requested contributed the largest share of damages for landscaping work (53.0%), while it contributed only 24.7% for utility work.

There are three observations. First, utility work contributed the most communication facility damages, primarily due to insufficient excavation practices. But, excavators performing utility work did a better job of requesting locates prior to digging. Second, landscaping work contributed about ¼ fewer communication facility damages, but over ½ of the landscaping & fencing contractors did not request a locate prior to digging. Third, construction, agriculture and street and road work contributed considerably fewer communication facility damages, with about 39%-43% of the damages due to not requesting a locate, 42%-45% of the damages due to insufficient excavation practices, and about 10%-14% of the damages due to insufficient location practices.

It is surprising that utility industry work damaged the largest share of communication facilities (mostly contract excavators) while these excavators did the best job of complying with the One-Call law by requesting a locate. This underscores the need for industry wide education and training in excavating best practices.



Although utility industry work contributed the largest share (41.4%) of communication facility damages, utility excavators requested a locate for 75% of the communication facilities they damaged.

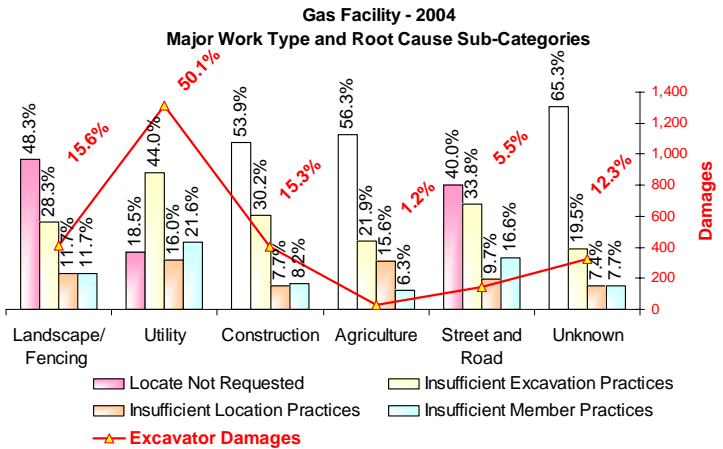
Landscaping and fencing work contributed the second largest share (32.2%) of communication facility damages, but landscaping and fencing contractors requested a locate for only 47% of the communication facilities they damaged.

GAS FACILITY

Utility work accounted for 50.1% of gas facility damages, while landscaping and fencing work accounted for 15.5%.

Locate not requested contributed the largest share of gas facility damages for all work types (40%-56%) except utility work, which contributed 18.5%. Insufficient excavation practices contributed the largest share of damages for utility work (44.0%), while it contributed only 22%-34% for the other work performed types.

There are two observations. First, utility work contributed the most gas facility damages, primarily due to insufficient excavation practices. But, excavators performing utility work did a better job of requesting locates prior to digging. Second, landscape activity contributed fewer gas facility damages, but nearly 1/2 of the landscaping & fencing contractors did not request a locate prior to digging.



Although utility industry work contributed the largest share (50.1%) of gas facility damages, utility excavators requested a locate for 81.5% of the facilities they damaged, while other excavators requested a locate for only 44-60% of the gas facilities they damaged.

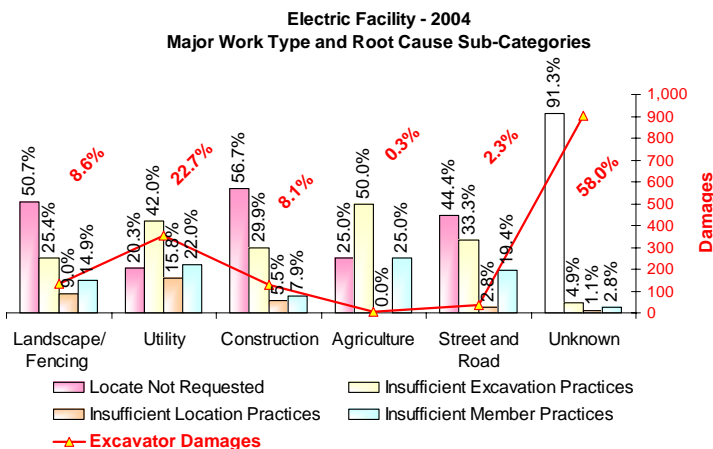
Excavators who damaged electric facility while performing utility work requested a locate 80% of the time, while those performing other work requested a locate 32% of the time.

ELECTRIC FACILITY

Utility work accounted for 22.7% of electric facility damages, while landscaping and fencing work accounted for 8.6%. The unknown work performed type was reported for 58.0% of the damages.

Insufficient excavation practices contributed the largest share of damages for utility work (42.0%), while it was only 25-33% for most other work types. Locate not requested contributed the largest share of damages (44-57%) for all work types except utility work (20.3%) and agricultural work (25.0%).

Excavators performing utility work did a much better job of requesting locates prior to digging than the other work types. Note the high use of the unknown work performed type; the vast majority reported as locate not requested.



CATV FACILITY

Utility work accounted for 26.7% of CATV facility damages, while landscaping and fencing work accounted for 23.3%. The unknown work performed type was reported for 32.3% of the damages.

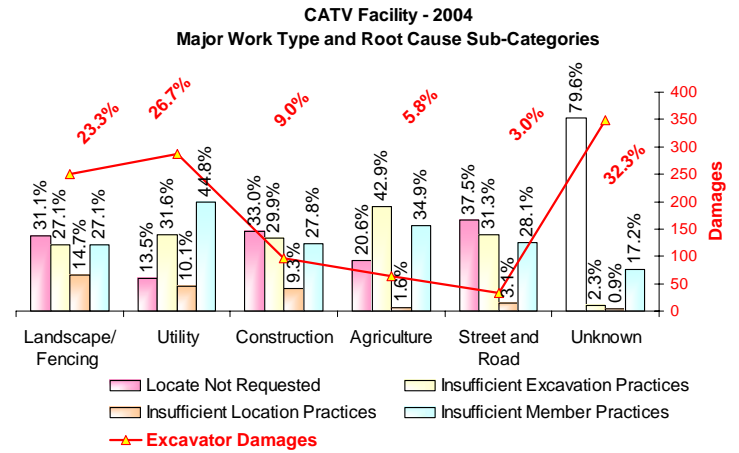
Insufficient member practices contributed the largest share of damages for utility work (44.8%), while it contributed 28%-35% for the other work types. These insufficient member practices occurred mostly when the facility was not marked or located (3/4 of the time). The root causes contributing the largest share of damages for the other work types was split between locate not requested (21%-37%) and insufficient excavating practices (27%-43%).

There are three observations. First, utility work contributed the most CATV facility damages, primarily due to insufficient member practices. But, excavators performing utility work did a good job of requesting locates prior to digging (86.5%). Second, landscaping and fencing activity contributed a bit less CATV damage, with 69% of the landscaping & fencing excavators requesting a locate prior to digging. Third, construction, agriculture and street and road work contributed considerably fewer CATV damages, with about 20%-30% of the excavators not requesting a locate, 30%-43% of the damages occurring due to insufficient excavating practices, and about 28%-25% of the damages occurring due to insufficient member practices.

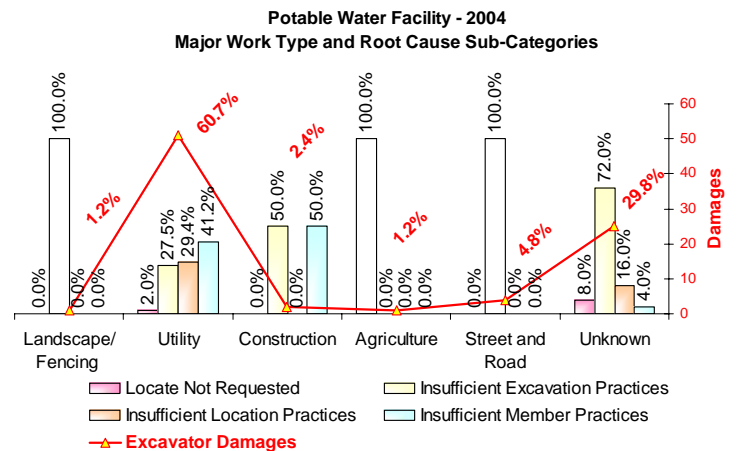
POTABLE WATER FACILITY

Utility work accounted for 60.7% of potable water facility damage. The unknown work performed type was reported for 29.8% of the damages.

Facility owner/operators not locating or marking their facility contributed the largest share of damages for utility work (41.2%). Excavators who damaged potable water facility while performing



Excavators who damaged CATV facility while performing utility work requested a locate 87% of the time. Unfortunately, facility owners not locating or marking their facility contributed significantly to these damages.

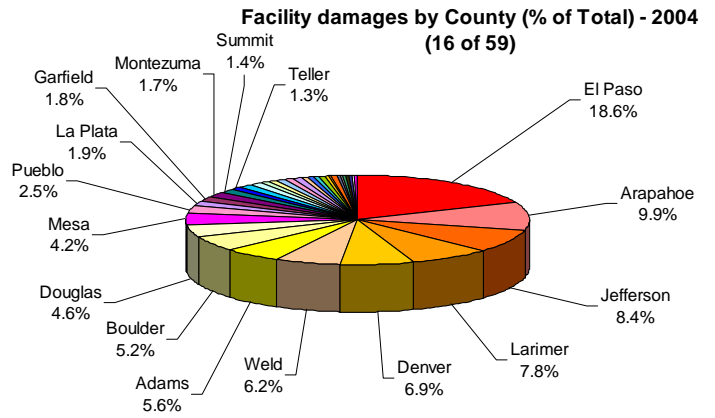


utility work requested a locate 98% of the time. The other work types contributed very few potable water facility damages.

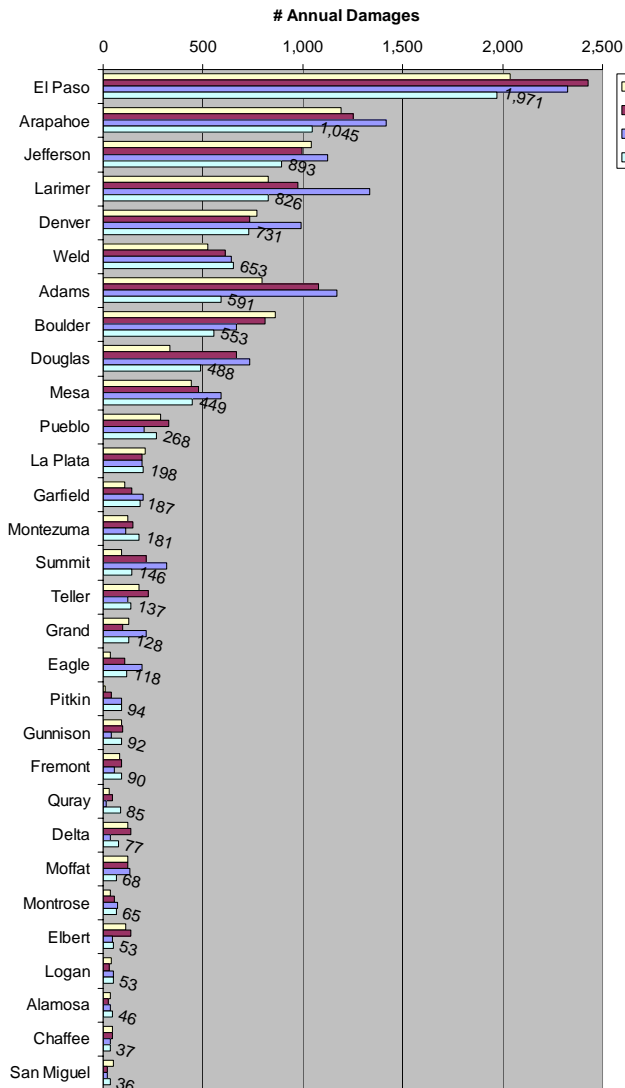
Geography

- Where did the facility damages occur?

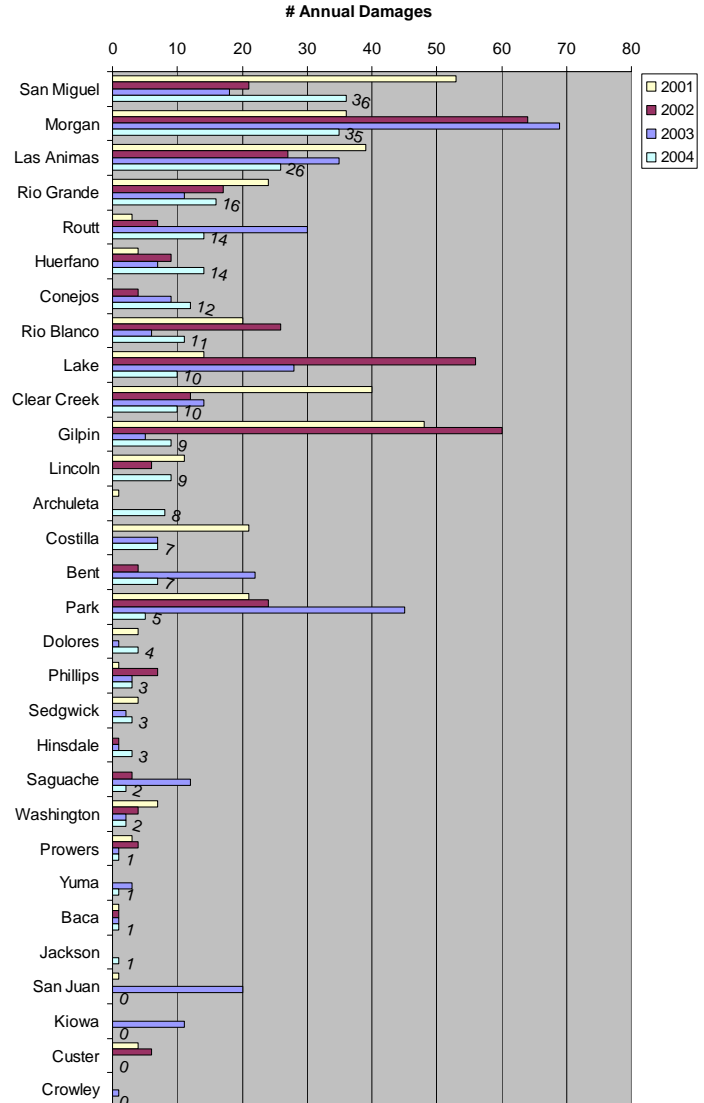
Facility damages occurred in 59 of the 64 counties in Colorado. El Paso County continued to have the highest share of damages with 18.6%; about twice as many as Arapahoe County with 9.9%. Nine Denver-Metro and Colorado Springs area counties contributed over 73% of the damages. Mesa and Pueblo Counties followed with 4.2% and 2.5% respectively. The table below shows the number of damages in each county for the years 2001-2004. Note the significant drop in damages in most of the larger Front Range counties. Of the first nine Front



2001-2004 - County (Top Half)



2001-2004 - County (Bottom Half)



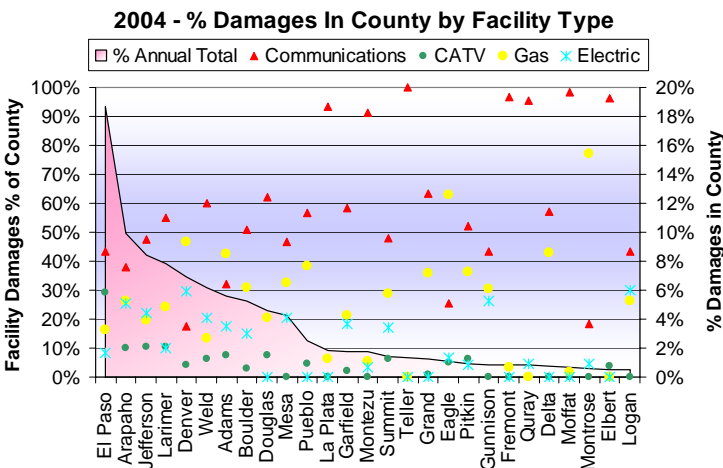
Rage counties listed, only Weld County had an increase in facility damages — small at less than 2%. Pueblo County also had a 31% increase.

There were 43 counties with at least five facility damages in 2004. Twenty-three of these had a decrease in damages, while 20 had an increase. With the exception of Weld and Pueblo Counties, the increases occurred in the less densely populated rural counties. Facility damages in seventeen of these counties decreased by more than the 22%, and five counties had a decrease greater than 50%. The average decrease in the 10 counties with the most damages (excluding Weld County) was 27.9%.

This demonstrates and validates that the 22% decrease in facility damages in 2004 was both widespread throughout the state and prevalent in the highly populated Denver-Metro and Colorado Springs counties.

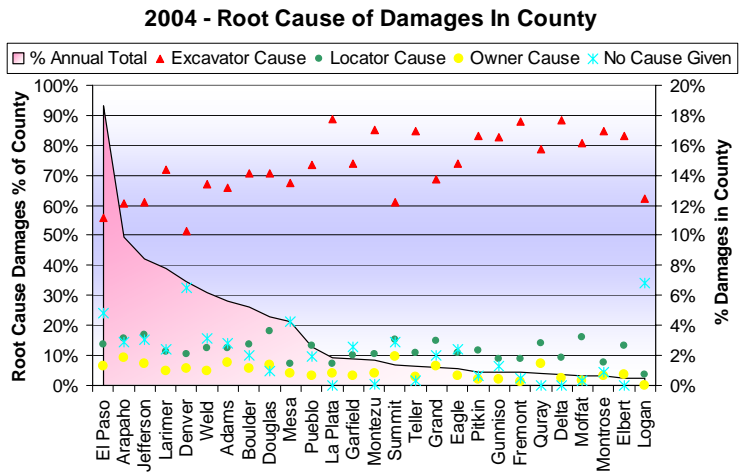
DISTRIBUTION OF DAMAGES BY FACILITY TYPE

The graph below shows the share (%) of damages by facility type in each of 27 counties. Only the communication, gas, electric and CATV facility types are shown. Although communication facility damages tended to occur more frequently than gas facility damages in most counties, note the higher share of gas facility damages in Denver, Adams, Eagle, and Montrose Counties.



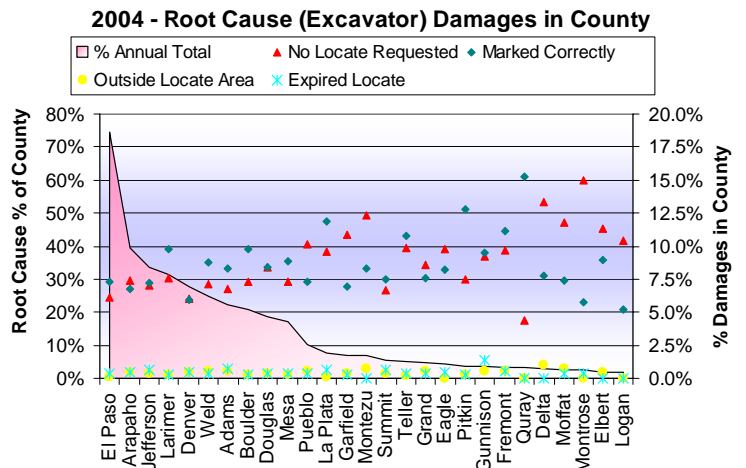
DISTRIBUTION OF DAMAGES BY ROOT CAUSE

The graph below shows the share (%) of damages by root cause (grouped) in each of 27 counties. No locate requested by excavator and insufficient excavating practices (plotted as excavator cause) contributed the majority of damages (50%-90%) in most counties. Note the larger share of the unknown root cause in Denver, Mesa and Logan Counties.



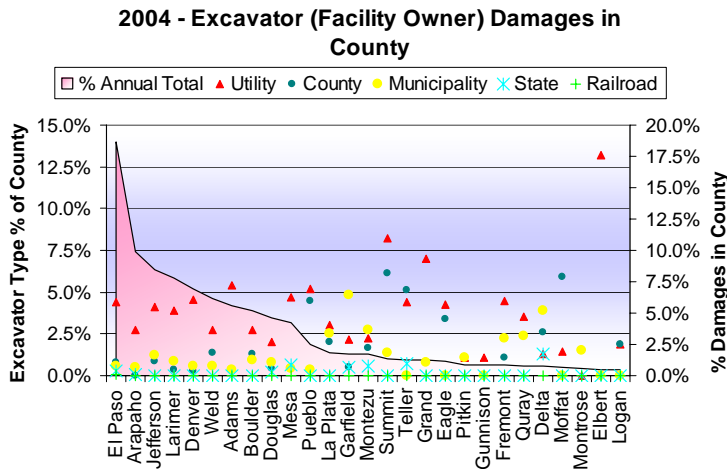
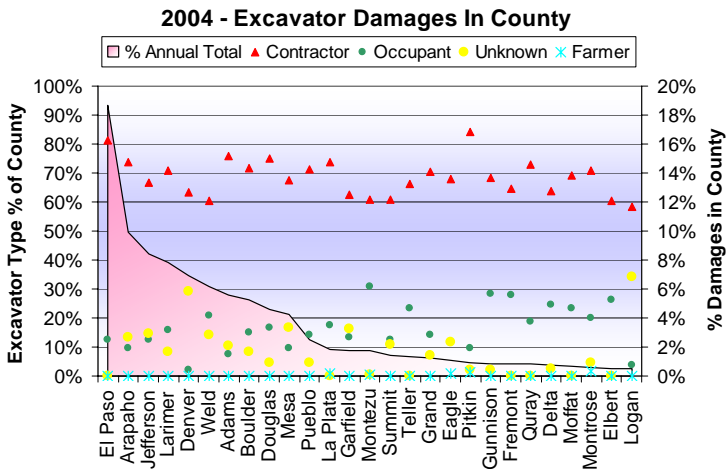
DISTRIBUTION OF ROOT CAUSE (EXCAVATOR)

The graph below further details the share (%) of damages by root cause (grouped) contributed by excavators in each of 27 counties. The excavator contributed the greatest share of damages due to no locate requested and facility marked correctly (25%-60%) in most counties. Note the greater tendency to not request a locate in many rural counties.



DISTRIBUTION OF DAMAGES BY EXCAVATOR TYPE

The two graphs below show the share (%) of damages by type of excavator in each of 27 counties. The graph does not represent what caused the damages, only who was excavating when the damages occurred. The top graph shows that contractors contributed the greatest share of damages (60%-80%) in most counties, followed by occupants (5%-20%). Note the low share of damages contributed by occupants in Denver and Logan Counties, which also have a higher share of damages with the unknown excavator type. The lower graph shows that facility owner/operators (as the excavator) contributed 2%-8% of facility damages, followed by county and municipal government.



About The Author

Mr. Barry Miller

Mr. Barry Miller analyzed the UNCC damage data and authored this report utilizing tools such as Microsoft Excel and Crystal Reports.

Mr. Miller earned a B.S. degree in Energy Economics and Finance from the Colorado School of Mines in Golden, Colorado. He is an independent business consultant and works closely with UNCC. 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 UNCC in the areas of business continuity, secure data center design, capital investment decision analysis, cash flow analysis, and business forecasting.

Mr. Miller authored the prior UNCC Damage Data Reports in 2001, 2002, and 2003. He 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 tickets 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 awareness at a number of industry and consumer trade shows, worked closely with damage prevention councils around the state, and designed and presented a damage prevention awareness and safety course for stakeholders.