Western Canada 2015 DIRT Report

British Columbia BCCGA Common Ground Alliance

ABCGA Alberta Common Ground Alliance

SCGA Saskatchewan Common Ground Alliance

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Executive Summary

The Western Canada 2015 Damage Information Reporting Tool (DIRT) Report provides detailed analyses and recommendations pertaining to the buried asset damage events reported in British Columbia (BC), Alberta (AB), and Saskatchewan (SK). The 2014 DIRT report was the first year that the findings for the three provinces were combined in one report. A year-over-year comparison is new in the 2015 report. As a preface, it appears that the downturn in oil and gas activity and resulting lower economic activity may have lead to a reduction in overall incidents simply through reduced activity. However, this does not take away from the standardized ratios pointing towards overall improvements in damage reporting through a general trend of lower incidents per notification.

The following limitations should be noted with regards to the presentation of the 2015 data:

> While every effort has been made to ensure that the most up-to-date information is employed in this report, the voluntary nature of DIRT reporting means that this report does not include all of the events that occurred in western Canada in 2015. While not all stakeholders may have chosen to report in this edition, the information is relevant for the purposes of a high-level analysis.

Highlights

- There were **4,563 damage event reports** across the three provinces, representing **a 7.5% decrease over 2014**, split between 1,131 events in BC (a 14% decrease), 2,644 in AB (a 9.9% decrease), and 788 in SK (a 13.5% increase).
- As was the case in 2014, in 2015, the majority of damage events were reported by **contractors** in BC and AB.
- **In all three provinces, peak damage events were concentrated in summer**, with July as the leading month for damage events in BC, August in AB, and June as the leading month in SK.
- **Natural gas and telecommunications** were the most commonly damaged asset types in all three provinces.
- **Urban areas** experienced the highest number of damage events.
- Most damage events occurred on **private land** in BC and AB, but there were also a significant number of damage events reported on **federal land** in AB.
- ***One-Call Practices Not Sufficient*** was the primary root cause of damage events in BC – meaning that no call was made. In comparison, ***Locating Practices Not Sufficient*** was a larger root cause in AB and SK.
- **Inconsistency in reporting** is a concern, as is the voluntary nature of many of the data fields.
- Based on cost calculations developed for Quebec's Info-Excavation, **the estimated societal and direct cost of damage events in AB, SK, and BC is between $430m and $525m for 2015**, with Alberta bearing roughly $275m, BC $120m, and SK $82m.

Recommendations

- **Improve reporting consistency** through a focus on regulations, guidelines, and the development of improved tools and technology for damage reporting (e.g. a one stop automated tool). Enhanced efforts to work with public works and other associations may enhance data collection and analysis.
- **Focus education and awareness campaigns** on target regions (i.e. urban areas), excavator groups (i.e., contractors), the months prior to peak seasons (i.e. spring), and land owners (i.e. private and federal). In addition, it may be necessary to work directly with field staff as there is a lack of consistency as to who fills out damage reports (e.g., excavator versus health and safety officer). Targeted sessions on how to fill out the damage reporting field form may be appropriate.
- **Consider the development of benchmarks** in line with those used in industry (e.g. incidents per kilometer of buried asset).
- **Uniformity in the data groupings** used for reporting across all jurisdictions will improve comparability and allow for more standardized reporting.
- **Develop an annual cost estimate** such as that produced for Info-Excavation Quebec to better educate stakeholders and decision-makers of the cost of underground infrastructure damage.

Introduction

The Damage Information Reporting Tool (DIRT) is the result of the efforts of the Common Ground Alliance (CGA) to gather meaningful data regarding the occurrence of buried asset damage events. An event is defined by the CGA DIRT User's Guide as "the occurrence of downtime, damages, and near misses." DIRT allows industry stakeholders to submit data anonymously to a comprehensive database that is used to analyze the factors leading to events. Since reducing the occurrence of damage events is in everyone's interest, the data provided in DIRT is an invaluable tool in directing efforts to the incidence of such events in a cost-efficient and effective manner. This report presents a detailed overview of where events occurred in Canada's three westernmost provinces in 2015, what sort of activity precipitated it, what happened, and what sort of equipment was involved.

The goal of this report is to help improve worker and public safety, protect underground infrastructure, and reduce the significant direct and indirect costs of damage to buried assets. A comprehensive picture of contributing issues is vital to foster a stronger culture of underground safety.

The data for 2015 varies in both quality and quantity between AB, SK, and BC, reflecting the different stages that each province's DIRT stakeholders are at in their efforts to collect data through DIRT. This combined DIRT report is the second annual report for western Canada. For 2015, 4,563 events were submitted, with the majority of the events (58%) reported in Alberta. This represents an overall decline of 365 events, or approximately 7.4%, over 2014. Declines were experienced in Alberta and British Columbia, while the number of reported incidents in Saskatchewan increased due to an increased focus on reporting.

This report is organized as follows: the first section provides a brief summary and comparison of the three western provinces; individual sections then follow for BC, AB, and SK. Each unique provincial section contains an introduction, data analysis, summary, and recommendations. Data groupings for each province as well as the DIRT field reporting form are provided as appendices to the report.

The information below (as well as that contained in each provincial section) is organized to match the structure of the Damage Information Reporting Field Form. More specifically, the regional comparison of the data is organized around the following section headings:

- Part A: Information Providers
- Part B: Date and Location of Events
- Part C: Affected Facilities
- Part D: Excavation Information
- Part E, F, H & G: Notification, Locating and Marking, Excavator Downtime, and Cost of Damage
- Part I: Root Causes

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Regional Comparison

In total, there were 4,563 damage events reported in the western provinces in 2015. Figure 1 provides a summary of the events by province and year of reporting. In British Columbia (BC), there were 1,132 damage events, representing 24.8% of the total; in Alberta (AB) there were 2,264 events, representing 49.5% of the total; and in Saskatchewan (SK) there were 788 events, representing 17.3% of the total.

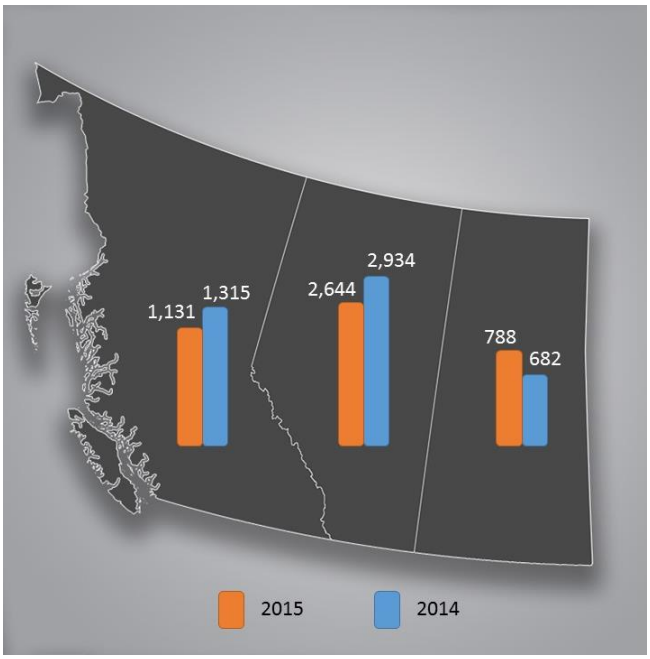


Figure 1. Summary of damage event reports by province.

Part A: Information Providers

In BC, 95.0% of the damage event reports originated from *Natural Gas*. This is in stark contrast to AB, where the majority of damage reports were fairly evenly split between *Liquid Pipeline* (37.0%) and *Telecommunications* (34.6%). Saskatchewan was more in line with AB, with 45.0% of damage reports originating from *Telecommunications*.

Part B: Date and Location of Events

The main season for damage events in BC ranged from May to September with the peak number of events occurring in July. In AB, the main season took place from May to October with the peak number of damage events occurring in August. No seasonal information was available for SK.

In both BC and AB, the percent of total damage events was highest around urban areas, with 42.4% reported in the Greater Vancouver Area in BC, and 33.1% reported in the Edmonton region in AB. No regional information was available for SK.

Part C: Affected Facilities

The type of facilities affected varied more in AB than in BC. In BC, 95.0% of the facilities affected were *Natural Gas*, whereas in AB, *Telecommunications* were the largest category of facilities affected, at 38.9%. Similar to AB, the majority of damage event reports in SK were related to *Telecommunications*.

Part D: Excavation Information

Damage event reports were fairly evenly distributed across the Work Performed categories in both BC and AB. *Construction/Development* and *Water* were the top two categories of Work Performed in BC, while *Water* and *Energy/Telecommunications* were the top two categories in AB.

Part E, F, G, & H: Notification, Locating and Marking, Excavator Downtime, and Cost of Damage

The DIRT data allows for the easy comparison of various ratios across jurisdictions. Table 1 on Page 7 provides a summary of the damage ratio per 1,000 locates, the ratio of notifications to locate requests, and the damage ratio per 1,000 notifications in BC, AB, and SK for 2014 and 2015, including the year-over-year change percentage.

Table 1. 2014-2015 DIRT data ratios by jurisdiction, with year-over-year change percentage.

British Columbia			
2014-2015 Data Ratios	**2015**	**2014**	**Change %**
Damage events per 1,000 locates	6.9	8.9	-22.5%
Ratio of notifications to locate requests	4.7	4.6	+2.1%
Damage events per 1,000 notifications	1.5	1.9	-21.1%

Alberta			
2014-2015 Data Ratios	**2015**	**2014**	**Change %**
Damage events per 1,000 locates	6.4	7.0	-8.6%
Ratio of notifications to locate requests	4.7	4.5	+4.3%
Damage events per 1,000 notifications	1.4	1.6	-12.5%

Saskatchewan			
2014-2015 Data Ratios	**2015**	**2014**	**Change %**
Damage events per 1,000 locates	5.6	5.0	+10%
Ratio of notifications to locate requests	2.8	2.6	+7.1%
Damage events per 1,000 notifications	1.9	1.9	0%

Part I: Root Causes

The damage event root causes varied by province. In BC, the most common root cause (63.5%) was *One-Call Practices Not Sufficient*. In contrast, the most common root cause in AB was the *Miscellaneous/Other* category (58.8%), reflecting the need for improved data collection. Among the

more specific root cause categories in AB, *Locating Practices Not Sufficient* was the most common at 15.3%. In SK, the most common root cause was *Locating Practices Not Sufficient* (51.1%).

Summary Recommendations

British Columbia

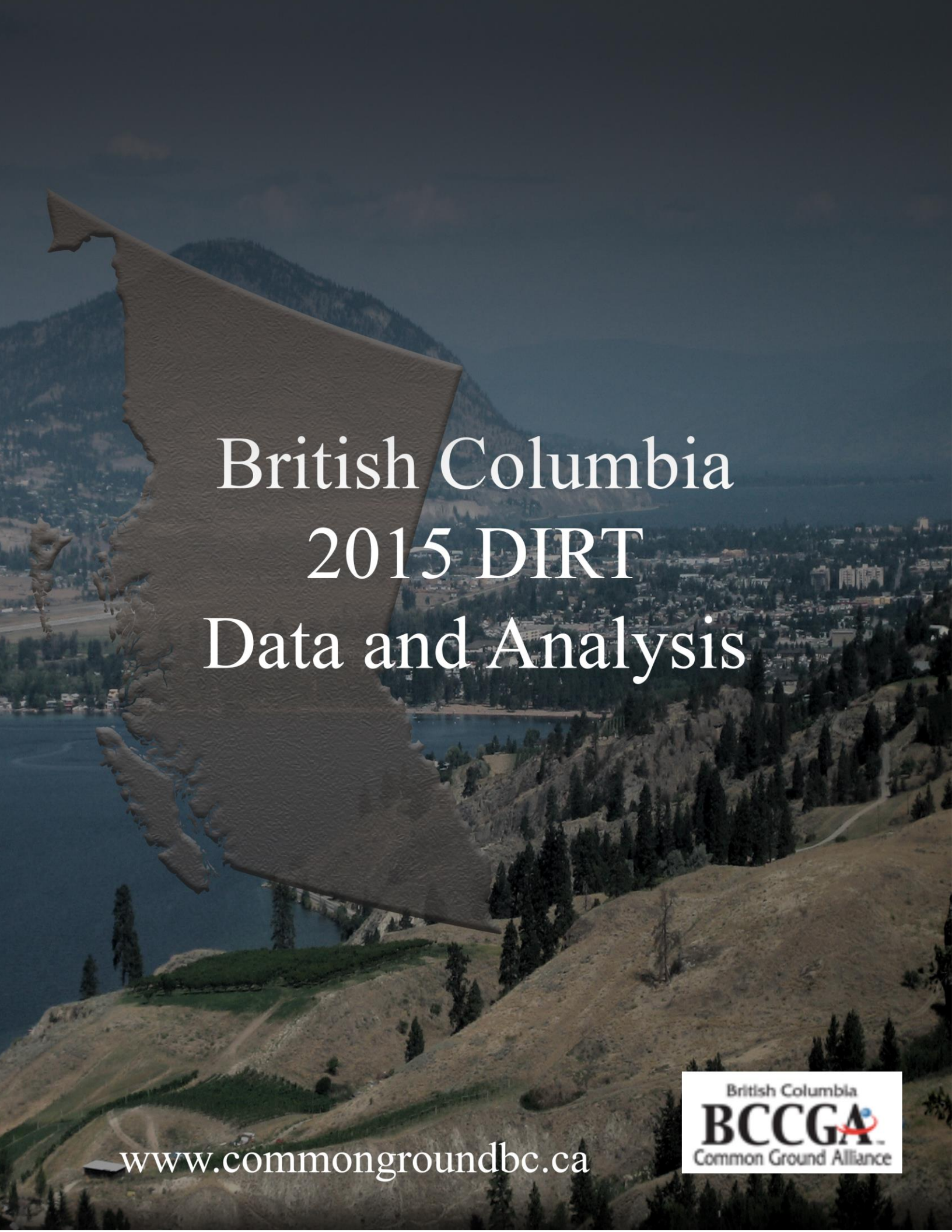
1. **Improved Reporting**. Emphasis should continue to be placed on increasing the number of DIRT submitters, so as to provide a more accurate representation of all events within BC in a given year. In BC, the data quality of the reported events was generally high (especially in comparison to AB), though there is always room for improvement. Areas of emphasis for improved reporting include:
    a. Part B: the Location and timing of events;
    b. Part G: Excavator downtime; and
    c. Part H: Cost of Damage.
2. **Focus on Seasons**. While damage events occurred throughout the year, the peak season for damage events occurred from April to October with a peak in June. There should be ongoing education initiatives throughout the year with maximum educational efforts focused on April and May before the excavation activity ramps up for the summer.
3. **Focus Locations**. The largest proportion of events occurred in the *Greater Vancouver Area*, followed by the *Interior*, which together make up over 70% of all reports. The BCCGA should continue to focus on improvements through initiatives targeted at the two leading regions.
4. **Focus on Contractors, Private Landowners and City Streets.** The majority of events occurred on the Land Type categories of *Private - Land*, *Public - City Street*, and to a lesser extent *Private - Business*, while *Contractor* represents a large and growing majority of those who submit event reports. Thus, educational messaging should be focused towards private landowners as well as contractors working on both private and municipal worksites. This could include a messaging program focused on large-scale suppliers of landscape materials and tools. Similarly, the equipment category of *Hoe/Trencher* was involved in the majority of events in both 2014 and 2015, thus safety messages should be emphasized during equipment training.
5. **Focus on Construction/Development and Water Work**. *Construction/Development*, which occupies nearly half of the distribution, and to a lesser extent *Water*, were the two most prominent categories of events by type of work performed. As stated above, educational messaging should continue to be targeted toward these categories for maximum impact.
6. **Improving One-Call Practices and Excavation Practices.** *One-Call Practices Not Sufficient* was the root cause in over half of all the reported damage events in both 2014 and 2015, and thus appears to be a major factor in damage to underground infrastructure. *Excavation Practices Not Sufficient* also represented the root cause in over one-third of damage events. Increased awareness of safe excavating practices and the use of One-Call by all responsible parties (for example, home owners and contractors) is imperative to reducing the number of damage events.

Alberta

1. **Ongoing Efforts to Improve Data Quality**. Efforts should be made to significantly improve the overall quality of data with a greater emphasis placed on Part D: Excavation Information and Part I: Root Causes in particular. Although there was a noticeable improvement in data quality concerning Root Causes in 2015, it is still impossible to identify a targetable primary root cause or a primary excavation equipment type, with a majority of damage reports leaving both equipment type and root cause undefined. Better information on the root causes of damage events would greatly enhance the ability to focus education efforts in future campaigns. Emphasis should also continue to be placed in increasing the number of DIRT submissions so as to provide a more accurate representation of all events within Alberta in a given year.
2. **Focus on Seasons**. While damage events occurred throughout the year, the high season for damage events occurred from May to November, peaking in July. There should be ongoing education initiatives throughout the year with maximum educational efforts focused on May and June before the excavation activity ramps up for the summer.
3. **Focus Locations**. The majority of events occurred in the regions of *Edmonton* and *Calgary*, which both saw an increase in damage event reports compared to 2014, while the *North* region's proportion halved. These urban regions ought to be prioritized in future, as Alberta's two major cities were the location of 64.7% of the province's damage reports in 2015.
4. **Focus on Private Land Owners and City Streets**. Last year it was clear that the categories of *Federal Land* and *Private - Land Owner* were a key focus area. While damage reports from *Federal Land* have drastically decreased, reports from *Private - Land Owner* increased, as did those from *Public - City Street*. Thus, a continuing focus on private landowners as well as a new emphasis on urban street construction work is necessary.
5. **Focus on a Variety of Work Performed**. As was the case in 2014, in 2015 damage events were fairly uniformly distributed over the different types of work performed (except for *Agriculture*, which may be excepted for having little impact), meaning that education efforts should span the range of work performed rather than being concentrated on any particular area.
6. **Improving Practices.** The data quality is insufficient for making targeted recommendations around improving practices. Where data were collected, *Locating Practices Not Sufficient*, *Excavation Practices Not Sufficient*, and *One Call Practices Not Sufficient* all fell into the same range of root cause percentage, indicating that data quality will need to be improved before specific causes may be targeted.

Saskatchewan

1. **Improve Data Availability**. Efforts should be made to improve the overall availability of data in line with other jurisdictions, and expand the range of stakeholders.
2. **Education**. The damage events were fairly evenly spread over the different utility types suggesting there is a greater need for a broad spectrum of education and safety efforts.
3. **Improving Excavation Practices.** *Excavation Practices Not Sufficient* was the root cause in a large number of the reported damage events. Educational efforts should be focused on increasing awareness of safe excavating practices by all responsible parties (for example, home owners and contractors) and is imperative to reducing the number of damage events in SK.



British Columbia 2015 DIRT Data and Analysis

www.commongroundbc.ca

British Columbia
BCCGA
Common Ground Alliance

British Columbia DIRT

This report provides a high-level snapshot of damage statistics related to British Columbia's underground infrastructure. The goal of this report is to help improve worker and public safety and protect underground infrastructure in BC. A comprehensive picture of contributing issues is vital to foster a stronger culture of underground safety.

This report utilizes information collected using the USA Common Ground Alliance (CGA) Damage Information Reporting Tool (DIRT). The British Columbia Common Ground Alliance (BCCGA) encourages all interested parties to submit their damage reports to the BC Virtual Private DIRT by visiting www.cga-dirt.com. Once registered, users can submit damage information or generate reports on the existing data. This report presents the data collected from the Virtual Private DIRT website in 2015.

The following limitations should be noted with regards to the presentation of the 2015 data:

> While every effort has been made to ensure that the most up-to-date information is employed in this report, the voluntary nature of DIRT reporting means that this report does not include all of the events that occurred in BC in 2015. It is clear that not all stakeholders in BC have chosen to report in this edition. The information is statistically relevant for the purposes of a high-level analysis.
>
> The BC Virtual Private DIRT is still relatively new and it appears that some operators did not collect information in all DIRT fields. As such, in a number of cases, fields have not been completed. The BCCGA will continue to improve the quality of data by educating users on what information is most valuable to collect. A coordinating body managing the reporting of incidents may improve the overall data quality as not all submitters have access to full information about an event. For example, a utility provider may not have access to information about contractor down time or costs.

As a principle, the BCCGA is committed to improving the data collection process.

About the BCCGA

The BC Common Ground Alliance (BCCGA) is a unique consensus-driven organization with a direct conduit to regulatory innovation. It is open to any individual or organization with an interest in safety and underground infrastructure. The BCCGA considers that all involved with underground infrastructure or disturbance are responsible and accountable for the safety of their own procedures. It acknowledges, however, that it is in everyone's best interest to work together to develop safe and consistent practices.

The BCCGA works to offer practical tools and to foster an environment in which anyone living or doing business in British Columbia is aware of and compliant with best practices in regards to underground infrastructure to ensure the safest possible environment for the citizens and workers of the province.

BCCGA is coordinating working groups to develop and deliver:

- Best Practice Guidelines for Safe Excavation
- Safety Recognition – City of Excellence Award
- Education – DigSafe Workshops

- National level priorities
- Advocacy for use of the DIRT tool (statistical database of hits)
- Networking and collaborating
- Improving stakeholder engagement
- Responding to calls for input into regulatory amendments
- Circulation of relevant information regarding safety and industry practice.

In BC, quantifying damage to underground infrastructure has often lacked consistency. In some cases, statistics have not been maintained. As a result, stakeholders have not been able to effectively determine how many damage events occur each year, the causes of these events, nor the circumstances surrounding these events. The Damage Information Reporting Tool allows the BCCGA to generate a high-level picture of safety and damage prevention in relation to excavation practices and the protection of underground infrastructure. This, in turn, should help all involved improve worker and public safety and protect underground infrastructure in BC.

The primary purpose in collecting underground facility damage data is to analyze data, learn why events occur, and determine what actions by industry can prevent them in the future, thereby ensuring the safety and protection of people and infrastructure. The use of BC Virtual Private DIRT allows the BCCGA to identify root causes, perform trend analyses, and ultimately help educate all stakeholders so that damages can be reduced through more effective practices and procedures.

Data Analysis

The information provided in this report is generally organized to match the structure of the Damage Information Reporting Field Form of the BC Virtual Private DIRT. More specifically, the analysis of the data is organized around the following section headings:

- Part A: Information Providers
- Part B: Date and Location of Events
- Part C: Affected Facilities
- Part D: Excavation Information
- Part E, F, G, and H: Notification, Locating and Marking, Excavator Downtime, and Cost of Damage
- Part I: Root Causes

Part A: Information Providers

Table 2 indicates the number and percent of damage events reported by stakeholder group. As was the case in 2014, in 2015, *Natural Gas* represented the largest reporting stakeholder group with 1,075 events (95%), with *Liquid Pipeline* representing the other 56 events (5.0%). This represents a slight increase in the number of *Natural Gas* events over 2014. There was a lack of data from *Public Works*, *Telecommunications*, and *Unknown/Other* categories.

Table 2. The number of damage events by stakeholder group

Stakeholder Group	2015 Events	2015 %	2014 Events	2014 %
Electric	-	-	92	7.0%
Liquid Pipeline	56	5.0%	59	4.5%
Natural Gas	1,075	95.0%	1,043	79.3%
Public Works	-	-	1	0.1%
Telecommunications	-	-	87	6.6%
Unknown/Other	-	-	32	2.4%
Total	1,131	100.0%	1,315	100.0%

Part B: Date and Location of Events

The total of 1,131 damage event reports in 2015 translates to a monthly average of 94.25 events/month, down from an average of 110 events/month in 2014. Figure 2 below demonstrates the actual distribution of event reports per month. The peak season for reported damage events (i.e. greater than the average of 110 events/month) extended from April through October with a peak of 145 events in the month of July. Compared to 2014, 2015 saw a marked decrease in events in August (146 to 109).

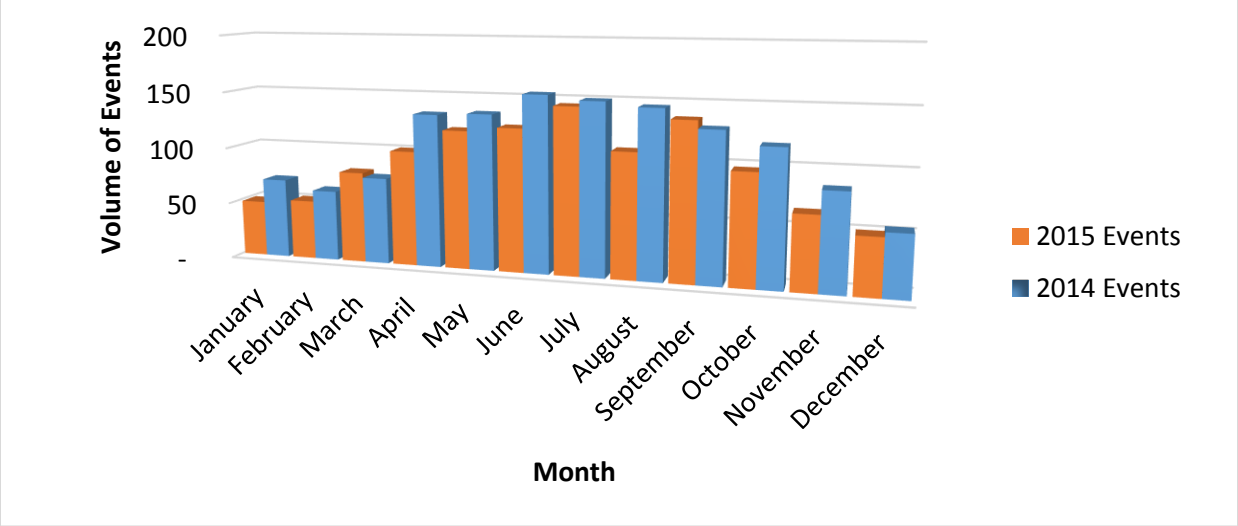


Figure 2. Volume of events by month.

Figure 3 provides the distribution of reported damage events by region within British Columbia in 2015. Notably, each region witnessed a decline in the numbers of events compared to 2014, with Northern BC posting a steep 53.4% year-over-year decline. As in 2014, Greater Vancouver in 2015 witnessed the greatest proportion of events (42.4%), followed by the Interior (30.2%). The Fraser Valley and Coastal BC and Vancouver Island reported a similar number of damage events (10.6% and 12.1%, respectively).

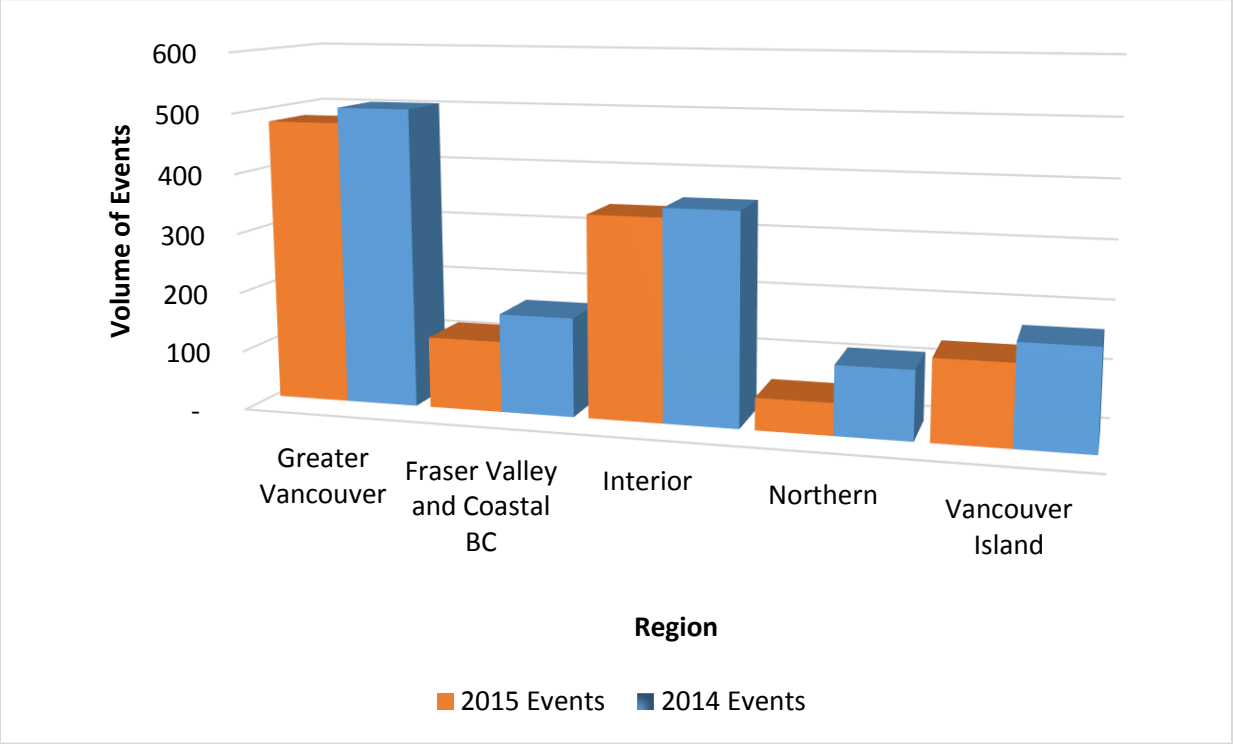


Figure 3. Volume of events by region.

The distribution of damage events in 2015 (Table 3, overleaf) was more concentrated into certain categories than in 2014. As in 2014, the main locations of events were on *Public – City Street* (314, or 27.8%) and *Private – Land Owner* (554, or 49%). While the number of events on *Private – Business* land increased from 42 to 246 (585.7%) over 2014, *Public-Other* and *Pipeline* events plummeted from 108 and 45 respectively to a handful each. Similarly, the incidence of "*Data not Collected*" declined from 158 to 2.

Table 3. Volume of events by land type (right of way)

Land Type	2015 Events	2015 %	2014 Events	2014 %
Data Not Collected	2	0.2%	158	12.0%
Pipeline	2	0.2%	45	3.4%
Power/Transmission Line	-	0.0%	1	0.1%
Private - Business	246	21.8%	42	3.2%
Private - Land Owner	554	49.0%	603	45.9%
Private Easement	2	0.2%	1	0.1%
Public - City Street	314	27.8%	328	24.9%
Public - County Road	3	0.3%	4	0.3%
Public - Other	2	0.2%	108	8.2%
Public - State Highway	4	0.4%	11	0.8%
Unknown/Other	2	0.2%	14	1.1%
Total	1,131	100.0%	1,315	100.0%

Part C: Affected Facilities

In terms of affected facilities (Figure 4), 2015 resembles 2014 in all reporting categories. Nearly all of the facilities damaged in 2015 were Natural Gas (1,074, or 95% of events), with *Liquid Pipeline* representing the rest. In 2015 no data was available for the *Sewer*, *Telecommunications*, and *Unknown/Other* categories. In 2014, *Telecommunications* accounted for 95 events or 7.2% of cases that year, while *Sewer* and *Unknown/Other* accounted for <1% of events.

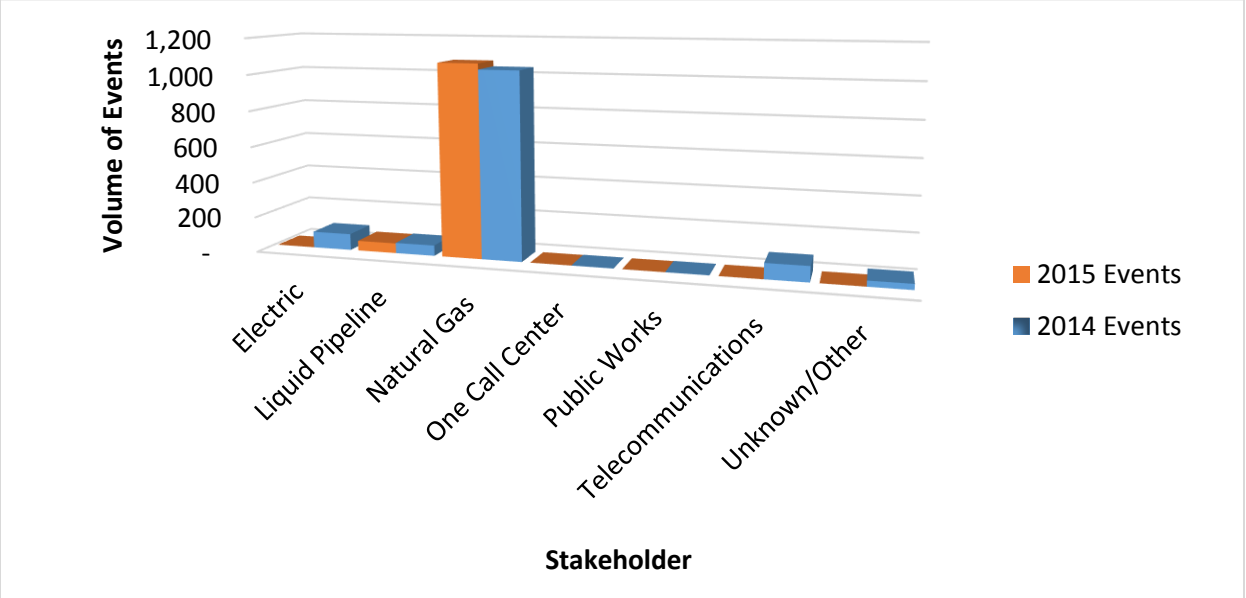


Figure 4. Volume of events by facility operation type.

Part D: Excavation Information

Figure 5 below indicates that the *Hoe/Trencher* category of excavation equipment was involved in 794 events representing 60.4% of the total in 2015, a proportion unchanged from 2014. Figure 5 demonstrates the continued predominance of *Construction/Development* in 2015 (45.6%), with water a distant second in both years varying from 23.7% in 2015 to 21.2% in 2014.

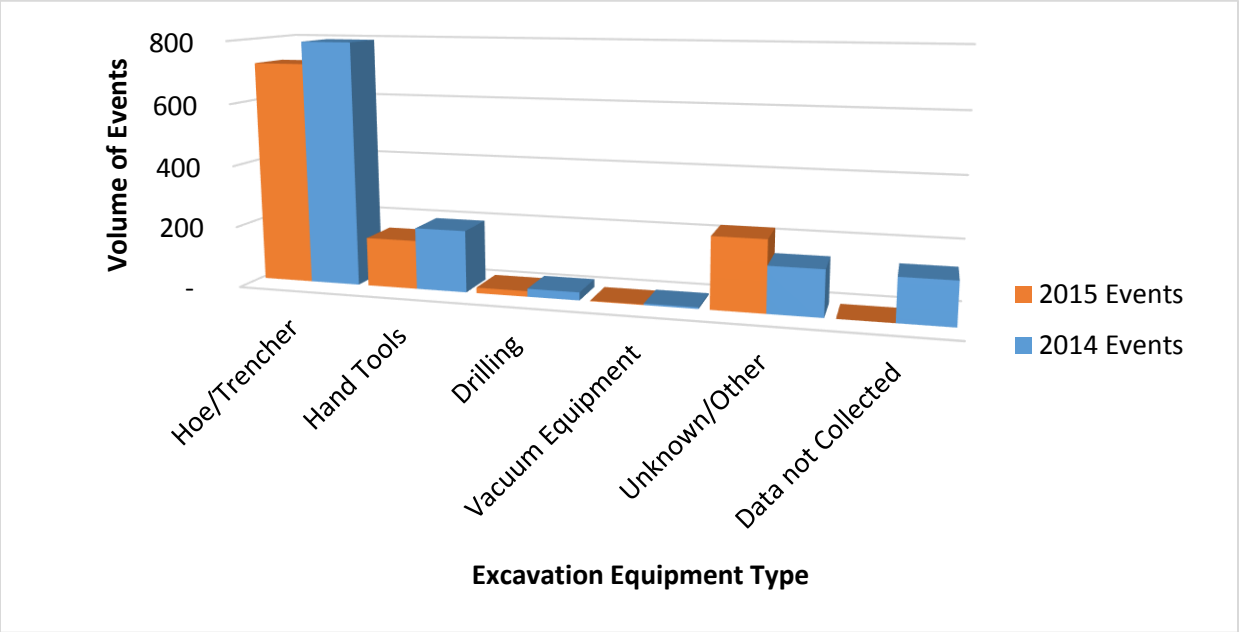


Figure 5. Volume of events by excavation equipment type.

Table 4 below indicates that while most categories remained relatively stable—including *Contractor*, *Municipality*, and *Utility*, *Farmer* grew from 4 to 32 (or from 0.3% to 2.8%), *Unknown/Other* plunged from 61 to 6 (or 4.6% to 0.5%), and *Developer* declined from 22 to 9 (or from 1.7% to 0.8%). In both years, the leading excavator type for damage events was *Contractor*, followed by *Occupant*.

Table 4: Volume of events by excavator type.

Excavator Type	2015 Events	2015 %	2014 Events	2014 %
Contractor	757	66.9%	761	57.9%
County	-	0.0%	1	0.1%
Data Not Collected	-	0.0%	125	9.5%
Developer	9	0.8%	22	1.7%
Farmer	32	2.8%	4	0.3%
Municipality	75	6.6%	76	5.8%
Occupant	233	20.6%	249	18.9%
Unknown/Other	6	0.5%	61	4.6%
Utility	19	1.7%	16	1.2%
Total	1131	100.0%	1,315	100.0%

Figure 6 below displays the volume of damage events for the type of work performed. A significant increase in *Construction/Development* is noticeable (from 412 to 516 events, or 31.3% to 45.6% of the annual distributions), as is a decrease in the categories of both *Water* (from 312 to 240, or 23.7% to 21.2% and *Data Not Collected* (from 169 to 45, or 12.9% to 4.0%).

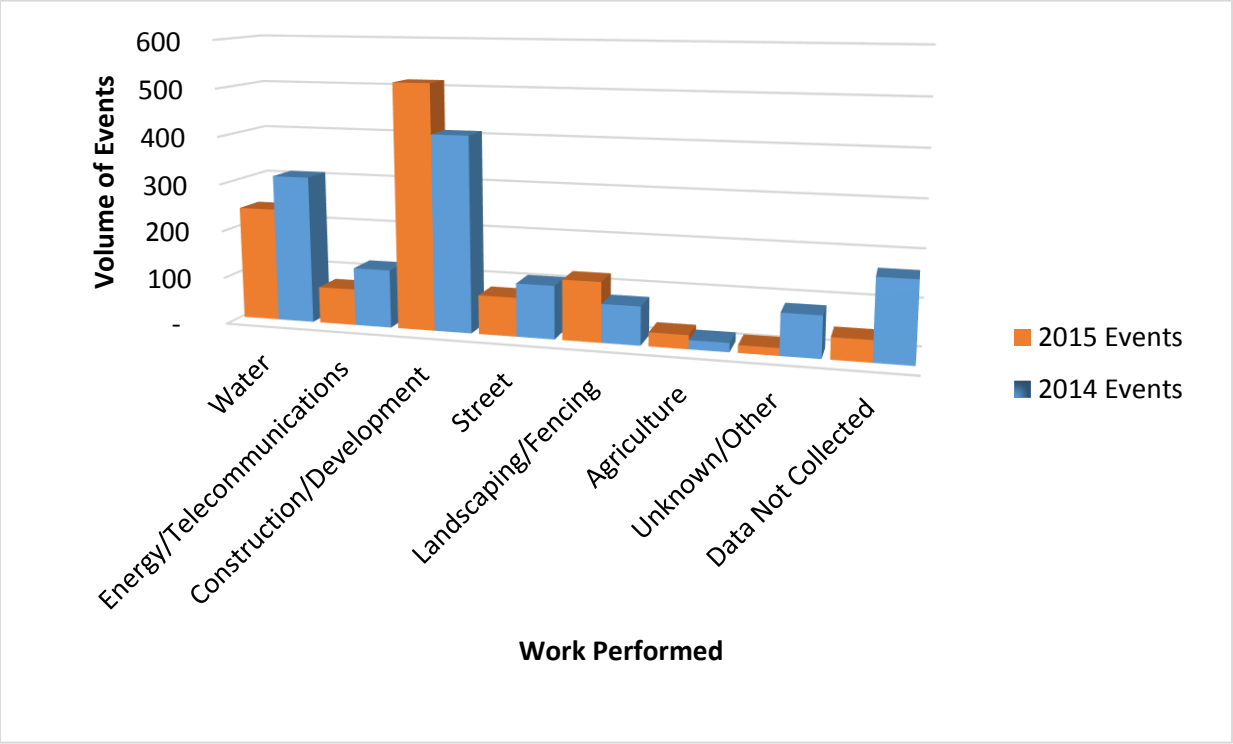


Figure 6. Volume of events by work performed.

Part E, F, G & H: Notification, Locating and Marking, and Excavator Downtime

As stated above, there were 1,131 damage events reported in British Columbia in 2015, representing a 14% decrease over 2014. Table 5 on Page 18 contains statistics on damage events, locates, notifications, and the calculated ratios of damage events to 1,000 locates and damage events to 1,000 notifications. In total, there were 164,268 locate requests to BC One-Call in 2015, a 9.9% increase, and 768,501 notifications, a 10.4% increase, yielding a ratio of 4.7 notifications per locate request. The ratio of damage events per 1,000 locates was 6.9, and there was a ratio of 1.5 damage events per 1,000 notifications.

Table 5. One-Call notifications, locates, and damage ratios

One-Call Notification	2015	Change %	2014
Number of Events (Damages)	1131	-14.0%	1,315
Number of Locates	164,268	+9.9%	148,100
Damage Ratio per 1000 locates	6.9	-22.5%	8.9
Ratio of Notifications per Locate Request	4.7	+2.1%	4.6
Number of Notifications	768,501	+10.4%	688,274
Damage Ratio per 1000 Notifications	1.5	-21.1%	1.9

Part I: Root Causes

Table 6 provides the volume of damage event records by root cause. The majority of the damage events (63.5%) were categorized as *One-Call Practices Not Sufficient*. The second most common root cause (36.1% of events) was *Excavation Practices Not Sufficient*. The most salient point of change between 2015 and 2014 is the reduction in the *Miscellaneous Root Cause* category from 181 events to 2.

Table 6. Volume of events by root cause

Damage by Root Cause	2015 Events	2015 %	2014 Events	2014 %
One-Call Practices Not Sufficient	718	63.5%	694	52.8%
Locating Practices Not Sufficient	3	0.3%	19	1.4%
Excavation Practices Not Sufficient	408	36.1%	421	32.0%
Miscellaneous Root Cause	2	0.2%	181	13.8%
Total	1131	100.0%	1,315	100.0%

Data Quality

The Data Quality Index (DQI) consists of the evaluation of each of the 1,131 damage records submitted in BC in 2015. DQI is first organized according to reporting sections A through I, and then summarized into quintiles, in order to represent an overall picture of data quality in the BC DIRT program (Figure 7).

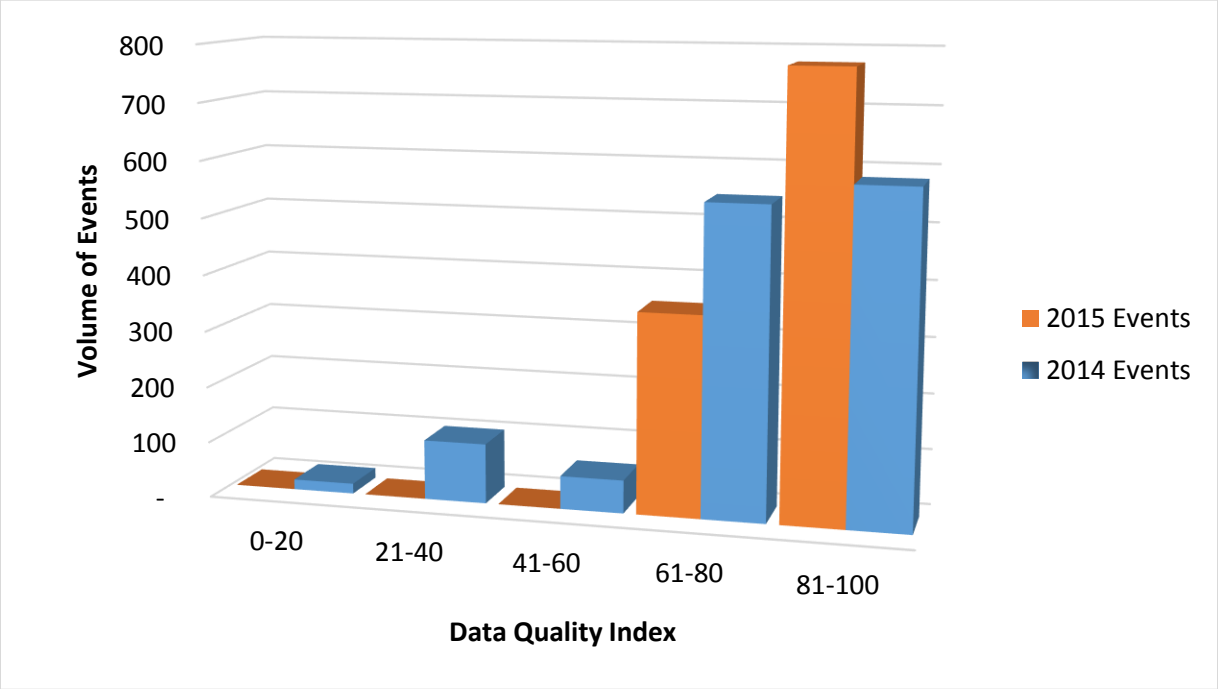


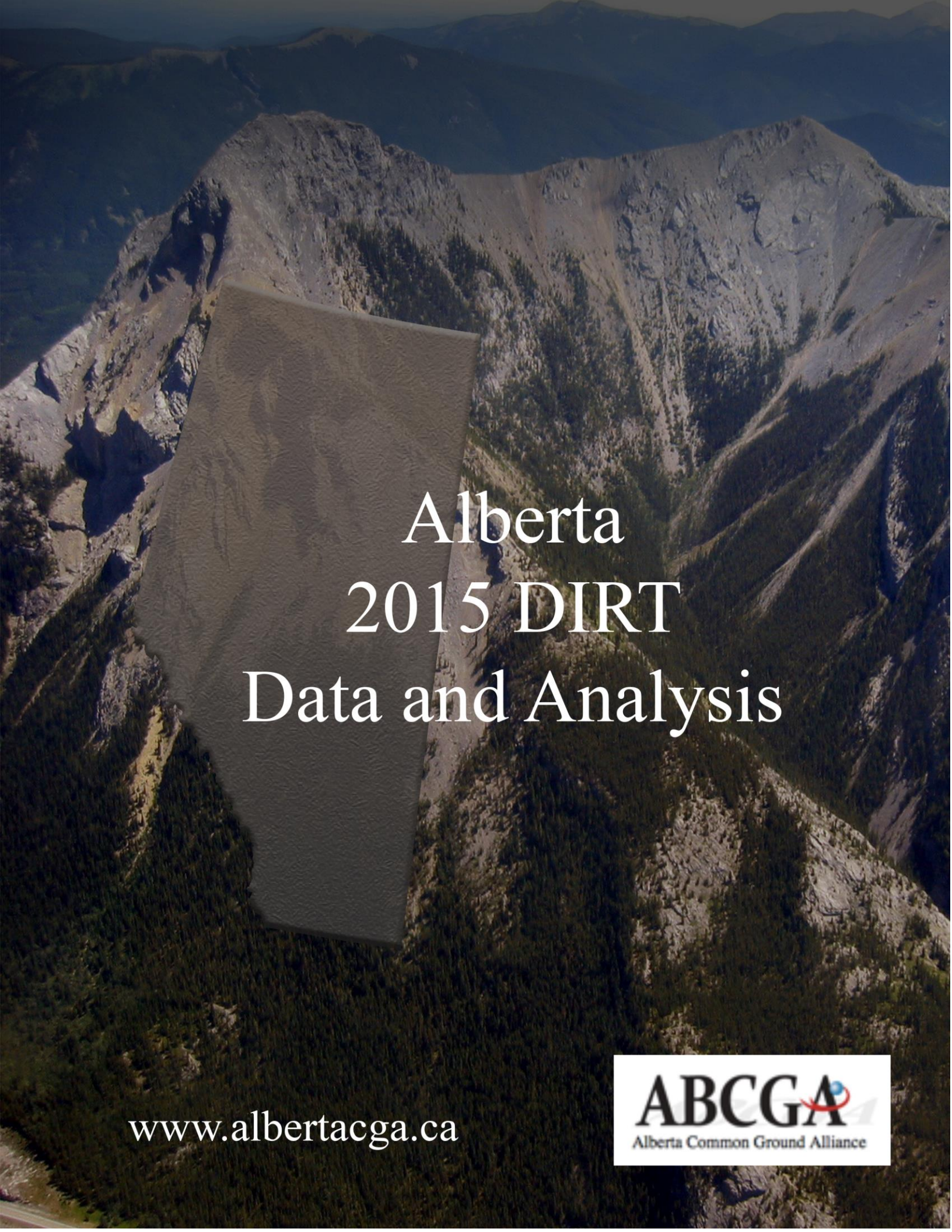
Figure 7: Volume of events recorded by DQI category

In 2015, all of the 1,131 damage event records fell in the 61-80 and 81-100 DQI ranges (where 100 represents the highest data quality), a significant improvement over 2014. The majority (68.5%) of the 1,311 damage event records fell within the highest DQI range 81-100. In most cases the individual DQIs for each part of the damage event records were medium-high to high, with the exception of Parts B, G and H (Excavator Downtime and Cost of Damage).

Recommendations

The following recommendations are intended to enhance industry efforts to reduce damage events and standardize the data collection process. Based on the analysis of the 2015 DIRT data, the recommendations are:

1. **Improved Reporting**. Emphasis should continue to be placed on increasing the number of DIRT submissions so as to provide a more accurate representation of all events within BC in a given year. In BC, the data quality of the reported events was generally high (especially in comparison to AB), though there is always room for improvement. Areas of emphasis for improved reporting include:
    a. Part B: Location and timing of events;
    b. Part G: Excavator downtime; and
    c. Part H: Cost of Damage.
2. **Focus on Seasons**. While damage events occurred throughout the year, the peak season for damage events occurred from April to October with a peak in June. There should be ongoing education initiatives throughout the year with maximum educational efforts focused on April and May before the excavation activity ramps up for the summer.
3. **Focus Locations**. The largest proportion of events occurred in the Greater Vancouver Area, followed by the Interior, which together make up over 70% of all reports. Significant improvement could be possible with initiatives targeted at the two leading regions.
4. **Focus on Contractors, Private Landowners and City Streets.** The majority of events occurred on the *Private–Land Owner*, *Public–City Street*, and to a lesser extent, *Private–Business* land categories, while Contractors represent a large and growing majority of those who submit event reports. Thus, educational messaging should be focused towards private landowners as well as contractors working on both private and municipal worksites. This could include a messaging program focused on large-scale suppliers of landscape materials and tools. Similarly, Hoe/Trencher equipment was involved in the majority of events in both 2014 and 2015 and safety messages should be emphasized during equipment training.
5. **Focus on Construction/Development and Water Work**. *Construction/Development*, which takes nearly half of the distribution, and to a lesser extent *Water*, were the two most prominent categories of events by type of work performed. As is stated above, educational messaging should be targeted towards these categories for maximum impact.
6. **Improving One-Call Practices and Excavation Practices.** *One-Call Practices Not Sufficient* was the root cause in over half of all the reported damage events in both 2014 and 2015 and thus appears to be a major factor in damage to underground infrastructure. *Excavation Practices Not Sufficient* also represented the root cause in over one third of damage events. Further efforts to spread the adoption of safe excavating practices and the use of One-Call by all responsible parties (for example, home owners and contractors) is imperative to reducing the number of damage events.



Alberta
2015 DIRT
Data and Analysis

www.albertacga.ca

ABCGA
Alberta Common Ground Alliance

Alberta DIRT

This section provides a high-level snapshot of damage statistics related to Alberta's underground infrastructure. The goal of this report is to help improve worker and public safety and to protect underground infrastructure in AB. A comprehensive picture of contributing issues is vital to foster a stronger culture of underground safety.

The Alberta Common Ground Alliance (ABCGA) encourages all interested parties to submit their damage reports to the AB Virtual Private DIRT by visiting www.cga-dirt.com. Once registered, users can submit damage information or generate reports on the existing data. This report presents the data collected from the Virtual Private DIRT website in 2015.

The following limitations should be noted with regards to the presentation of the 2015 data:

- While every effort has been made to ensure that the most up to date information is employed in this report, the voluntary nature of DIRT reporting means that it does not include all of the events that occurred in Alberta in 2015. It is clear that not all stakeholders in AB have chosen to report in this edition. The information is statistically relevant for the purposes of a high-level analysis.
- AB DIRT is still relatively new and it appears that some operators did not collect information pertaining to certain prescribed DIRT fields. As such, in a number of cases, some fields have not been completed. The ABCGA will continue to improve the quality of data by educating users on what information is most valuable to collect. The addition of an ABCGA controller submission page would increase the usage and the number of required fields.

As a principle, the ABCGA is committed to improving the data collection process.

About the ABCGA

The Alberta Common Ground Alliance is an open membership organization dedicated to improving worker safety, public safety, community safety, protection of the environment and preservation of the integrity of the infrastructure that provides essential goods and services by identifying, validating and promoting the adoption of effective ground disturbance and damage prevention practices.

The prevention of damage to buried facilities has many stakeholders who are mutually dependent upon the successful execution of one another's roles and responsibilities in the overall process. The exchange of accurate and timely information during the damage prevention process combined with a genuine interest by all stakeholders for a successful outcome is critical. Prevention of damage to buried facilities is a responsibility shared among the stakeholders.

What is now the ABCGA was originally formed in the 1970s as the Alberta Utility Location and Coordination Council (AULCC) of the Alberta Chapter of the American Public Works Association and known most recently as the Alberta Damage Prevention Council (ADPC) of the Alberta Chapter of the

American Public Works Association. In 2004 it was recognized as a Regional Partner of the Common Ground Alliance. The ABCGA was incorporated as a society in July 2011.

The Ground Disturbance Stakeholders Committee, which was originally established in 1998, became part of the ABCGA in 2006. During its 30+ years of activity, the ABCGA has become recognized as the voice of buried facility damage prevention in Alberta. It provides the 'table' to which issues related to damage prevention may be brought for discussion among the stakeholders and ultimate resolution. The ABCGA works with industry stakeholders and regulators to produce stronger, more effective results through cooperation, collaboration and the pursuit of common goals in damage prevention.

The objectives of the ABCGA are:

- To prevent damage from ground disturbance activities by identifying, validating and promoting the adoption of damage prevention best practices among all stakeholders in the buried facility damage prevention process;
- To define and promote recognition and acceptance of the roles, responsibilities and expectations of all the stakeholder groups in the buried facility damage prevention process;
- To establish and maintain minimum program content for ground disturbance training programs;
- To establish and maintain a ground disturbance training program assessment and endorsement process to ensure minimum content consistency and relevance;
- To foster a cooperative approach to the resolution of issues among all the stakeholders in the buried facility damage prevention process;
- To foster a sense of shared responsibility for the prevention of damage to buried facilities;
- To advocate for the development and implementation of fair, reasonable and practical damage prevention regulation that is based on best practices and acceptable to all stakeholder groups;
- To sponsor, promote and participate in public awareness, education and training programs related to the prevention of damage to buried facilities and safe ground disturbance activities;
- To evaluate publications, programs and services that are or may be of interest to members;
- To conduct activities that advance the purposes of the ABCGA and enhance the quality of the services provided to the members;
- To promote membership in the ABCGA and participation in achieving its objectives;
- To establish and maintain liaison with other related interest groups and organizations; and
- To serve as the provincial voice for buried facility damage prevention and ground disturbance training.

Data Analysis

The information provided in this report is generally organized to match the structure of the Damage Information Reporting Field Form of the AB Virtual Private DIRT. The analysis of the data is organized around the following section headings:

- Part A: Information Providers
- Part B: Date and Location of Events
- Part C: Affected Facilities
- Part D: Excavation Information
- Part E, F, H & G: Notification, Locating and Marking, Excavator Downtime, and Cost of Damage
- Part I: Root Causes

Part A: Information Providers

Table 7 indicates the number and percent of damage events reported by stakeholder group. *One-Call Centre* and *Telecommunications* represented the two largest reporting stakeholder groups in 2015 with 753 events (28.5%) and 1,029 events (38.9%), respectively. Compared to 2014, damage events reported by *Liquid Pipeline* plunged from 1,086 to 2, or 37.0% to <0.1%; reports by *One-Call Center* increased from 350 to 753, or from 11.9% to 28.5% of the annual distributions; and reports in the *Unknown/Other* category increased several times from 146 to 575, or from 5.0% to 21.7%.

Table 7. The number of damage events by stakeholder group

Stakeholder Group	2015 Events	2015 %	2014 Events	2014 %
Electric	170	6.4%	143	4.9%
Excavator	-	0.0%	5	0.2%
Liquid Pipeline	2	0.1%	1,086	37.0%
Natural Gas	114	4.3%	180	6.1%
One-Call Center	753	28.5%	350	11.9%
Private Water	1	0.0%	9	0.3%
Telecommunications	1,029	38.9%	1,015	34.6%
Unknown/Other	575	21.7%	146	5.0%
Total	2,644	100.0%	2,934	100.0%

Part B: Date and Location of Events

The total of 2,644 damage event reports in 2015 translates to an average of 220.3 events/month. Figure 8 below demonstrates the actual distribution of event reports per month. The peak season for reported damage events (i.e. greater than the average of 220 events/month) extended from May through October with a peak of 368 events in the month of August. Compared to 2014, 2015 saw drastic decreases in the volume of events in November (275 to 82) and December (169 to 63) and an increase in May (217 to 313).

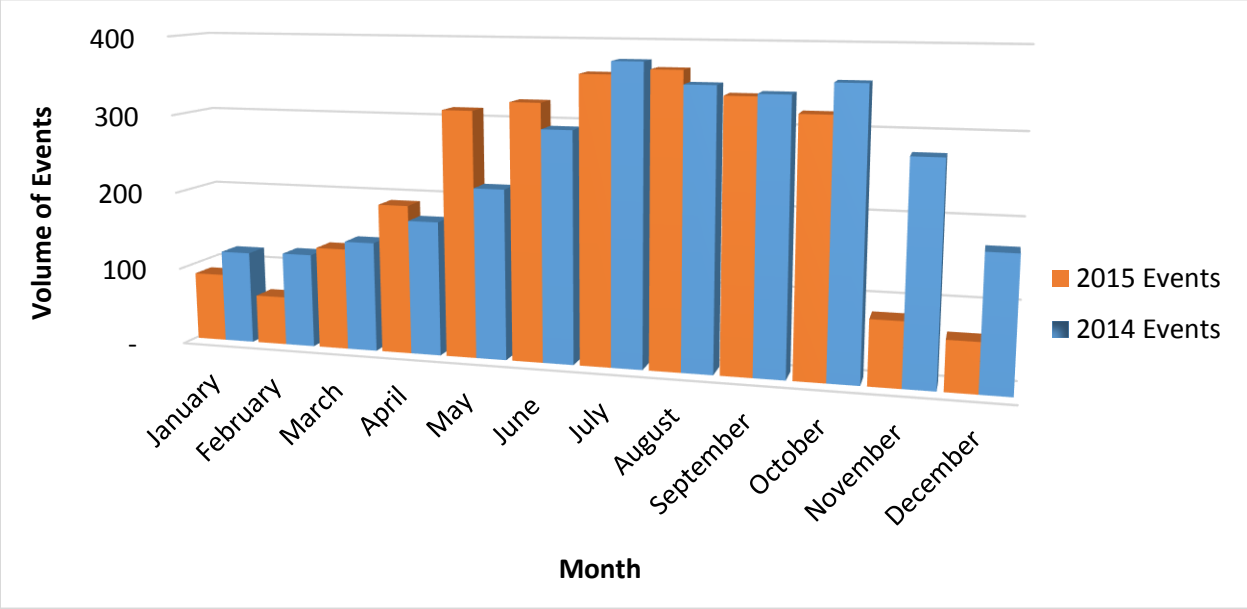


Figure 8. Volume of events by month.

Figure 9 provides the distribution of reported damage events by region within Alberta in 2015. The most events were experienced in the Edmonton region (38.4%), followed by the Calgary region (26.3%), with the North, Central, and South regions reporting proportions close to 10% each. As Figure 9 demonstrates, the province-wide reduction in damage events was especially concentrated in the North, while Edmonton and Calgary both experienced slight increases in number of events.

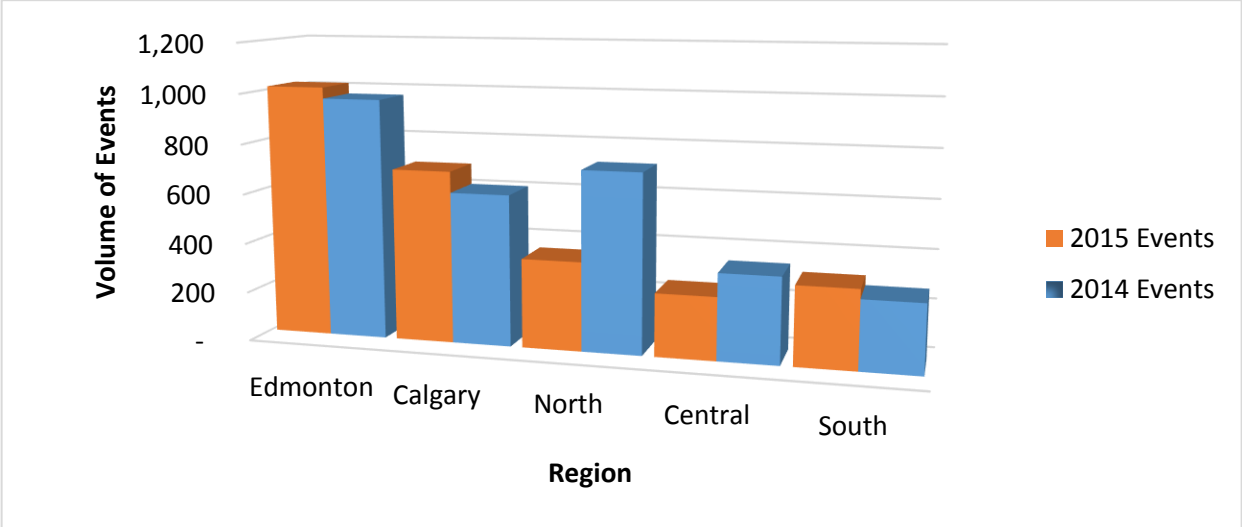


Figure 9. Volume of events by region.

The distribution of damage events in 2015 (Table 8) was concentrated in the *Private–Land Owner* (27.8%), *Public – City Street* (19.1%), and *Private Easement* (13.8%) categories. Compared to 2014, major

increases were seen in the categories of *Dedicated Public Utility Easement* (147 to 267, or 5.0% to 10.1%) and *Pipeline* (34 to 247, or 1.2% to 9.3%), while a dramatic decrease was seen in *Federal Land* (614 to 35, or 20.9% to 1.3%). Finally, the marked decline in "*Data Not Collected*" (from 110 to 3 events, or 3.7% to 0.1%) is an encouraging sign from the perspective of data quality.

Table 8. Volume of events by land type (right of way)

Land Type	2015 Events	2015 %	2014 Events	2014 %
Data Not Collected	3	0.1%	110	3.7%
Dedicated Public Utility Easement	267	10.1%	147	5.0%
Federal Land	35	1.3%	614	20.9%
Pipeline	247	9.3%	34	1.2%
Power/Transmission Line	-	0.0%	7	0.2%
Private - Business	59	2.2%	53	1.8%
Private - Land Owner	735	27.8%	621	21.2%
Private Easement	364	13.8%	414	14.1%
Public - City Street	504	19.1%	444	15.1%
Public - County Road	209	7.9%	261	8.9%
Public - Other	88	3.3%	108	3.7%
Public - Highway	36	1.4%	45	1.5%
Railroad	1	0.0%	1	0.0%
Unknown/Other	96	3.6%	75	2.6%
Total	2,644	100.0%	2934	100.0%

Part C: Affected Facilities

As is demonstrated below in Figure 10, most of the facilities affected in 2015 were *Telecommunications* (1,025 events or 34.9%), the same as in 2014. *Liquid Pipeline* witnessed a major decrease in the number

of events, plunging from 624 events in 2014 to 154 in 2015 (or 21.3% to 5.8% of the respective annual distributions), while *Natural Gas* increased from 599 to 954 (or from 20.4% to 36.1%). Finally, *Water* events also decreased significantly from 268 to 21, (or from 9.7% to 0.8%).

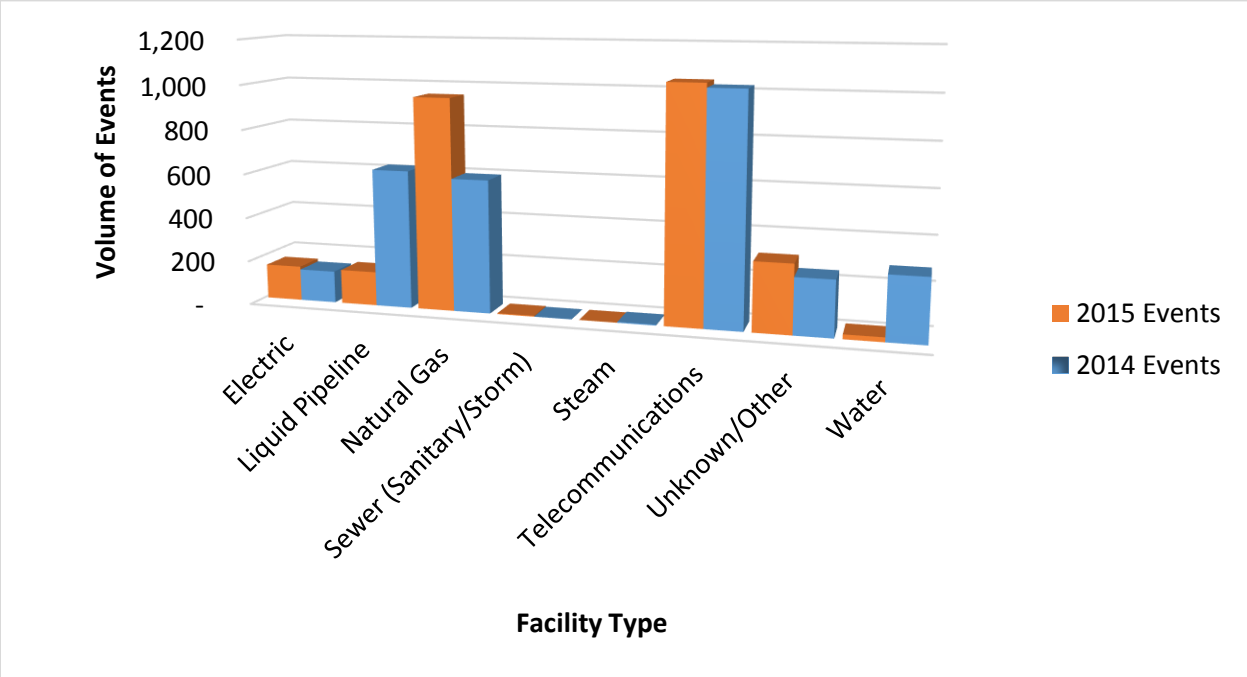


Figure 10. Volume of events by facility operation type.

Part D: Excavation Information

Among the events associated with a known excavation equipment type, *Hoe/Trenchers* represented the majority of the damage events in both years, followed by *Drilling*, *Hand Tools*, and *Vacuum Equipment* in descending order of volume of events (Figure 11 overleaf). However, the majority of events were recorded as *Unknown/Other*, with an even higher proportion undefined in 2015 as in 2014. For this reason, it is impossible to meaningfully analyze this portion of the damage reports.

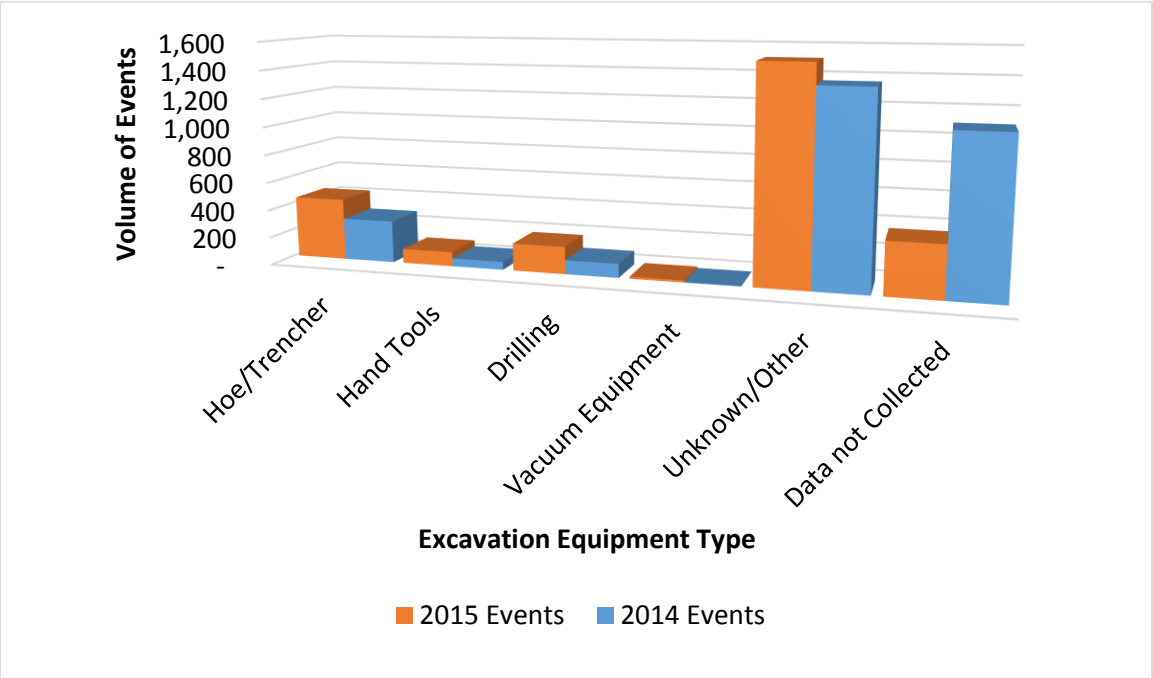


Figure 11. Volume of events by excavation equipment type.

Table 9 below shows the volume of events by excavator type for 2014 and 2015. In 2015, *Contractor*—already the largest reporters of damage events—increased its share to 57.4% of events (or from 1,160 in 2014 to 1,517 in 2015). *County* multiplied by more than a factor of 10 from 30 to 386 events (or from 1.0% to 14.6%), as did *Unknown/Other* from 27 to 273 (or from 0.9% to 10.3%). Huge decreases are seen in the categories of *Occupant* (267 to 7, or 9.1% to 0.3%), *Utility* (294 to 58, or 10.0% to 2.2%), and *Data Not Collected* (1,107 to 356, or 37.7% to 13.5%).

Table 9. Volume of events by excavator type.

Excavator Type	2015 Events	2015 %	2014 Events	2014 %
Contractor	1,517	57.4%	1,160	39.5%
County	386	14.6%	30	1.0%
Data Not Collected	356	13.5%	1,107	37.7%
Developer	1	0.0%	6	0.2%
Farmer	36	1.4%	17	0.6%
Municipality	10	0.4%	26	0.9%
Occupant	7	0.3%	267	9.1%
Unknown/Other	273	10.3%	27	0.9%
Utility	58	2.2%	294	10.0%
Total	2644	100.0%	2,934	100.0%

Figure 12 displays the volume of damage events for the type of work performed. In both years, *Data Not Collected* was the most significant category, although 2015 saw a significant decrease in that category (from 44.5% to 23.5%) and small but encouraging increases in other categories in the distribution, including *Water*, *Energy/Telecommunications*, *Street*, and *Landscaping/Fencing*, indicating a notable increase in data precision.

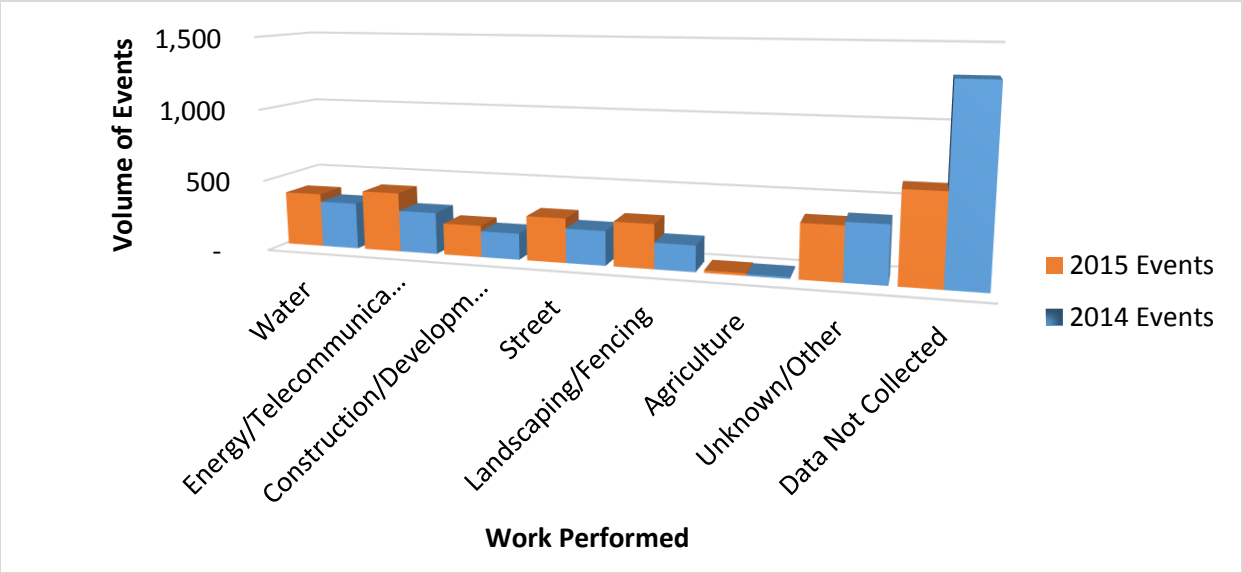


Figure 12: Volume of events by work performed

Part E, F, G & H: Notification, Locating and Marking, and Excavator Downtime, and Cost of Damage

As is stated above, there were 2,644 damage events reported in Alberta in 2015. Table 10 contains statistics on damage events, locate requests submitted, the number of notifications, and the calculated ratios of damage events to 1,000 locates and damage events to 1,000 notifications. In total, there were 410,548 locate requests and 1,947,324 notifications to Alberta One-Call members in 2015, yielding a ratio of 4.5 notifications per locate request. The ratio of damage events per 1,000 locates was 6.4, and there was a ratio of 1.4 damage events per 1,000 notifications.

Table 10. One-Call notifications, locates, and damage ratios

One-Call Notification	2015	Change %	2014
Number of Events (Damages)	2644	-9.9%	2,934
Number of Locates	410,548	-1.4%	416,429
Damage Ratio per 1000 locates	6.4	-8.6%	7.0
Ratio of Notifications per Locate Request	4.7	+4.3%	4.5
Number of Notifications	1,947,324	+3.0%	1,889,150
Damage Ratio per 1000 Notifications	1.4	-12.5%	1.6

Part I: Root Causes

Table 11 provides the volume of damage event records by root cause. *Miscellaneous Root Cause* events declined between 2014 (2,288, or 78%) and 2015 (1,555, or 58%) while still constituting the majority of all events. Correspondingly, there was an increase in the total number events identified with specific categories from 646 in 2014 to 1,089 in 2015. This breaks down into year-over-year increases in the *One-Call Practices Not Sufficient* category (100 to 299, or from 3.4% to 11.3% of respective yearly totals) and *Excavation Practices Not Sufficient* (130 to 386, or 4.4% to 14.6%), while the number of events in the *Locating Practices Not Sufficient* category remained relatively steady.

Table 11. Volume of events by root cause

Damage by Root Cause	2015 Events	2015 %	2014 Events	%
One-Call Practices Not Sufficient	299	11.3%	100	3.4%
Locating Practices Not Sufficient	404	15.3%	416	14.2%
Excavation Practices Not Sufficient	386	14.6%	130	4.4%
Miscellaneous Root Cause	1,555	58.8%	2,288	78.0%
Total	2,644	100.0%	2,934	100.0%

Figure 13 provides greater detail around the breakdown of the *Miscellaneous Root Cause* category and it should be noted that a large number of events were categorized as *Data Not Collected*. It should also be noted that the *Other* category includes unknown root causes, the number of which increased from 137 in 2014 to 1,047 in 2015 (or from 8.8% to 46% of the respective annual distributions).

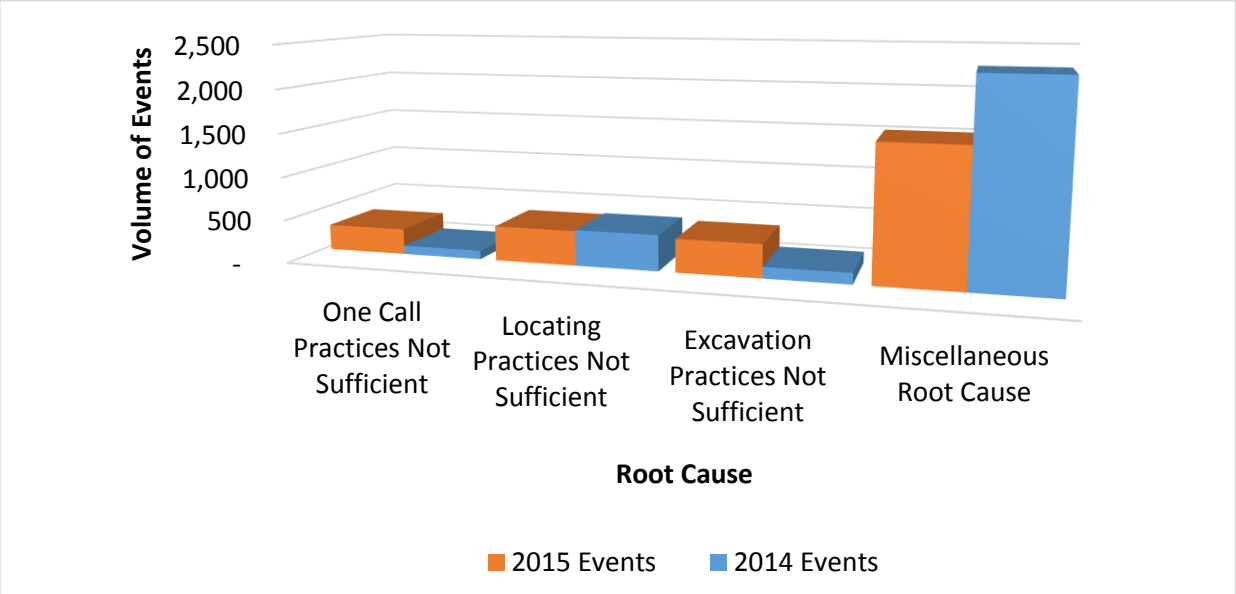


Figure 13. Volume of events by miscellaneous root cause subcategory.

Data Quality

The Data Quality Index (DQI) consists of the evaluation of each of the 2,644 damage records submitted in AB in 2015. DQI is first organized according to reporting sections A through I, and then summarized into quintiles, in order to represent an overall picture of data quality in the AB DIRT program.

Data quality (Figure 14) improved between 2014 and 2015, although much work remains to be done. Declines in the 21-40 and 41-60 categories, the second-lowest and middle quintiles respectively, are evident, as well as an increase in the second-highest quintile, 61-80. In both years, <2% of all recorded damage events fell into the highest quintile. The individual DQIs for each part of the damage event records were generally medium to high with the exceptions of Parts H and I, Cost of Damage and Root Cause.

Figure 14. Volume of event records by DQI category.

Recommendations

The following recommendations are intended to enhance industry efforts to reduce damage events and standardize the data collection process. Based on the analysis of the 2015 DIRT data, the recommendations are:

1. **Ongoing Efforts to Improve Data Quality**. Efforts should be made to significantly improve the overall quality of data with a greater emphasis placed on Part D: Excavation Information and Part I: Root Causes in particular. Although there was a noticeable improvement in data quality concerning Root Causes in 2015, it is still impossible to identify a targetable primary root cause nor a primary excavation equipment type, with a majority of damage reports leaving both equipment type and root cause undefined. Better information on the root causes of damage events would enhance the ability to focus education efforts in future campaigns. Emphasis should also continue to be placed in increasing the number of DIRT submissions so as to provide a more accurate representation of all events within Alberta in a given year.
2. **Focus on Seasons**. While damage events occurred throughout the year, the peak season for damage events occurred from May to November, peaking in July. There should be ongoing education initiatives throughout the year with maximum educational efforts focused on May and June before the excavation activity ramps up for the summer.
3. **Focus Locations**. The majority of events occurred in Edmonton and Calgary, which both saw an increase in damage event reports compared to 2014, while the North's proportion halved. These regions ought to be prioritized in future, as Alberta's two major cities are the location of 64.7% of the province's damage reports in 2015.
4. **Focus on Private Land Owners and City Streets**. Last year it was clear that both *Federal Land* and *Private - Land Owner* were key focus areas. While *Federal Land* has drastically reduced its number of damage reports, *Private - Land Owner* increased, as did *City Street*. Thus, a continuing focus on private landowners as well as a new emphasis on urban street construction work is necessary.
5. **Focus on a Variety of Work Performed**. As in 2014, damage events were fairly uniformly distributed over the different types of work performed (except for *Agriculture*, which may be excepted for having little impact) and there is no one area to concentrate efforts to achieve maximum impact of education efforts.
6. **Improving Practices.** The data quality is insufficient for making targeted recommendations around improving practices. Where data were collected, *Locating Practices Not Sufficient*, *Excavation Practices Not Sufficient*, and *One Call Practices Not Sufficient* all fell into the same range of root cause percentage, indicating that data quality will need to be improved before specific causes may be targeted.

Saskatchewan 2015 DIRT Data and Analysis

www.scga.ca

SCGA
Saskatchewan Common Ground Alliance

Saskatchewan DIRT

This report provides a high-level snapshot of damage statics related to Saskatchewan's underground infrastructure. The goal of this report is to help improve worker safety, public safety and to protect underground infrastructure in SK. A comprehensive picture of contributing issues is vital to foster a stronger culture of underground safety.

This report utilizes information collected using the Common Ground Alliance (CGA) USA's Damage Information Reporting Tool (DIRT). The Saskatchewan Common Ground Alliance (SCGA) encourages all interested parties to submit their damage reports to the SK Virtual Private DIRT by visiting www.cga-dirt.com. Once registered, users can submit damage information or generate reports on the existing data. This report presents the data collected from the Virtual Private DIRT website in 2015.

The following limitations should be noted with regards to the presentation of the 2015 data:

- While every effort has been made to ensure that the most up to date information is employed in this report, the voluntary nature of DIRT reporting means that this report does not include all of the events that occurred in SK in 2015. It is clear that not all stakeholders in SK have chosen to report in this edition. The information is statistically relevant for the purposes of a high-level analysis.
- The SK Virtual Private DIRT is still relatively new and it appears that some operators did not collect information pertaining to certain prescribed DIRT fields. As such, in a number of cases some fields have not been completed. The SCGA will continue to improve the quality of data by educating users on what information is most valuable to collect.

As a principle, the SCGA is committed to improving the data collection process.

About the SCGA

The Saskatchewan Common Ground Alliance (SCGA), through shared responsibility among all key stakeholders, is committed to enhancing public and worker safety while reducing damage to buried facilities. The Common Ground Alliance is a member-driven association dedicated to ensuring public safety, environmental protection, and the integrity of services by developing and promoting effective damage prevention practices, which we refer to collectively as Best Practices. Promoting a spirit of shared responsibility, the CGA welcomes all stakeholders who would like to be a part of the identification and promotion of best practices. In recent years, the CGA has established itself as the leading organization in North America through shared responsibility among all stakeholders. The CGA currently has seven Regional Partnerships throughout Canada including British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec and the Maritimes.

In order to successfully develop and promote effective damage prevention practices, any persons or companies who may be involved in ground disturbance activities such as excavators, locators, road builders, electric, telecommunications, oil, gas, water, One-Call, public works, regulators, fencing contractors, landowners, engineering and design are encouraged to participate.

The underground facility network in Saskatchewan is growing and as a result the stakes are higher for employers and workers as buried facilities become increasingly congested. Stakeholders in the underground community include excavators, locators, planners, and facility owners. To date, there has been tremendous effort given to enhancing the safety of various underground operations focusing on both facility and worker protection by a number of individual groups. The CGA will give Saskatchewan the opportunity to play a part in a new collective approach to damage prevention and worker safety in the province. Following the lead of many jurisdictions across North America, several key employers in Saskatchewan have been looking for ways to collectively renew and enhance our approach to damage prevention and underground worker safety in the province through the creation and promotion of Best Practices.

Understanding the value of a collective approach, Saskatchewan industry partners are committed to adopt the model established in most North American jurisdictions–2015 marks the first year that the full DIRT dataset was available for this report. This member driven association is dedicated to ensuring public safety, worker safety, environmental protection and the integrity of facilities and services by promoting effective damage prevention practices.

Data Analysis

The information provided in this report is generally organized to match the structure of the Damage Information Reporting Field Form. Data for Saskatchewan are limited to those provided by the main public utility companies of SaskEnergy (natural gas), SaskPower (electricity), and SaskTel (telephone). In 2015, the number of damage reports totalled 788, up 13.5% from 682 in 2014, due to an increased focus on reporting. In 2015, the analysis of the data is organized around the following section headings:

- Part A: Information Providers
- Part B: Date and Location of Events
- Part C: Affected Facilities
- Part D: Excavation Information
- Part E, F, H & G: Notification, Locating and Marking, Excavator Downtime, and Cost of Damage
- Part I: Root Causes

Due to previously limited data availability, only sections A, E, and I contain year-over-year comparisons.

Part A: Information Providers

Part A, B, and C account for stakeholder groups, the date and location of events, and the facilities affected. The data for Saskatchewan provide details of the number of damage events by underground utility type.

The majority of damage events reported in 2015 affected *Telecommunications* (402 of 682, or 51%) (Table 12), up from 307 or 45% in 2014. Damage to *Electric* accounted for 191 events (24.2%), followed by natural gas with 176 events (26.4%). Compared to 2014, *Telecommunications* damage events increased both in number (up 95 events) and proportion (up 6% relative to respective annual distributions). In contrast, *Natural Gas* and *Electric* related damage events decreased slightly.

Table 12. The number of damage events by stakeholder group/facility affected

Stakeholder Group	2015 Events	2015 %	2014 Events	2014 %
Telecommunications	402	51.0%	307	45.0%
Natural Gas	176	22.3%	180	26.4%
Electric	191	24.2%	195	28.6%
Liquid Pipeline	17	2.2%	-	0.0%
Unknown/Other	2	0.3%	-	0.0%
Total	788	100.0%	682	100.0%

Part B: Date and Location of Events

The total of 788 damage events reported in 2015 represents an average of 66 events/month. Figure 16 demonstrates the actual distribution of event reports over the year. The peak season for reported

damage events extended from May to November, with the most number of events (109) reported in June.

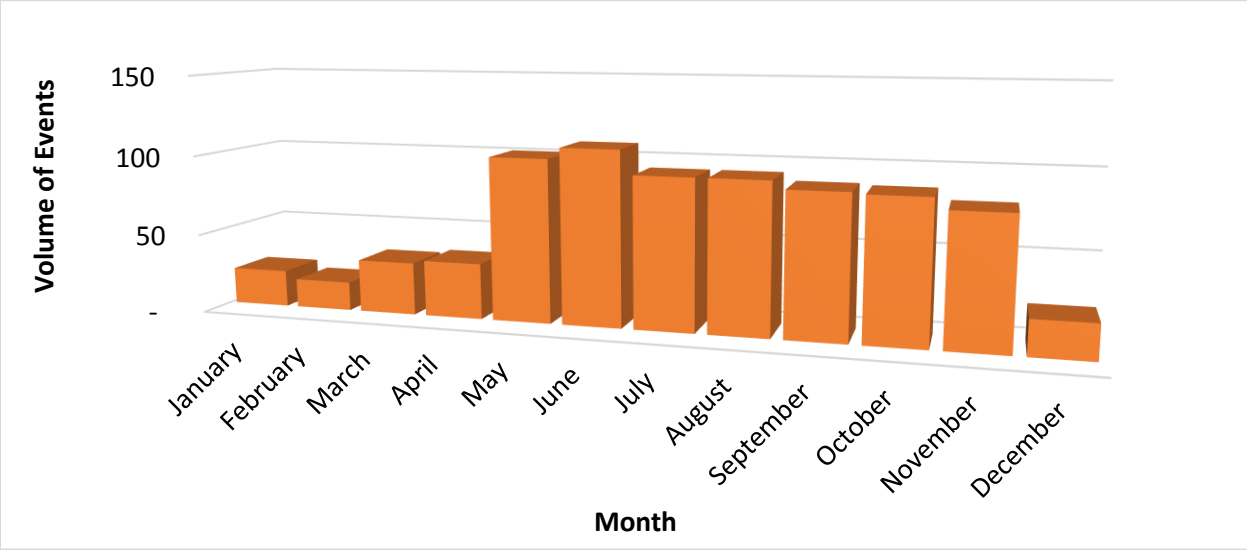


Figure 15: Volume of events by month

Figure 16 shows the distribution of reported damage events across Saskatchewan by region. Saskatoon experienced the most events in 2015 with 224 damage events (28.4%) followed by Regina at 166 (21.1%) and Prince Albert at 169 (16.4%).

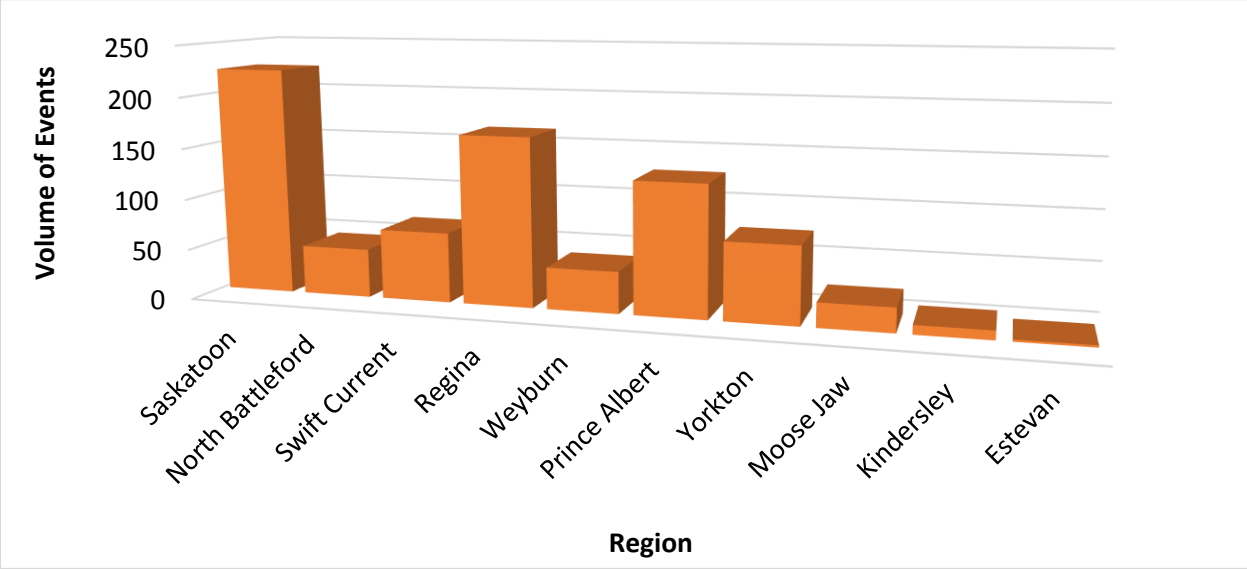


Figure 16: Volume of events by region in 2015

The distribution of damage events associated with a known land type in 2015 (Table 13) was concentrated in the *Private–Land Owner* (38.6%), while *Data Not Collected* (25.4%) and *Unknown/Other* (16%) occupy significant portions of the distribution, and *Public–County Road* comes a distant fourth at 5.8%.

Table 13: Volume of events by land type (right of way) in 2015

Land Type	2015 Events	%
Data Not Collected	200	25.4%
Dedicated Public Utility Easement	12	1.5%
Federal Land	17	2.2%
Pipeline	12	1.5%
Power/Transmission Line	0	0.0%
Private - Business	16	2.0%
Private - Land Owner	304	38.6%
Private Easement	7	0.9%
Public - City Street	29	3.7%
Public - County Road	46	5.8%
Public - Other	1	0.1%
Public - State Highway	18	2.3%
Railroad	0	0.0%
Unknown/Other	126	16.0%
Total	788	100.0%

Part C: Affected Facilities

As shown below in Figure 17, a slim majority of the total events by facility affected in 2015 was *Telecommunications* (403 events, or 51.1%%), followed by *Electric* (197 events, or 25%) and *Natural Gas* (176 events, or 22.3%).

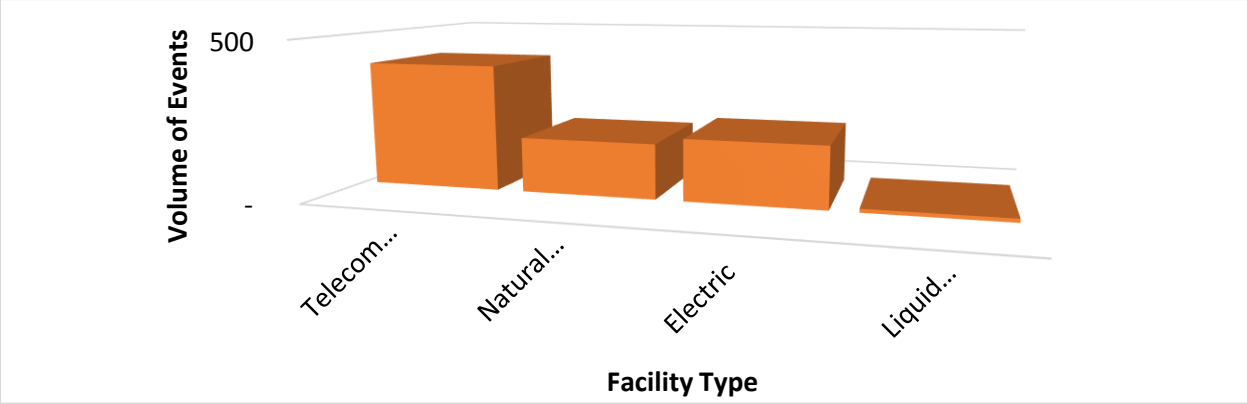


Figure 17: Volume of events in 2015 by facility operation type

Part D: Excavation Information

Among the events associated with a known excavation equipment type, *Hoe/Trencher* was most frequently listed as the equipment involved, with 394 events representing 50% of the total distribution. The categories of both *Unknown/Other* (101, or 12.8%) and *Data Not Collected* (222, or 28.2%) make up much of the rest, except for 62 events (7.9%) associated with *Drilling*.

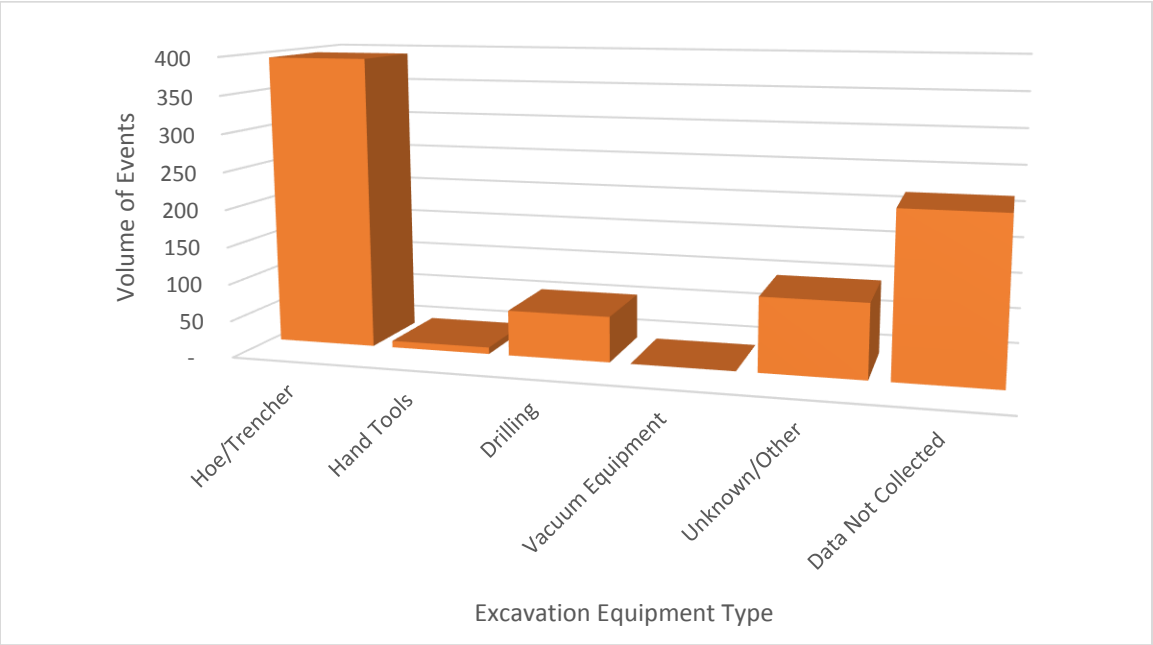


Figure 18: Volume of events by excavator equipment type

Table 14 below shows the volume of events by excavator type for 2015. In 2015, *Municipality* represented the largest category of damage event reporter at 43.8%. The next biggest category was *Unknown/Other* at 24.2% of reported damage events. Unlike the other province, *Contractor* was only a small percentage of damage reports at 3.9%.

Table 14: Volume of events by excavator type

Excavator Type	2015 Events	%
Contractor	31	3.9%
County	0	0.0%
Data Not Collected	67	8.5%
Developer	42	5.3%
Farmer	77	9.8%
Municipality	345	43.8%
Occupant	29	3.7%
Unknown/Other	191	24.2%
Utility	6	0.8%
Total	788	100.0%

Figure 19 represents the volume of damage events in 2015 by the category of work performed. With 241 events (30.6%), *Water* was the most common category, followed by *Street* (183, or 23.2%) and *Energy/Telecommunications* (12.7%), with 222 events for which no data was collected (28.2%).

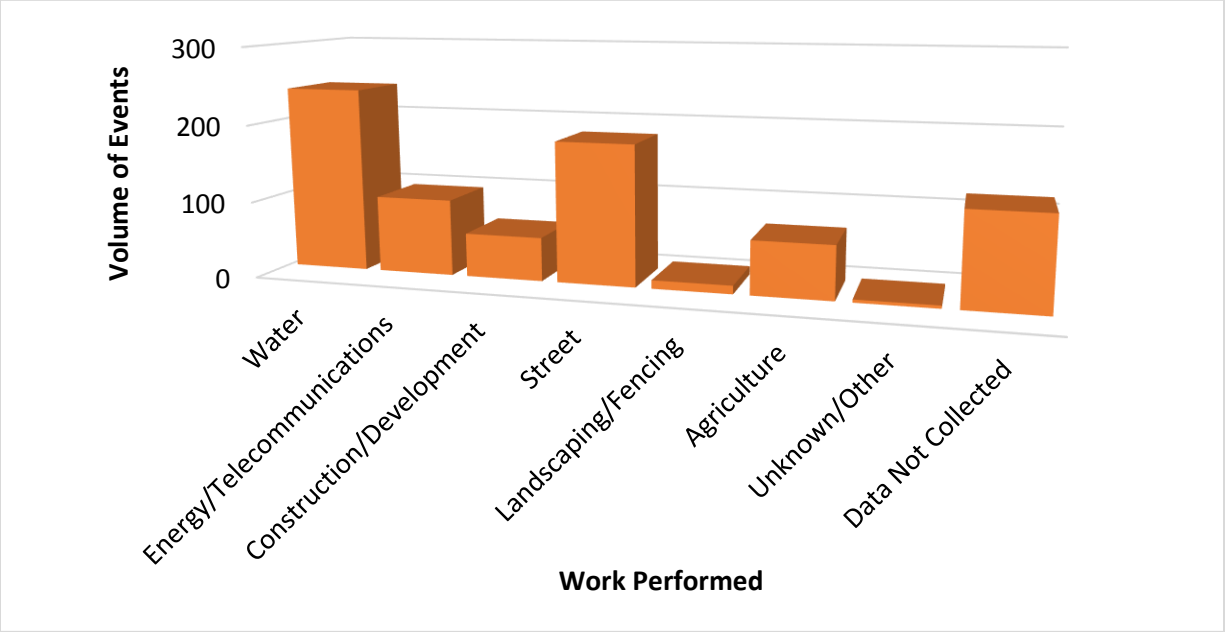


Figure 19: Volume of events by work performed

Part E, F, G & H: Notification, Locating and Marking, Excavator Downtime, and Cost of Damage

Part D, E, F, and G account for excavation type, notification, locating and marking, and excavator downtime. As is stated above, there were 788 damage events reported in SK in 2015. Table 13 contains statistics on damage events, locate requests, the number of notifications, and the calculated ratios of damage events to 1,000 locates and damage events to 1,000 notifications. In 2015, there were 141,964 locate requests and 768,501 notifications to Saskatchewan One-Call members, yielding a ratio of 5.4 notifications per locate request. The ratio of damage events per 1,000 locates was 5.6, and there was a ratio of 1.0 damage events per 1,000 notifications.

Table 15. One-Call notifications, locates, and damage ratios

One-Call Notification	2015	Change %	2014
Number of Damage Events	788	+13.5%	682
Number of Locates	141,964	+3.2%	137,427
Damage Ratio per 1000 locates	5.6	+10.7%	5.0
Ratio of Notifications per Locate Request	5.4	+51.9%	2.6
Number of Notifications	768,501	+53.6%	356,733
Damage Ratio per 1000 Notifications	1.0	-47.4%	1.9

Part I: Root Causes

The volume of damage events by root cause is summarized in Table 14 below. The primary root cause of reported damage events in Saskatchewan in 2015 was *Locating Practices Not Sufficient* with 403, or 51.1% of all events. This stands in contrast to 2014, when *Excavation Practices Not Sufficient* was the primary root cause. In 2015, *Excavation Practices* slipped to second place with 313 (39.7%), while *One-Call Practices Not Sufficient* plunged to 58 (7.4%) from 189 (27.7%). The number of miscellaneous root causes also decreased drastically from 90 (13.2%) in 2014 to 14 (1.8%) in 2015.

Table 16. Volume of events by root cause

Damage by Root Cause	2015 Events	2015 %	2014 Events	2014 %
One-Call Practices Not Sufficient	58	7.4%	189	27.7%
Locating Practices Not Sufficient	403	51.1%	145	21.3%
Excavation Practices Not Sufficient	313	39.7%	258	37.8%
Miscellaneous Root Cause	14	1.8%	90	13.2%
Total	788	100.0%	682	100.0%

Data Quality

The Data Quality Index (DQI) consists of the evaluation of each of the 788 damage records submitted in SK in 2015. DQI is first organized according to reporting sections A through I, and then summarized into quintiles, in order to represent an overall picture of data quality in the SK DIRT program.

In Figure 20 below, 295 damage event reports made the best quintile (37.4%) and a further 294 qualified for the second-highest (37.3%), with the remaining 197 reports falling into the middle quintile (25%). While most reporting sections were of high quality, sections B (Date and Location), H (Excavator Downtime), and especially G (Cost of Damage) all recorded hundreds of damage reports in the lower two DQI categories. Overall, however, the DQI situation in SK is promising in the first year for which such data is available.

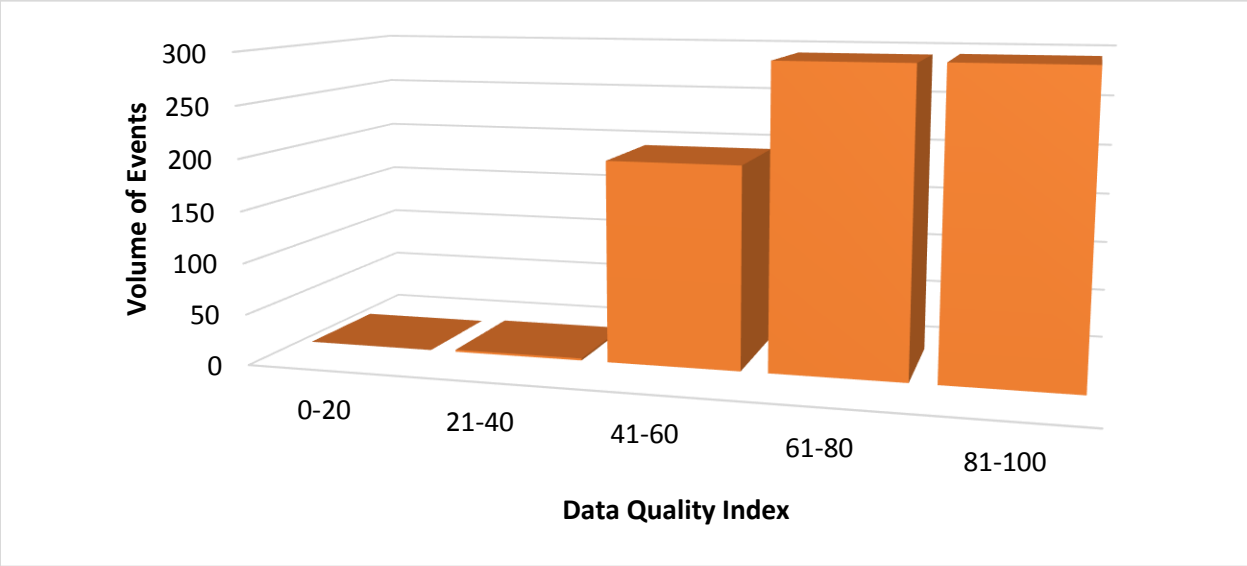


Figure 20: Volume of event records by DQI category

Recommendations

The following recommendations are intended to enhance industry efforts to reduce damage events and standardize the data collection process. Based on the analysis of the 2015 DIRT data, the recommendations are:

1. **Improve Data Availability**. Efforts should be made to improve the overall availability of data in line with other jurisdictions, and expand the range of stakeholders.
2. **Education**. The damage events were fairly evenly spread over the different utility types suggesting there is a greater need for a broad spectrum of education and safety efforts.
3. **Improving Excavation Practices.** Excavation Practices Not Sufficient was the root cause in a large number of the reported damage events. Educational efforts should be focused on increasing awareness of safe excavating practices by all responsible parties (for example, home owners and contractors) and is imperative to reducing the number of damage events in SK.

Appendix A: British Columbia Category Groupings

Geographic Area

Group	Administrative Region
Greater Vancouver	Greater Vancouver
Fraser Valley and Coastal BC	Central Kootenay, Fraser Valley, Powell River, Sunshine Coast
Interior	Cariboo, Central Okanagan, Columbia-Shuswap, East Kootenay, Kootenay Boundary, North Okanagan, Okanagan-Similkameen, Squamish-Lillooet, Thompson-Nicola
Northern	Fraser-Fort George, Northern Rockies, Peace River
Vancouver Island	Alberni-Clayquot, Capital, Comox-Strathcona, Cowichan Valley, Nanaimo

Excavator Grouping

Group	Type of Excavator
Contractor	Contractor
County	County
Data Not Collected	Data Not Collected
Developer	Developer
Farmer	Farmer
Municipality	Municipality
Occupant	Occupant
Unknown/Other	Unknown/Other
Utility	Utility

Excavation Equipment Grouping

Group	Type of Equipment
Hoe/Trencher	Backhoe, Trackhoe, Trencher
Hand Tools	Hand Tools, Probe
Drilling	Auger, Bore, Directional Drill, Drill
Vacuum Equipment	Vacuum Equipment
Other	Farm Implement, Grader, Scraper, Road Milling Equipment, Explosives

Work Performed

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

Root Cause

Group	Root Cause
Excavation Practices Not Sufficient	Failure to maintain clearance, Failure to support exposed facilities, Failure to use hand tools where required, Failure to test hole (pot-hole), Improper backfill practices, Failure to maintain marks
One-Call Practices Not Sufficient	No notification made to One-Call centre, Notification made but not sufficient, Wrong information provided
Locating Practices Not Sufficient	Incorrect facility records/maps, Marking or location not sufficient, Facility not located or marked, Facility could not be found or located
Misc. Root Cause	Abandoned, One-Call centre error, Deteriorated, Previous Damage

Appendix B: Alberta Category Groupings

Geographic Area

Group	County
Edmonton	Barrhead, Westlock, Thorhild, Smoky Lake, St Paul, Bonnyville, Lac St Anne, Sturgeon, Lamont, Strathcona, Two Hills, Minburn, Vermillion, Brazeau, Parkland, Leduc, Wetaskiwin, Camrose, Beaver
Calgary	Bighorn, Mountain View, Kneehill, Starland, Special Area 2, 3 and 4, Kananaskis Country, Foothills, Rocky View, Wheatland
North	Mackenzie, Wood Buffalo, Northern Lights, Clear Hills, East Peace, Saddle Hills, Birch Hills, Smoky River, Big Lakes, Lesser Slave, Athabasca, Lakeland, Greenview, Woodlands
Central	Yellowhead, Clearwater, Ponoka, Lacombe, Stettler, Flagstaff, Wainright, Paint Earth, Provost, Red Deer
South	Newell, Pincher Creek, Willow Creek, Lethbridge, Taber, Cardston, Warner, 40 Mile

Excavator Grouping

Group	Type of Excavator
Contractor	Contractor
County	County
Data Not Collected	Data Not Collected
Developer	Developer
Farmer	Farmer
Municipality	Municipality
Occupant	Occupant
Unknown/Other	Unknown/Other
Utility	Utility

Excavation Equipment Grouping

Group	Type of Equipment
Hoe/Trencher	Backhoe, Trackhoe, Trencher
Hand Tools	Hand Tools, Probe
Drilling	Auger, Bore, Directional Drill, Drill
Vacuum Equipment	Vacuum Equipment
Unknown/Other	Farm Implement, Grader, Scraper, Road Milling Equipment, Explosives

Work Performed

Group	Type of Work
Water	Sewer, Water
Energy/Telecommunications	Natural gas, Electric, Steam, Liquid Pipe, Telecom, Cable TV
Construction/Development	Construction, Site Development, Grading, Drainage, Driveway, Demolition, Engineering, Railroad, Waterway
Street	Roadwork, Curb/Sidewalk, Storm drainage, Milling, Pole, Traffic Signals/Signs, Streetlight, Public Transit
Landscaping/Fencing	Landscaping, Fencing
Agriculture	Agriculture, Irrigation
Unknown/Other	Unknown/Other

Root Cause

Group	Root Cause
Excavation Practices Not Sufficient	Failure to maintain clearance, Failure to support exposed facilities, Failure to use hand tools where required, Failure to test hole (pot-hole), Improper backfill practices, Failure to maintain marks
One-Call Practices Not Sufficient	No notification made to One-Call centre, Notification made but not sufficient, Wrong information provided
Locating Practices Not Sufficient	Incorrect facility records/maps, Marking or location not sufficient, Facility not located or marked, Facility could not be found or located
Misc. Root Cause	Abandoned, One-Call centre error, Deteriorated, Previous Damage

Appendix C: Saskatchewan Category Groupings

Geographic Area

Group	County
Saskatoon	N/A
North Battleford	
Swift Current	
Regina	
Weyburn	
Prince Albert	
Yorkton	
Moose Jaw	
Kindersley	
Estevan	

Excavator Grouping

Group	Type of Excavator
Contractor	Contractor
County	County
Data Not Collected	Data Not Collected
Developer	Developer
Farmer	Farmer
Municipality	Municipality
Occupant	Occupant
Unknown/Other	Unknown/Other
Utility	Utility

Excavation Equipment Grouping

Group	Type of Equipment
Hoe/Trencher	Backhoe, Trackhoe, Trencher
Hand Tools	Hand Tools, Probe
Drilling	Auger, Bore, Directional Drill, Drill
Vacuum Equipment	Vacuum Equipment
Unknown/Other	Farm Implement, Grader, Scraper, Road Milling Equipment, Explosives

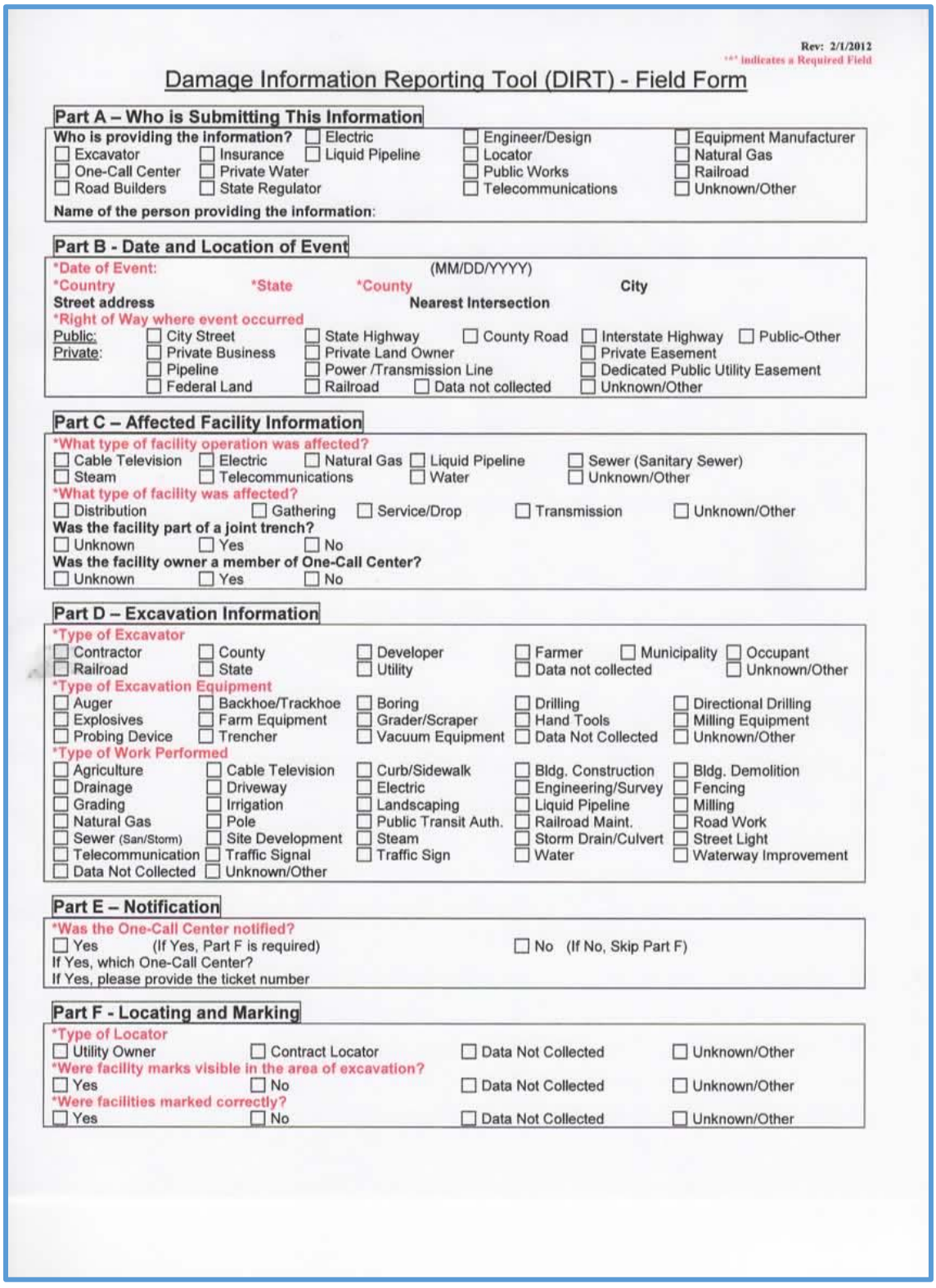
Work Performed

Group	Type of Work
Water	Sewer, Water
Energy/Telecommunications	Natural gas, Electric, Steam, Liquid Pipe, Telecom, Cable TV
Construction/Development	Construction, Site Development, Grading, Drainage, Driveway, Demolition, Engineering, Railroad, Waterway
Street	Roadwork, Curb/Sidewalk, Storm drainage, Milling, Pole, Traffic Signals/Signs, Streetlight, Public Transit
Landscaping/Fencing	Landscaping, Fencing
Agriculture	Agriculture, Irrigation
Unknown/Other	Unknown/Other

Root Cause

Group	Root Cause
Excavation Practices Not Sufficient	Failure to maintain clearance, Failure to support exposed facilities, Failure to use hand tools where required, Failure to test hole (pot-hole), Improper backfill practices, Failure to maintain marks
One-Call Practices Not Sufficient	No notification made to One-Call centre, Notification made but not sufficient, Wrong information provided
Locating Practices Not Sufficient	Incorrect facility records/maps, Marking or location not sufficient, Facility not located or marked, Facility could not be found or located
Misc. Root Cause	Abandoned, One-Call centre error, Deteriorated, Previous Damage

Appendix C: Damage Information Reporting Field Form



Rev: 2/1/2012
"*" 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 ☐ State Highway ☐ County Road ☐ Interstate Highway ☐ Public-Other
Private: ☐ Private Business ☐ Private Land Owner ☐ Private Easement
☐ Pipeline ☐ Power /Transmission Line ☐ Dedicated Public Utility Easement
☐ Federal Land ☐ Railroad ☐ 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 Center?
☐ Unknown ☐ Yes ☐ No

Part D – Excavation Information

*Type of Excavator
☐ Contractor ☐ County ☐ Developer ☐ Farmer ☐ Municipality ☐ Occupant
☐ Railroad ☐ State ☐ Utility ☐ Data not collected ☐ Unknown/Other
*Type of Excavation Equipment
☐ Auger ☐ Backhoe/Trackhoe ☐ Boring ☐ Drilling ☐ Directional Drilling
☐ Explosives ☐ Farm Equipment ☐ Grader/Scraper ☐ Hand Tools ☐ Milling Equipment
☐ Probing Device ☐ Trencher ☐ Vacuum Equipment ☐ Data Not Collected ☐ Unknown/Other
*Type of Work Performed
☐ Agriculture ☐ Cable Television ☐ Curb/Sidewalk ☐ Bldg. Construction ☐ Bldg. Demolition
☐ Drainage ☐ Driveway ☐ Electric ☐ Engineering/Survey ☐ Fencing
☐ Grading ☐ Irrigation ☐ Landscaping ☐ Liquid Pipeline ☐ Milling
☐ Natural Gas ☐ Pole ☐ Public Transit Auth. ☐ Railroad Maint. ☐ Road Work
☐ Sewer (San/Storm) ☐ Site Development ☐ Steam ☐ Storm Drain/Culvert ☐ Street Light
☐ Telecommunication ☐ Traffic Signal ☐ Traffic Sign ☐ Water ☐ Waterway Improvement
☐ Data Not Collected ☐ Unknown/Other

Part E – Notification

*Was the One-Call Center notified?
☐ Yes (If Yes, Part F is required) ☐ No (If No, Skip Part F)
If Yes, which One-Call Center?
If Yes, please provide the ticket number

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

Rev: 2/1/2012
'*' indicates a Required Field

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
☐ $5,001 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/Other

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 ☐ 3 or more 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 *Please choose one

One-Call Notification Practices Not Sufficient
☐ No notification made to the One-Call Center
☐ Notification to one-call center made, but not sufficient
☐ Wrong information provided to One Call Center

Excavation Practices Not Sufficient
☐ Failure to maintain marks
☐ Failure to support exposed facilities
☐ Failure to use hand tools where required
☐ Failure to test-hole (pot-hole)
☐ Improper backfilling practices
☐ Failure to maintain clearance
☐ Other insufficient excavation practices

Locating Practices Not Sufficient
☐ Facility could not be found or located
☐ Facility marking or location not sufficient
☐ Facility was not located or marked
☐ Incorrect facility records/maps

Miscellaneous Root Causes
☐ One-Call Center error
☐ Abandoned facility
☐ Deteriorated facility
☐ Previous damage
☐ Data Not Collected
☐ Other

Part J – Additional Comments

Visit DIRT at www.cga-dirt.com

If any questions, contact lphillips@digline.com

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