Ontario Regional
ORCGA
Common Ground Alliance

2012 DIRT Report

Version 6.0

ORCGA Damage Information Reporting Tool
Analysis & Recommendations
Published May 2013

DIG SAFE

Ontario Regional
ORCGA
Common Ground Alliance
2003 - 2013
10th Anniversary

Contents

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MESSAGE FROM THE PRESIDENT

ONTARIO REGIONAL COMMON GROUND ALLIANCE

Dear Damage Prevention Stakeholders,

The Ontario Regional Common Ground Alliance (ORCGA) has collected damage data since 2005 to better understand the root causes that lead to these events and to develop public awareness plans to minimize the risk of future events. An ongoing challenge has been to gather data from a greater cross section of stakeholders within Ontario. For 2012 (version 6.0), we have been able to increase the number of records submitted.

In 2009, the ORCGA began inputting data into our own Virtual Private DIRT (VPD), allowing us much more flexibility in the design of our data report. In 2011-2012, the ORCGA working with the CGA DIRT Consultants made a number of enhancements to our VPD. Some of these enhancements are included in Version 6.0. These changes also allow us easy access to specific geographical DIRT data for all of our 13 Councils across Ontario.

The importance of the DIRT Report to the damage prevention industry remains a key component in painting an accurate picture of where we are with respect to safety and damage prevention in Ontario. As more companies and stakeholders submit data into DIRT, we will gain more insight and a clear view of how to make improvements. For 2013, I encourage all of our stakeholders to begin submitting your damage statistics into DIRT.

Included in our 2012 DIRT report are a number of other enhancements, such as the case studies, testimonials on the use of DIRT, etc. These changes and the entire report are a result of the work performed by the volunteers from our Reporting & Evaluation Committee under the coordination of Lori O'Doherty (ORCGA). This year, much of this work was spearheaded by Lyndsay McGrath (Enbridge Gas Distribution). I would like to thank the entire committee for their ongoing support of the ORCGA.

Sincerely,

Jim Douglas
President and CEO, ORCGA

1.0 PURPOSE OF THIS REPORT

The Damage Information Reporting Tool (DIRT) is the result of the efforts made by the Ontario Regional Common Ground Alliance (ORCGA) to gather meaningful data about the occurrence of facility events. An "event" is defined by the DIRT User's Guide as "the occurrence of downtime, damages, and near misses." Gathering information about these types of events gives the ORCGA the opportunity to perform analyses of the contributing factors and recurring trends, as well as identify potential educational opportunities with the overall goals of reducing damages and increasing safety for all stakeholders.

The Annual DIRT Report provides a summary and analysis of the known events submitted during the prior year, and as additional years of data are collected, also provides the ability to monitor trends over time. The 2012 Report focuses on the data gathered throughout Ontario during the three year period between 2010 and 2012. This data can be helpful for all stakeholders to use as a benchmark for their damage prevention performance. It identifies current issues facing the industry, region and province wide.

In 2010, the Reporting and Evaluation (R&E) committee clarified the different root causes included in the DIRT – Field Form with the addition of the Root Cause Tip Card. This can be found in Appendix A of the Annual Dirt Report. This improves the consistency of how events are reported through DIRT and in turn the data quality captured.

With the 2009 addition of the Data Quality Index (DQI) and the 2010 addition of the Root Cause Tip Card, the stakeholders have improved their data collection and reporting practices. The R&E committee is confident that this improvement has led to higher quality data. This quality database is used to create the best practices and educational programs so to prevent damages to underground infrastructure and create a safer Ontario.

Data Analysis Disclaimer: Industry stakeholders have voluntarily submitted their underground facility event data into DIRT. The data submitted is not inclusive of all facility events that occurred during the report year.

The analysis of said data may not be representative of what is actually occurring in any particular geographic area(s) or for any particular industry group(s). Please use caution when drawing conclusions based upon the data or the Report.

Questions in regards to registering and/or inputting data into DIRT may be forwarded to office@orcga.com.

1.1 Role of the ORCGA

The Ontario Regional Common Ground Alliance (ORCGA) is a non-profit organization promoting efficient and effective damage prevention for Ontario's vital underground infrastructure. Through a unified approach and stakeholder consensus, the ORCGA fulfils its motto of "Working Together for a Safer Ontario".

We are a growing organization with over 430 organizations as active members and sponsors, and represent a wide cross section of stakeholders including:

Electrical Distribution	**Land Surveying**	**Railways**
Electrical Transmission	**Landscape/Fencing**	**Regulator**
Engineering	**Locator**	**Road Builders**
Equipment & Suppliers	**Municipal & Public Works**	**Safety Organization**
Excavator	**Oil & Gas Distribution**	**Telecommunications**
Homebuilder	**One-Call**	**Transmission Pipeline**
Insurance		

For over a decade these stakeholder groups have been active in promoting "Call Before You Dig" and other good damage prevention practices individually, or through smaller separate organizations. In 2003, these groups amalgamated under the ORCGA name to provide a single voice representing the damage prevention community in the province. The ORCGA is a regional chapter of the Common Ground Alliance (CGA) based in Alexandria, Virginia, which was formed in 2000 to further damage prevention efforts in North America.

The ORCGA welcomes comments and new members on its various committees. In order to submit a suggestion, or to join a meeting, please visit www.orcga.com to learn about the scope of the various committees. General inquiries about the ORCGA can be made at:

Ontario Regional Common Ground Alliance (ORCGA)
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Website: **www.orcga.com**
To learn more about ORCGA's Dig Safe Program, visit **www.digsafe.ca**

1.2 Case Studies

DIRT 6.0 features case studies or root cause investigations. Root cause investigations assess both the events leading up to the incident, the surrounding conditions, and the event outcomes or learning points.

The case studies presented have been modified to protect the privacy of the individuals involved.

1.3 Data Validation

The numbers and figures in this report are based on current information provided to the ORCGA as of December 31st, 2012.

When reviewing statistics published in this report, it is also important to note that due to retroactive submission by DIRT users as well as new stakeholders submitting, the volume of facility events submitted by year will be changing with each report.

In addition to the number of records submitted, another important factor is the completeness of those records. Complete records allow for better overall analysis and provide for a more inclusive review of the contributing factors behind the events themselves. Each submitted record contains numerous data elements that are vital to understanding and interpreting the incidents reported in DIRT. When there are small percentages of known data for a specific field, it becomes difficult to perform a meaningful analysis. It is of vital importance that stakeholders align their data collection and reporting practices with those found on the DIRT form. As a way to gauge the overall level of completion for the records submitted, the DQI was implemented in 2009 and has been reported again in 2012. The DQI provides a quantitative benchmark for stakeholders or organizations to review the quality of the facility event records that they submit on an ongoing basis. More complete event records lead to a higher overall DQI, and therefore a better, more complete analysis.

When reviewing the statistics published in this report, it is important to note that records with missing data were filtered out, leaving only the events with complete data.

The potential exists that more than one report may be submitted for the same event, such as one by the excavator and one by the facility owner. There can be a benefit to this scenario. For example, data may be included on one submission that was omitted on the other. In addition, the way that different Stakeholders interpret the Root Cause of the same event may yield interesting insights. The DIRT system compares each field within each report submitted against the fields of all other reports in DIRT, and calculates the probability that it matches an already submitted event. It becomes more difficult to determine if the DIRT system includes multiple reports for the same event when fewer fields are completed.

2.0 DATA ELEMENT ANALYSIS

2.1 Facility Elements Analysis

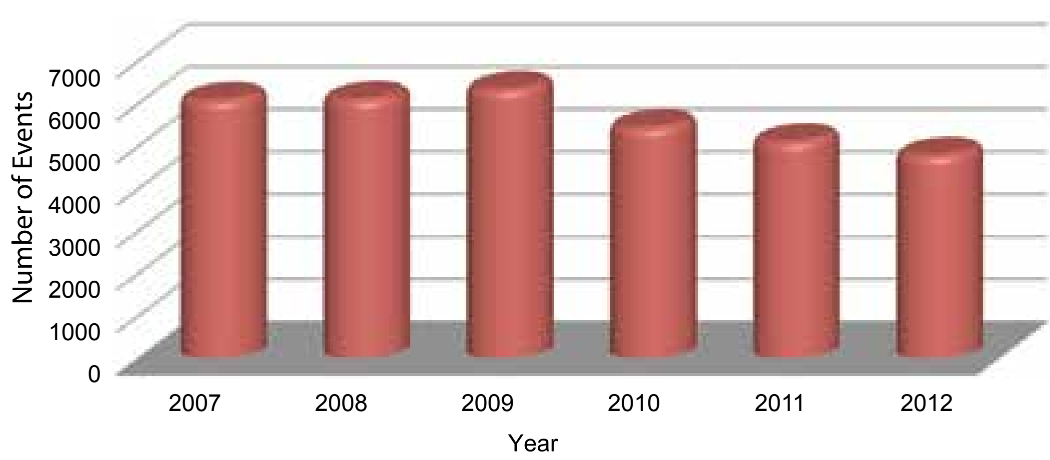
2.0

Our Goal

Avoid preventable damages within the underground infrastructure network as well as eliminating possible injuries due to these damages

In previous years, the DIRT report has shown a decrease in the number of facility events submitted between 2009 and 2011. In **Figure 1**, which is a measure of DIRT use, it can be seen that this trend has not changed significantly as a result of retroactive submission from newly registered stakeholders as well as decreased overall damages. For this reason, some statistics reported here will be different than those previously reported as well as trends may differ year-to-year.

Figure 1: Facility Events Submitted by Year



Conclusion: The overall volume of submitted facility events has been steadily decreasing since 2009.

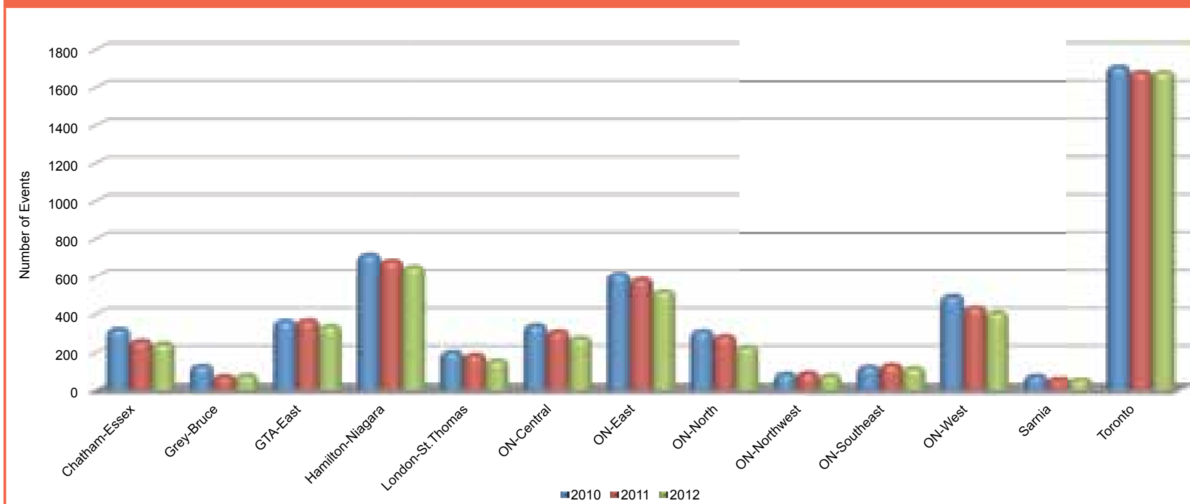
2.2 Facility Events Submitted Across Ontario

Trends in record submissions remain fairly similar to previous years and do not indicate any significant differences. **Table 1** shows the number of submitted events for each geographical area. **Table 2** shows the geographical area breakdown by city. **Figure 2** illustrates that over the past three years, no geographic area has fluctuated greatly in the percentage of records submitted.

Table 1: Submitted Events per Geographical Area

Geographic Area	Events	%
Toronto	1676	35.0%
Hamilton-Niagara	647	13.5%
ON-East	518	10.8%
ON-West	405	8.5%
GTA-East	334	7.0%
ON-Central	271	5.7%
Chatham-Essex	241	5.0%
ON-North	224	4.7%
London-St.Thomas	151	3.2%
ON-Southeast	113	2.4%
ON-Northwest	74	1.5%
Grey-Bruce	75	1.6%
Sarnia	53	1.1%
Grand Total	**4782**	**100%**

Figure 2: Volume of Events Submitted per Geographical Area



Conclusion: Geographic Areas have seen very little fluctuation in the volume of facility events submitted into DIRT, with Toronto experiencing the greatest amount.

Table 2: Geographical Area Breakdown by City

Geographical Area	Cities
Toronto	Peel Toronto York
Hamilton-Niagara	Halton Hamilton Niagara Haldimand-Norfolk
ON-East	Lanark Prescott Renfrew Stormont, Dundas and Glengarry Ottawa
ON-West	Brant Huron Oxford Perth Waterloo/Wellington Wellington County
GTA-East	Durham Kawartha Lakes Northhumberland Peterborough
ON-Central	Dufferin Simcoe
Chatham-Essex	Chatham-Kent Essex
ON-North	Algoma Cochrane Greater Sudbury Haliburton Manitoulin Muskoka Nipissing Parry Sound Sudbury District Timiskaming
London-St.Thomas	Elgin Middlesex
ON-Southeast	Frontenac Hastings Leeds and Grenville Lennox and Addington Prince Edward
ON-Northwest	Kenora Rainy River Thunder Bay
Grey-Bruce	Bruce Grey
Sarnia	Lambton

2.3 Submitted Facility Events by Stakeholder Group

2.0

In 2012, there was an approximate 171.4% increase in the number of events submitted by the Electric stakeholder as compared to 2011 as seen in **Figure 3**. As the stakeholder base grows so will the number of events submitted. However, with the introduction of the Ontario Underground Infrastructure Notification System Act, it is the hope that overall damages will continue to decrease.

Figure 3: Submitted Facility Events by Stakeholder Group

	Natural Gas	Telecom	Electric	Excavator	Locator	Road Builder
2010	2988	2412	43	0	0	0
2011	2636	2414	56	0	0	0
2012	2343	2285	152	2	0	0

Conclusion: Natural Gas and Telecommunication stakeholders are submitting the majority of the facility events in DIRT.

"We use the DIRT report as part of our process for responding to cable hits."

- Enersource

2.4 Submitted Facility Events by Type of Facility Operation Affected

Figure 4 indicates that Natural Gas and Telecommunication facilities continue to be identified as the primary facilities affected in the majority of events reported in DIRT. This aligns with the fact that Natural Gas and Telecommunication stakeholders continue to submit the majority of events.

Figure 4: Submitted Facility Events by Type of Facility Affected

	Natural Gas	Telecom	Electric	Cable TV	Steam	Unknown/Other
2010	2988	2412	43	0	0	0
2011	2636	2404	55	9	1	1
2012	2344	2277	151	4	5	1

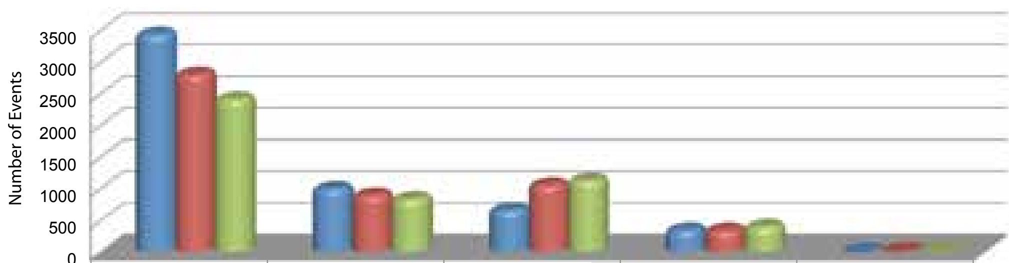
Conclusion: Natural Gas and Telecommunications are the primary facilities affected in the majority of events submitted in DIRT.

2.5 Volume of Events by Excavation Equipment Group

Figure 5 shows that in 2012, the Hoe/Trencher group accounted for the largest volume of damages in the Excavation Equipment Type category. However, this percentage is decreasing and being replaced by increasing damages involving Drilling and events classified as unknown/other. It is encouraging to see that excavators are more often adhering to Best Practices for digging in close vicinity of underground facilities.

Table 3 defines the types of excavation equipment included in each equipment group.

Figure 5: Submitted Facility Events by Excavation Equipment Group



	Hoe/Trencher	Hand Tools	Unknown/ Other	Drilling	Data Not Collected
2010	3437	996	662	347	1
2011	2805	891	1057	345	8
2012	2410	833	1129	396	14

Conclusion: Hoe/Trencher is the equipment group that accounts for the greatest volume of facility events submitted to DIRT.

Table 3: List of Equipment Groups

Group	Excavation Equipment Type
Hoe/Trencher	Backhoe/Trackhoe Trencher
Hand Tools	Hand Tools Probing Device
Drilling	Auger Boring Directional Drilling Drilling
Other	Farm Equipment Grader/Scraper Milling Equipment Vacuum Equipment

2.6 Case Study No. 1

On a Friday afternoon in the summer of 2012, a secondary hydro cable was struck during a routine fence post installation. The contractor was using a mechanical auger to drill a hole and after the incident took place he described what happened; "There was a loud bang, the auger stopped working, then the hole had smoke coming out of it." Fortunately there were no injuries.

2.6.1 Summary

An excavator was using a mechanical auger to drill a hole for a fence post installation. Locates indicated the work area was clear of buried utilities. The auger made contact with a live secondary power cable.

2.6.2 Description

The type of work was a fence installation between two residential buildings and along the side and front of a house. The contractor had several years experience in the industry and had completed this type of work many times prior to the incident.

Locates were requested and were completed and valid at the time of the incident. The area where the damage occurred was indicated to be 'clear' of buried utilities by several feet.

Excavation began and a mechanical auger was started and put to use in the intended location. The auger moved into the ground several inches without incident and then a loud bang came from the ground in and around the work area. The auger stopped working and smoke came out of the hole. The contractor presumed contact had been made with a live power cable. The work area was immediately sectioned off and the utility owner was notified. The job site was shut down until such time as a representative from the hydro utility could confirm that the work site was safe enough to remove equipment.

As the locate appeared to be inaccurate a damage investigation was initiated by the utility owner to determine the root cause of the incident. In doing so, the cable in question was re-located. The damaged line was not completely severed, however the integrity of the cable was compromised which could have an effect on the locate signal during investigation. The cable was therefore re-located both before and after the repair was completed in order to address this issue. No difference was found in the two investigations.

A locate transmitter was connected to the cable in question at the meter base on the side of the building. For those unfamiliar with locating practices, the transmitter is connected to a known utility in order to transmit a frequency onto it which can then be traced out and pinpointed further away.

A valid locate signal was found using common locate procedures. The locate signal was found in a different area than that of the damaged cable, in fact several feet away from the damaged cable. A weak signal was also found in the location of the damaged cable.

Other utilities were found to be grounded to the hydro system at this building, which is the common installation practice today. The cable TV service wire was grounded to the hydro system as was the telecom service and the hydro system itself was grounded to the water system. A single connection to the power cable could potentially place locate signal on four separate utilities. As the locate signal always takes the path of least resistance, the strongest signal may not be found on the intended target line. This type of common grounding is technically beneficial as it provides near zero voltage difference, which is good. However, the downfall is the potential interference can compromise the accuracy of a utility locate. In this case the locator had to choose which of the signals corresponded to the correct line.

The process in choosing which line is the correct one can be complex. Plant records, depth of signal, frequency selection, connection point, signal strength and general knowledge of installation procedures are a few of the factors considered in this process. Knowledge of the location of the other buried plant is also helpful. Unfortunately the damage prevention technician did not have information as to the location of all of the other buried utilities at the time of locate.

During the damage investigation the other utilities were disconnected from the hydro system one by one and the cable in question was re-located accordingly. It was determined through this process that the initial signal chosen at the time of locate came from a cable TV service wire and not from the secondary power cable. The CATV drop was therefore marked and located as the secondary hydro service line.

The investigation also found that the common grounding installation method and the nature of how the related networks interacted together made the locate signal on the TV wire stronger than on the power cable. The CATV wire was also placed deeper in the ground than is normal for this type of utility. Both of these findings contributed to the damage as they were misleading for the locator, however there were other important factors that also played a role in the incident.

After the investigation was brought to a close, many questions remain unanswered. What role does the shared bonding and grounding of separate utilities play in the accuracy of utility locating? What is the true cost of this installation method given the potential for injury and damage on a work site? We know that independent grounding of telecom and cable TV systems is possible, is there any value in exploring the idea of pursuing this installation method, in the interest of safety and damage prevention? One thing we do understand, emphasis on workplace safety and accountability are becoming much more important as we move forward in this industry. Knowing this we owe it to ourselves to ask if the risk of sharing a common ground is still worth the reward.

2.7 Facility Events Reported by Root Cause Group

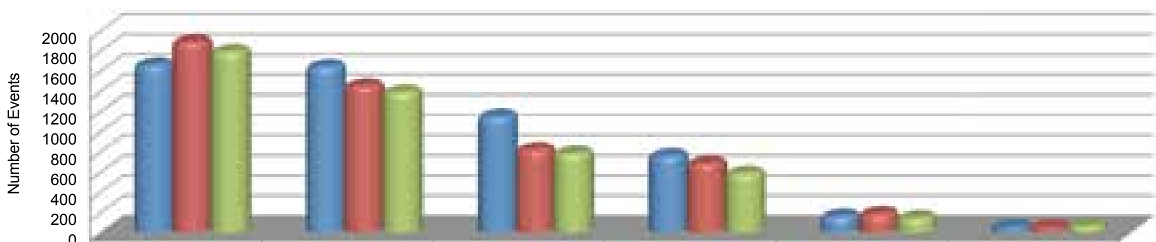
Table 4 explains the detailed root causes included in each root cause category. Refer to the Root Cause Tip Card (Appendix A) for a more detailed breakdown of the meaning of each root cause group. Depending upon which reporting stakeholder submits data for a facility event, the root cause volumes can vary significantly.

Table 4: List of Root Causes

Group	Root Cause Type
Excavation practices not sufficient	Failure to maintain clearance Failure to maintain the marks Failure to support exposed facilities Failure to use hand tools where required Failure to verify location by test-hole (pot-holing) Improper backfilling Unknown Subcategory
Locating practices not sufficient	Facility marking or location not sufficient Facility was not located or marked Unknown Subcategory
Miscellaneous root causes	Abandoned facility Data Not Collected Deteriorated facility Previous Damage Other
Notification NOT made	No notification made to the one-call center
Notification practices not sufficient	Notification to one-call center made but not sufficient Wrong information provided
Incorrect facility records/maps	Incorrect facility records/maps

In order to develop useful education and marketing tools to improve the Damage Prevention Performance of Ontario, it is important to examine the cause of reported events. To further understand the most common reasons for facility events, the distribution of root cause subcategories can also be examined.

Figure 6: Facility Events by Root Cause Group



	Notification NOT made	Excavation practices not sufficient	Miscellaneous Root Cause	Notification practices not sufficient	Locating practices not sufficient	Incorrect facility records/maps
2010	1663	1646	1151	762	164	57
2011	1893	1457	822	691	187	56
2012	1797	1395	786	588	147	69

Conclusion: Notification Not Made is the group that makes up the greatest volume of submitted facility events.

Figure 6 indicates that the most common cause of facility events is that notifications are not being requested through the one-call center. No Locate damages have decreased in 2012; and are expected to continue to decrease with the implementation of mandatory one-call.

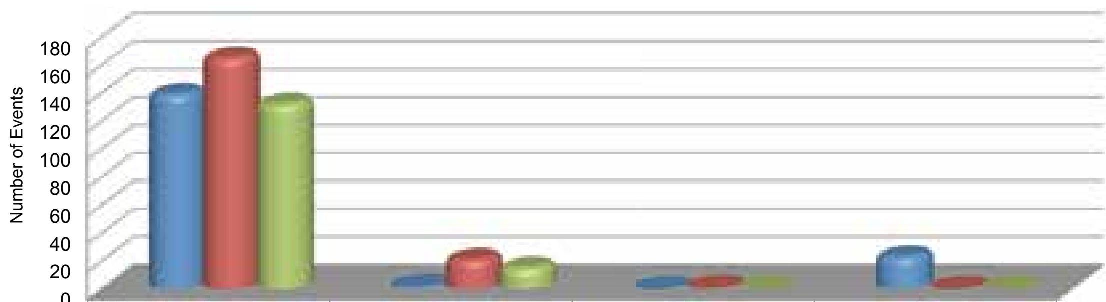
Figure 7: Facility Events by Excavation Practices Not Sufficient

	Other insufficient excavation practices	Failure to use hand tools where required	Failure to maintain clearance	Failure to maintain marks	Failure to support exposed facilities	Failure to verify location by test-hole (pot-holing)
2010	1119	444	13	37	32	1
2011	830	367	167	58	32	3
2012	779	376	148	45	36	11

Conclusion: Other Insufficient Excavation Practices subcategory has the greatest volume of submitted facility events within the Excavation Practices Not Sufficient root cause category.

As can be seen in **Figure 7**, the Excavation Practices Not Sufficient root cause group is made up mostly of events caused by Other insufficient excavation practices. This root cause subcategory is any other excavation error, which cannot be classified as one of the other five root cause subcategories within the Excavation practices not sufficient root cause group. **Figure 7** also illustrates the need for heightened educational awareness of when to use hand tools and to maintain the locate marks during the valid lifetime of a locate.

Figure 8: Facility Events by Locating Practices Not Sufficient

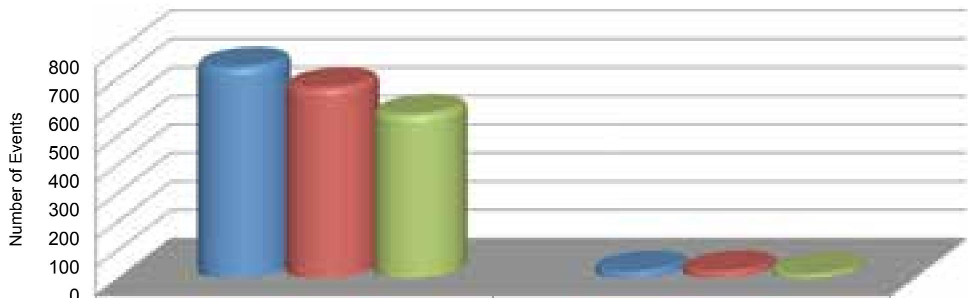


	Facility marking or location not sufficient	Facility was not located or marked	Facility could not be found/located	Unknown subcategory or locating practice
2010	139	2	0	23
2011	165	21	1	0
2012	132	15	0	0

Conclusion: Facility Marking or Location Not Sufficient subcategory has the greatest volume of submitted facility events within the Locating Practices Not Sufficient root cause category.

Figure 8 indicates that DIRT submitters are classifying events caused by locating practices not sufficient more effectively. Facility marking or location not sufficient events are caused, for example, by locator marking the work zone, but missing a service, locator misreading the ticket and did not locate the entire work zone, locator did not use records or interpret the records correctly, locator did not tone correctly or the facility was outside the tolerance zone.

Figure 9: Facility Events by Notification Practices Not Sufficient



	Notification to one-call center made but not sufficient	Wrong information provided to one-call center
2010	738	24
2011	667	24
2012	573	15

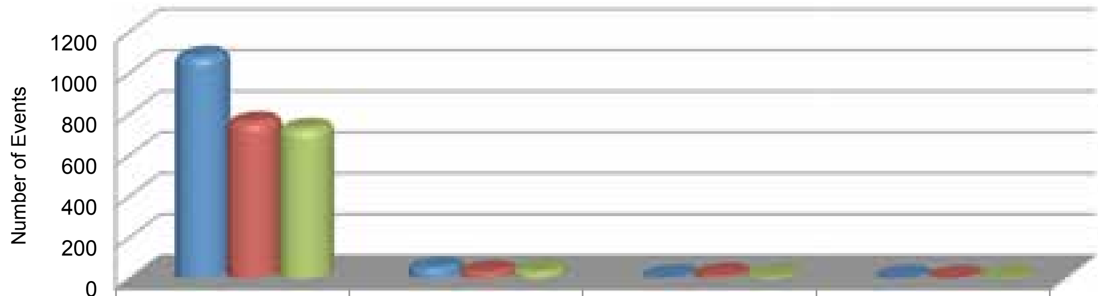
Conclusion: Notification to one-call center made but not sufficient subcategory has the greatest volume of submitted facility events within the Notification Practices Not Sufficient root cause category.

Figure 9 indicates the need for the one-call requestor to provide more complete and accurate data. Insufficient notification to the one-call centre accounts for the greatest volume events submitted under the Notification Practices Not Sufficient category. This subcategory includes instances such as missing information or inadequate lead times for the request.

> **"DIRT enables us to conduct further analysis and gain further detail to address factors such as whether our company is a driver or a leader within the industry."** - Bell Canada

Figure 10 represents root causes that have no classification. Data Not Collected subcategory accounts for 15.3% of the total events. It is a measure of all events where a root cause was not selected. Further efforts must be applied to categorize each event.

Figure 10: Facility Events by Miscellaneous Root Cause



	Data not collected	Other	Deteriorated facility	Abandoned facility
2010	1082	55	9	5
2011	763	36	19	4
2012	731	36	14	5

Conclusion: Data Not Collected subcategory has the greatest volume of submitted facility events within the Miscellaneous root cause category.

“DIRT allows for easy uploading of batch damage reports, which can then be used for data manipulation” - Enbridge Gas Distribution

2.0

2.8 Case Study No. 2

"Another day at the office", crept through the thoughts of a Telecommunications utility repair call center agent, as he was about to start his day at work.

2.8.1 Summary

He sat down at his desk, put on his headset, and eagerly punched in his operator ID, with 3 days left out of the work week, followed by a week's vacation! The beep on his ear-piece chimed, he took his first call; an out-of-service call, originating from the outskirts of the city. Fact-finding quickly and noting all key points he prepped the documentation on a dispatch ticket for a technician to investigate, and ended the call with the customer by offering his apologies for this inconvenience, and thanked the customer for his patience and service. With taking only 1 quick breath before continuing his focus with the next call – another out-of-service call, our repair agent friend did not even notice his peers, all 200 fellow agents, were on live calls, all trouble reporting out-of-service calls. Evidently it was not shaping up to be... another day at the office.

2.8.2 Description

Later that morning, a technician arrives on-site at a large corporation, and identifies himself and his purpose; to resolve whatever problem may be causing the out-of-service, to restore phone, internet and TV services. From the control panels, he is able to quickly identify an exterior cable fault. By using mapping tools, the technician is certain of how and where the cables run underground. Tracking underground cable at ground level to just beyond the business' property, now at the side of the road, he recognizes that the ground has been recently disturbed. Technician quickly called in for a locate request and had the disturbed area cleared, in hopes of determining the at-fault origin

As the damage is being exposed it is becoming clearer that this damage was quite severe... an air pipe was damaged, and neighbouring cables. No wonder the call center lines where off the hook. These cables brought service to an entire development some distance away from the corporation, the damage site. Over 250 homes were affected either with interference on their lines, an interruption of service, some even completely out-of-service. Once the damage was completely exposed, it was clear, there was no saving it, and it required replacement... a 275 meters replacement from manhole to manhole, to be exact.

The corporation, a senior lead responsible for the project in surrounding and securing the perimeter of the property, when questioned, was quick to identify the hired contractor and stated with certainty that no locates were requested by neither himself nor the excavation company that performed the work. Further investigation with this contractor revealed that they were simply trying to put in some fence posts. They did not request for locates.

This damage resulted in a repair that lasted over 3 business days… 4 three man crews shifted around the clock to repair/replace what was damaged. That particular business, other businesses, and the over 250 homes in that development were effected for the duration of the repair; substantial repercussions to this damage. The telecommunications company that owned this underground plant not only was unable to provide connectivity to these affected homes and businesses for 2 full days, which translated to a conservative estimate of approx $3,000 in lost revenue, while still having to pay their employees at the call center for taking the repair calls, the technicians that repaired / replaced the air pipe and cables, contractor costs, emergency after hours costs… they suffered over $25,000 in damage costs alone, replacement of the 275m air pipe incurred the highest costs, the structure and conduits needed to be rebuilt. Then there's of course the costs incurred as a result of the intangible effects, such as the drop in their customer perception levels, assurance levels of a reliable and dependable network.

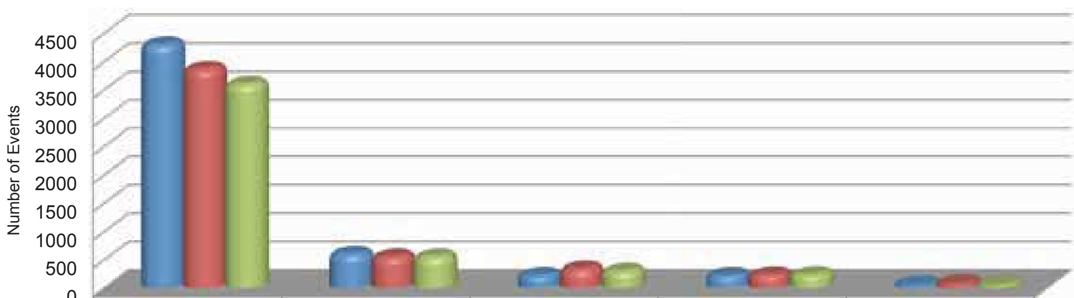
The greater the impact this experience may have caused… the greater that impact will remain. And the longer customers will hold the only company they are aware of who is at fault; their service provider for the disruption of service during a time when it was much needed.

Hopefully this example speaks loudly to the impact not only directly to those involved, such as the excavation company, the utility member, the corporation that hired the excavation, but also to those indirectly involved as well, such as the innocent homeowners within the community whose service was fed from that main cable that was damaged, the other businesses, all of whom, most likely didn't even have a clue as to what caused their loss of service. Had this negligence not been overlooked, had the excavator done their due-diligence in requesting for locates, a clear and legible path could have been paved for their excavation practices, one that would not have resulted in such a costly damage to all at stake.

2.9 Facility Events by Excavator Group

Figure 11 shows that contractors and developers continue to be involved in the majority of the reported facility events. Additional analysis of these groups is provided within the Multiple Field Analysis portion of this report.

Figure 11: Facility Events by Type of Excavator



	Contractor/ Developer	Homeowner/ Farmer	Other	Municipality	Utility
2010	4304	610	231	233	65
2011	3868	561	345	240	92
2012	3603	562	306	243	68

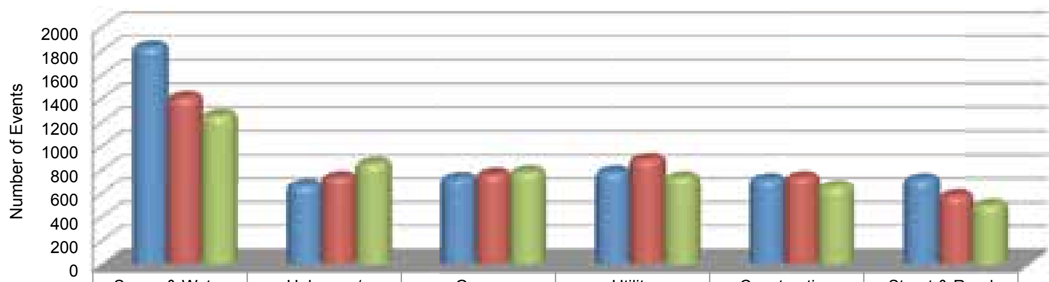
Conclusion: Contractor/Developer is the excavator type that accounts for the greatest volume of facility events submitted to DIRT.

"[The DIRT Report] is a valuable resource that has all the pertinent information that is required for our records" - Enersource

2.10 Facility Events by Type of Work Performed

The Sewer & Water and Utility work type groups continue to be involved in the majority of the facility events as seen in **Figure 12**. There was a significant decrease in the number of events for all types of work performed with the exception of Green and Unknown/Other, where we see a slight increase.

Figure 12: Volume Of Facility Events by Type of Work Performed



	Sewer & Water	Unknown/ Other	Green	Utility	Construction	Street & Road
2010	1836	665	728	781	717	716
2011	1409	735	761	888	734	579
2012	1258	853	782	733	653	503

Conclusion: Sewer & Water is the type of work performed that accounts for the greatest volume of facility events submitted to DIRT.

Table 5 indicates which types of work are included in each group.

Table 5: List Of Work Included In Each Work Group

Group	Type of Work Performed
Construction	Bldg. Construction Bldg. Demolition Driveway Grading Site Development
Green	Agriculture Fencing Irrigation Landscaping Waterway Improvement
Sewer & Water	Drainage Sewer (Sanitary/Storm) Water
Street & Road	Curb/Sidewalk Milling Pole Public Transit Authority Railroad Maintenance Road Work Storm Drain/Culvert Street Light Traffic Sign Traffic Signal
Utility	Cable TV Electric Liquid Pipeline Natural Gas Telecommunications
Unknown/Other	Data Not Collected Unknown/Other

> **"Being able to make comparisons of the results has reinforced the successes of our own damage prevention teams."** - Bell Canada

2.11 Case Study No. 3

On a typical summer day, a homeowner got together with a few friends to waterproof the basement of his house as it tended to leak during extreme rainfall conditions.

2.11.1 Summary

In order to complete this construction work, the homeowner rented a small excavating machine and begun to excavate the external basement walls that made up the foundation. As the homeowner continued to excavate the machine hit and severed the ½" PE IP gas service that provided natural gas to the home. Once the underground pipeline was hit, gas release was immediate and the homeowners called 911 and Utility Response Crews along with police and fire services responded.

2.11.2 Description

The severed service was made safe by the Utility Response Crew and repaired back to its normal operating condition. Luckily no one was hurt during this emergency. The root cause detail of this damage would be digging without a proper locate.

This case study identifies an area of underground infrastructure damage prevention that is not readily identified yet touches on home renovation work frequently undertaken by the homeowner. This scenario clearly identifies a need to target the waterproofing community to teach them about underground infrastructure and the dangers that could occur while working in and around them. Public Awareness campaigns continually target homeowners. However, a question that remains to be answered is how to create messaging that is understood and retained by these high priority groups.

* This Case Study is fictitious. Any resemblance to real people or events is purely coincidental.

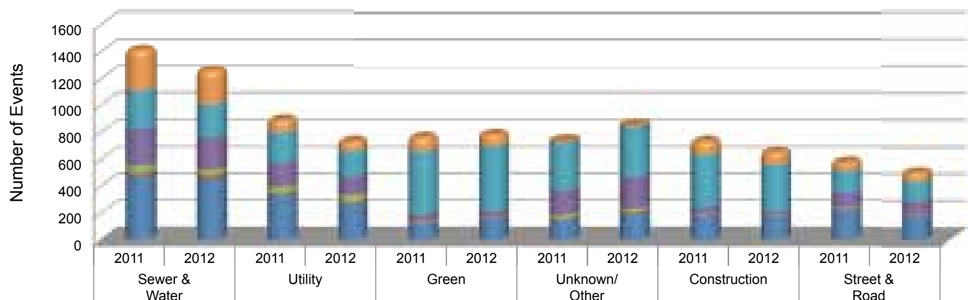
3.0 MULTI-FIELD ANALYSIS

3.1 Analysis of Root Cause and Facilities Affected Types of Work Groupings

3.0

The following charts illustrate the known root causes of events for the six work groups of Sewer & Water, Green, Construction, Utility, Street & Roadwork and Unknown/Other for the years 2011 and 2012.

Figure 13: Volume of Facility Events by Root Cause Group and Industry

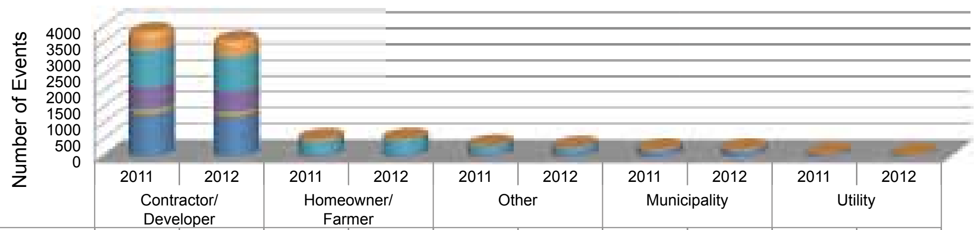


	Sewer & Water 2011	Sewer & Water 2012	Utility 2011	Utility 2012	Green 2011	Green 2012	Unknown/ Other 2011	Unknown/ Other 2012	Construction 2011	Construction 2012	Street & Road 2011	Street & Road 2012
Notification practices not sufficient	302	252	91	78	106	85	12	11	105	94	75	68
Notification NOT made	286	242	223	186	470	488	365	379	389	353	160	149
Miscellaneous Root Cause	265	246	180	138	47	44	174	233	48	26	108	99
Locating practices not sufficient	67	43	56	54	13	8	30	29	8	7	13	6
Incorrect facility records/maps	20	29	11	11	4	5	10	13	5	6	6	5
Excavation practices not sufficient	469	446	327	266	121	152	144	188	179	167	217	176

Conclusion: Within the Sewer & Water work performed category, Excavation Practices Not Sufficient accounts for the greatest volume of facility events submitted to DIRT.

Figure 13 indicates that the Green and Construction industry has caused the greatest number of damages than other industries due to Notification NOT Made. This shows that we need to educate these industries and aggressively promote the "Call Before You Dig" message. We do see decreases in the other industries for Excavation Practices Not Sufficient, which may indicate that Best Practice guidelines are being more closely followed.

Figure 14: Facility Events by Root Cause Group and Excavator Type



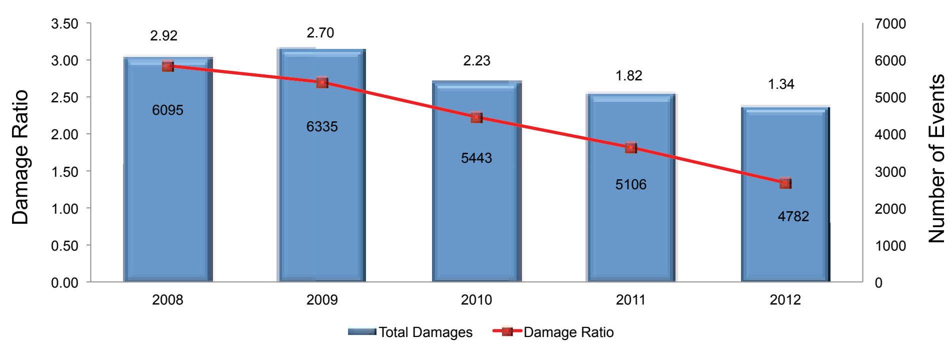
	Contractor/ Developer 2011	Contractor/ Developer 2012	Homeowner/ Farmer 2011	Homeowner/ Farmer 2012	Other 2011	Other 2012	Municipality 2011	Municipality 2012	Utility 2011	Utility 2012
Notification practices not sufficient	570	497	89	59	6	5	23	26	3	1
Notification NOT made	1165	1085	403	423	244	193	57	76	24	20
Miscellaneous Root Cause	665	648	20	18	58	61	58	49	21	10
Locating practices not sufficient	158	123	4	2	4	3	15	13	6	6
Incorrect facility records/maps	46	61	2	1	1	0	4	3	3	4
Excavation practices not sufficient	1264	1189	43	59	32	44	83	76	35	27

Conclusion: Within the Contractor/Developer excavator type group, Excavation Practices not Sufficient accounts for the greatest volume of facility events submitted to DIRT.

Figure 14 indicates that the Contractor/Developer excavator type still represents the majority of the Excavation Practices not Sufficient events.

Figure 15 shows the damage ratio reported in DIRT over the past 5 years against the number of damages. Industry practice is to measure damage prevention performance by the volume of damages per thousand locates requested.

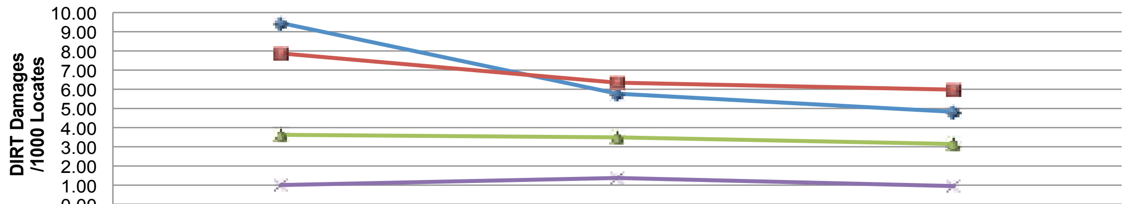
Figure 15: Damage Ratio - Damages/1000 locates



Conclusion: The damage ratio has steadily declined over the past 5 years.

Figure 16 also indicates that the damage ratio has been decreasing from year to year over a three year span. It also shows the damage ratio for each excavator type, based on damage volumes collected through DIRT, and locate requests.

Figure 16: Damage Ratio by Excavator Type



	2010	2011	2012
Contractor/ Developers	9.46	5.77	4.82
Homeowner/ Farmer	7.87	6.35	5.98
Municipality	3.62	3.49	3.15
Utility	1.01	1.37	0.95

Conclusion: The damage ratio by excavator type has been steadily decreasing over the past three years.

"The input process to DIRT has made it quick and easy to upload a single file of all damages that have occurred. This data allows us to compare our results with those that are in the same industry (or even peripheral industries)."

- Bell Canada

4.0 REPORT FINDINGS

4.1 Data Quality Index Indications

The DQI is a measure of data quality and consists of the evaluation of each organization that submitted records, in addition to the evaluation of each record submitted to DIRT. The overall average DQI is 73.6%. The breakdown of DQI for each individual part of the DIRT field form is illustrated in **Table 6** below.

The weight assigned to the various DIRT parts varies based upon its value in analyzing the event for damage prevention purposes, with root cause receiving the largest weight. The DQI for a set of records can be obtained by averaging the individual DQI of each record. The "2012 DQI" column in the table below represents the average of all 4782 submitted events in the 2012 data set.

Table 6: DIRT Submission Parts and DQI

DIRT Parts	Relative Weight	2010 DQI	2011 DQI	2012 DQI
A: Who is submitting this information?	5%	100.0	100.0	100.0
B: Date and Location of the event	12%	76.3	73.0	75.6
C: Affected Facility Information	12%	93.3	93.4	91.7
D: Excavation Information	14%	91.4	89.1	80.5
E&F: Notification, Locating and Marking	12%	88.9	91.6	90.5
G: Excavator Downtime	6%	11.6	11.9	12.7
H: Description of Damage	14%	32.8	27.5	33.1
I: Description of the Root Cause	25%	78.3	81.9	79.4
Total Weighted DQI	**100%**	**73.8**	**73.6**	**72.6**

Of the various parts of the damage report, Parts G: Excavator Downtime and H: Description of Damage are often not included as most of the organizations inputting data into DIRT do not track this information. The DQI for Part G: Excavator Downtime has increased between 2011 and 2012. The DQI for Part I: Description of the Root Cause was 81.9% in 2011 and have decreased to 79.4% in 2012.

4.0

4.2 Status and Recommendations

In order to increase confidence and clarity in the data, the R&E Committee has created a Root Cause Tip Card (Appendix A). This includes clearer descriptions and examples of events that should be considered under each root cause category when reporting events in DIRT. Moving forward, the R&E Committee will encourage new users to follow the committee guidelines for inputting data and are aware of the Root Cause Tip Card. The ORCGA will also be approaching member municipalities and utilities to encourage their participation in DIRT.

> **"We utilize the DIRT form out in the field when responding to cable hits. It captures all the pertinent information that might be otherwise missed"**
>
> - Enersource

5.0 REGIONAL DATA COMPARISONS

The following information was provided by the Common Ground Alliance (CGA). This data reflects 2011 data, as the release date for the CGA DIRT Report occurs after the ORCGA DIRT Report release.

Events submitted to DIRT include the state or province of occurrence. The 2011 DIRT data set has been segmented by One Call Systems International (OCSI) region to recognize event characteristics and patterns by geography. Again, due to changes in event reporting, year-to-year data comparisons on a geographic basis are not advised, as they will likely result in misleading interpretations.

The greatest numbers of events reported to the CGA DIRT in 2011 were from OCSI Regions 4 and 6 (as illustrated in **Figure 17** below). These two regions account for 47% of the total.

Figure 17: 2011 Distribution of Events by OCSI Region

OCSI Region	1 North-East USA	2 Mid-Atlantic USA	3 South-East USA	4 Great Lakes USA	5 Plains USA	6 South-West USA	7 North-West USA	8 Canada
No. Events	14,618	22,773	36,044	43,868	21,523	55,022	6,451	7,480
Share	7%	11%	17%	21%	10%	26%	3%	4%

6.0 EXCAVATOR OF THE YEAR

The Excavator of the Year distinction is presented to an excavator with the best-in-class safe digging practices. Each year a subset of the Reporting and Evaluation Committee, consisting of representatives of each of the utilities, is tasked with reviewing each contractor's individual damage ratio. The damage ratio is dependent on the volume of locates, of which each excavator must have a minimum of 500, measured against the number of digging related damages to the underground structure. The recipient of the award is the excavator with the lowest damage ratio who best reflects the type of work each category represents.

2012 EXCAVATOR OF THE YEAR AWARDS

GAS

T.W. JOHNSTONE CO. LTD. CONTRACTORS LONDON-ONTARIO

ELECTRIC

KN CONSTRUCTION

ROAD BUILDER

Rankin Construction Inc. CONTRACTORS & ENGINEERS

HOME BUILDER

RCC WATERPROOFING

LANDSCAPE

LOMCO Lanscape Contractors

TELECOMMUNICATIONS

Telcon Datvox NetworkCabling

MOST IMPROVED

AVERTEX UTILITY SOLUTIONS INC.

SEWER & WATER

LM Enterprises

APPENDIX A ROOT CAUSE TIP CARD

A.1 LOCATING PRACTICES NOT SUFFICIENT

A.1.1 Facility could not be found or located

Type of facility or lack or records prevented locating of facility.

Example: *Plastic pipelines installed without tracer wire.*

A.1.2 Facility marking or location not sufficient

Includes all areas where marking was insufficient.

Example: *Locator marked the work zone, but missed a service.*
Locator misread the ticket and did not locate the entire work zone.
Locator did not use records or interpreted the records incorrectly.
Locator did not tone correctly.
Facility was outside the tolerance zone.

A

A.1.3 Facility was not located or marked

No locating or marking was completed prior to excavation activities.

Example: *The company received a valid ticket but did not mark, locate, or communicate with the excavator prior to start of work.*

A.1.4 Incorrect facility records/maps

Incorrect facility records or maps led to an incorrect locate.

Example: Records show the facility located on the wrong side of the street, and ticket was cleared.
Records do not accurately reflect current plant status.

A.2 ONE-CALL NOTIFICATION PRACTICES NOT SUFFICIENT

A.2.1 No Notification made to the One-Call Center

Excavator did not call the one-call center.

A.2.2 Notification to one-call center made, but not sufficient

The Excavator contacted the notification center, but did not provide sufficient information, or the excavator did not provide sufficient notification time according to requirements and guidelines.

Example: *Excavator did not wait for the locate to be completed prior to digging*
Excavator was excavating with an expired locate.
Excavator was excavating outside of the located area.
Excavator was excavating without the locate onsite.

A.2.3 Wrong Information Provided To The One-Call Center

Damage occurred because an excavator provided the wrong excavation information to the notification center.

Example: *Excavator indicated the wrong dig site.*
After speaking with the excavator, the locator incorrectly cleared a ticket.

A.3 EXCAVATION PRACTICES NOT SUFFICIENT

A.3.1 Failure to maintain marks

The marks deteriorated or were lost and the excavator failed to request that they be restored/refreshed.

A.3.2 Failure to support exposed facilities

Facility damage due to lack of support in accordance with generally accepted engineering practices or guidelines.

A.3.3 Failure to use hand tools where required

A.3.4 Failure to test-hole (pot-hole)

Failure to verify physical location of the facility when working within tolerance zone as defined by accepted practices or guidelines.

A.3.5 Improper backfilling practices

Damage caused by improper materials (ex. Large/sharp rocks) in the backfill or improper compaction of the backfill.

A.3.6 Failure to maintain clearance

Excavator failed to maintain clearance (defined by applicable guidelines, law, and facility owners) from underground facilities when using power/mechanical equipment.

A.3.7 Other insufficient excavation practices

Excavator errors that do not fall under one of the above.

A.4 MISCELLANEOUS ROOT CAUSES

A.4.1 One-Call Center Error

Includes all issues related to the center such as incorrectly entered data, ticket transmission failures, et al.

Example: *This would include damages that occurred because the center's database registry had not been updated to reflect correct location of underground facilities.*
The one-call center system crashed and failed to deliver the ticket.

A

A.4.2 Abandoned Facility

Damage related to abandoned facilities. Select a more specific root cause.

Example: *The abandoned facility may have been located, instead of the active facility.*
This does NOT include when an abandoned facility is thought to have been located, but it is found to be active after the excavation exposed the facility or damaged it.

A.4.3 Deteriorated Facility

Those situations in which an excavation disrupts the soil around the facility resulting in damage, failure or interruption of service. However, the deterioration and not the excavation caused the facility damage.

A.4.4 Previous Damage

Damage occurred during previous excavation.

Example: *Pipe coating was damaged during a previous excavation and was not reported. Subsequently, a corrosion leak occurred, or subsequent excavation at the site revealed the damage to the pipe.*

A.4.5 Data Not Collected

Damage occurred, but Root Cause was not identified.

Example: *Damage Investigator did not indicate a Root Cause.*

APPENDIX B DAMAGE INFORMATION REPORTING FIELD FORM

B

Check the Appropriate Response on the Form
'*' indicates a Required Field

Damage Information Reporting Tool (DIRT) - Field Form

Part A – Who is Submitting This Information

Who is providing the information?

☐ Electric ☐ Engineer/Design ☐ Equipment Manufacturer ☐ Excavator ☐ Insurance ☐ Liquid Pipeline
☐ Locator ☐ Natural Gas ☐ One Call Center ☐ Private Water ☐ Public Works
☐ Railroad ☐ Road Builders ☐ State Regulator ☐ Telecommunications ☐ Unknown/Other

Name of the person providing the information:

Part B - Date and Location of Event

***Date of Event:** (MM/DD/YYYY)
***Country** ***State** ***County** **City**
Street address **Nearest Intersection**

***Right of Way where event occurred**
Public: ☐ City Street ☐ County Road ☐ State Highway ☐ Interstate Highway ☐ Federal Land
Private: ☐ Private Business ☐ Private Land Owner ☐ Private Easement ☐ Pipeline ☐ Railroad
☐ Power /Transmission Line ☐ Dedicated Public Utility Easement ☐ Data not collected ☐ Unknown/Other

Part C – Affected Facility Information

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

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

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

Was the facility owner a member of One Call?
☐ Unknown ☐ Yes ☐ No

Part D – Excavation Information

***Type of Excavator**
☐ Contractor ☐ Developer ☐ Occupant ☐ Farmer ☐ Railroad
☐ State ☐ County ☐ Municipality ☐ Utility ☐ Data not collected ☐ Unknown/ Other

***Type of Excavation Equipment**
☐ Auger ☐ Backhoe/Track hoe ☐ Boring ☐ Drilling ☐ Directional Drill
☐ Explosives ☐ Farm Equipment ☐ Grader/Scraper ☐ Hand Tools ☐ Milling Equipment
☐ Probing Device ☐ Trencher ☐ Vacuum Equipment ☐ Data Not Collected ☐ Unknown/Other

***Type of Work Performed**
☐ Agriculture ☐ Bldg. Construction ☐ Bldg. Demolition ☐ Cable Television ☐ Curb/Sidewalk
☐ Drainage ☐ Driveway ☐ Electric ☐ Engineering/Survey ☐ Fencing
☐ Grading ☐ Irrigation ☐ Landscaping ☐ Liquid Pipeline ☐ Milling
☐ Natural Gas ☐ Petroleum Pipeline ☐ Pole ☐ Public Transit Auth. ☐ Railroad Maint.
☐ Road Work ☐ Sewer (Sanitary/ Storm) ☐ Site Development ☐ Steam ☐ Street Light
☐ Storm Drain/Culvert ☐ Telecommunications ☐ Traffic Sign ☐ Traffic Signal
☐ Water ☐ Waterway Improvement ☐ Data Not Collected ☐ Unknown/Other

Part E – Notification

***Was the One-Call Center notified?**
☐ Yes ☐ No
If Yes, which One Call center?
If Yes, please provide the One Call ticket number

Visit DIRT at www.cga-dirt.com

Check the Appropriate Response on the Form
'*' indicates a Required Field

Part F - Locating and Marking

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

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

*Were facilities marked correctly?
☐ Yes ☐ No ☐ Data Not Collected ☐ Unknown

Part G – Excavator Downtime

Did Excavator incur down time?
☐ Yes ☐ No

If yes, how much time?
☐ Unknown ☐ Less than 1 hour ☐ 1 hour ☐ 2 hours ☐ 3 or more hours Exact Value ______

Estimated cost of down time?
☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value ______

Part H – Description of Damage

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

*Did the damage cause an interruption in service?
☐ Yes ☐ No ☐ Data Not Collected ☐ Unknown

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

Approximately how many customers were affected?
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 10 ☐ 11 to 50 ☐ 51 or more Exact Value _______

Estimated cost of damage / repair/restoration
☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value ______

Number of people injured
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _______

Number of fatalities
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99 ☐ 100 or more
Exact Value _______

Part I – Description of the Root Cause

☐ No notification made to the one call center
☐ Notification to one-call center made, but not sufficient
☐ Wrong information provided to one call center
☐ One call center error
☐ Facility could not be found or located
☐ Facility marking or location not sufficient
☐ Facility was not located or marked
☐ Incorrect facility records/maps
☐ Abandoned facility
☐ Deteriorated facility
☐ Excavation practices not sufficient (other)
☐ Failure to maintain clearance
☐ Failure to maintain marks
☐ Failure to support exposed facilities
☐ Failure to use hand tools where required
☐ Failure to test-hole (pot-holing)
☐ Improper backfilling practices
☐ Previous damage
☐ Data Not Collected
☐ Other

Part J – Additional Comments

B

GOLD SPONSORS

SILVER SPONSORS

BRONZE SPONSORS