DIRT Report 2017

OCTOBER, 2018

Canadian Common Ground Alliance

CCGA
Canadian Common Ground Alliance

A Letter from the CEO

On behalf of the CCGA Board of Directors, I am proud to deliver the CCGA's first coast-to-coast DIRT report. Prior to 2017, the CCGA released a two-page compendium of DIRT data at the annual damage prevention symposium derived from reporting provinces. With our sixth Symposium, the Board committed to move forward with a more robust report.

Reading through the 2017 DIRT Report, a few points come to mind – namely how vast our country is – but mostly how far we have come in such a short amount of time. It wasn't long ago only Ontario, Quebec and British Columbia were reporting damages but with quiet perseverance, all Regions are now reporting into DIRT and the results will only improve. I'm also impressed at the percentage of locate requests originating on the web. Canada has clearly adopted the "Click Before You Dig" call-to-action, but more importantly, there is a lower risk of damage when a locate request is placed over the web so I'm very pleased to see this metric.

While we can bask in the glory of this Canada-wide report, some of the data is troubling. For instance, despite the decades-long efforts and expansive financial resources of Canada's One Call Centres, their members, their members' associations, the digging community – and all damage prevention stakeholders across Canada - 51% of damages are a direct result of no locate request being made to the One Call Centre. It is a fact that is difficult to fathom but it is also a stark reminder that comprehensive damage prevention / One Call legislation is absolutely and unequivocally necessary.

Yours truly,

Todd Scott
Chair - CCGA

Register with DIRT and Be Part of the Damage Prevention Solution

The Canadian Common Ground Alliance (CCGA) invites you to register with Regional Partner Virtual DIRT and report damages to Canada's buried infrastructure. Doing so will allow more thorough analysis and enable damage prevention and safety solutions that will benefit all Canadians.

Alberta: www.albertacga.ca
British Columbia: www.commongroundbc.ca
Ontario: www.orcga.com
Quebec: www.info-ex.com
Saskatchewan: www.scga.ca

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Introduction

The Damage Information Reporting Tool (DIRT) is an initiative of the Common Ground Alliance (CGA) designed to capture data following reports of damage to buried facilities from excavation activities. DIRT allows industry stakeholders in Canada and the United States to submit data anonymously to a comprehensive database. The database is used to identify the characteristics, themes and contributing factors leading to damages. Such findings are summarized in an annual DIRT report. This report, prepared for the Canadian CGA by Green Analytics, provides a summary and analysis of the reported damages occurring in Canada during 2017. Damage is defined as 'any impact or exposure that results in the need to repair an underground facility due to a weakening or the partial or complete destruction of the facility, including, but not limited to, the protective coating, lateral support, cathodic protection, or the housing for the line, device, or facility.'

In 2017, seven Canadian regions reported damages via the DIRT system. The regions and their respective population values are shown in Figure 1.

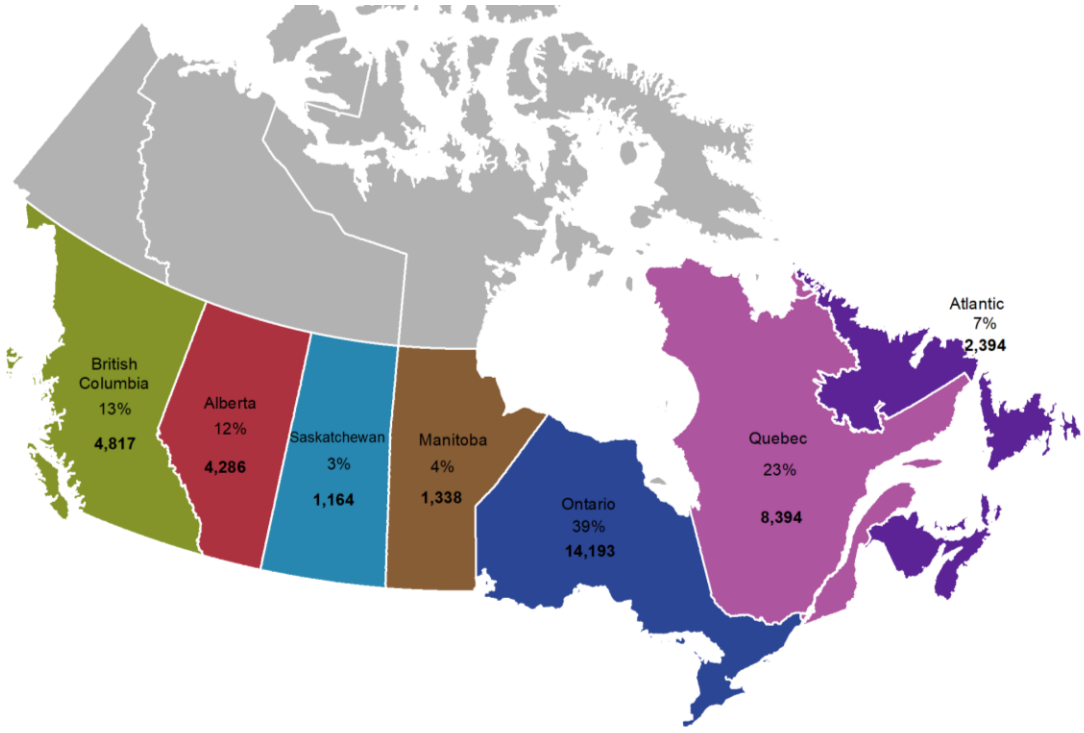

Figure 1. Reporting regions by population

The number of damages reported via DIRT for Canada in 2017 totaled 11,383.
45 damages occurred per work day.

The number of damages reported via DIRT for Canada in 2017 totaled 11,383. Table 1 presents a summary of key performance indicators related to damages by province/region. Canada wide, there were on average 45 reported damages per work day (assuming 254 work days per year). Damage ratio per 1,000 locate requests varied by province ranging from a low of 1.9 damages per 1,000 locate requests in Atlantic Canada to a high of 7.8 damages per 1,000 locate requests in British Columbia. Damage ratio per 1,000 notifications sent to member companies ranged from 0.7 in Ontario to 1.7 in British Columbia and Alberta.

Table 1. Damages, requests, notifications, by province/region, 2017

Province/region	Damages	Damages per work day	Damage ratio per 1,000 locate requests*	Damage ratio per 1,000 notifications**
British Columbia	1,477	5.8	7.8	1.7
Alberta	2,764	10.9	7.3	1.7
Saskatchewan	483	1.9	3.3	1.1
Manitoba	177	0.7	2.9	1.3
Ontario	5,184	20.4	5.0	0.7
Quebec	1,232	4.9	4.7	2.2
Atlantic	66	0.3	1.9	1.2
Total	**11,383**	**44.8**	**5.4**	**1.0**

*Locate request is defined as 'communication between a person planning to undertake a ground disturbance and One Call Centre personnel in which a request for locating underground facilities is processed'.

** Notifications take place when One Call Centres transmit locate requests to their member facility operators. Each incoming notice of intent to excavate will generate several notifications to the electric, gas, water, sewer, cable TV, telecommunications, etc.

Additional highlights from the 2017 data are presented in the box below. Detailed information on damages in 2017 as well as 2015 and 2016 are presented in this report, which is organized as follows:

- Following this **Introduction**, details are provided by **Year and Location of Damages**.
- Subsequent chapters present details on Reporting Stakeholders, Facilities Affected, Excavation Type, Work Details and Root Causes.
- The **Economic Driver Analysis** chapter provides an overview of a statistical analysis that examined relationships between damages and broader economic variables.
- **Societal Cost** estimates are then provided for 2017 damages.
- The **Conclusion** summarizes key trends and draws conclusions from the trends in the data over time and across jurisdictions.
- **Regional Profiles** summarize the damage data by province.

An Important Note About the DIRT Data

The DIRT data is a rich source of industry intelligence on damages related to buried facilities from excavation activities. Despite this, uncertainties remain that limit the ability to draw firm conclusions on the trends over time and across jurisdictions. For one, damages are reported to DIRT on a voluntary basis and thus do not reflect the total number of damages that take place in a given year. For example, an increase in damages in one year, relative to another, could reflect a difference in actual damages, or it could reflect an increase in the number of damages being reported. In addition, not all regions have adopted the database to the same extent. As a result, some jurisdictions contain more comprehensive data than others. This report focuses on reported damages

2017 Highlights

- Total reported damages were 11,383. While this is 6% lower than 2016, the Alberta Common Ground Alliance did not receive damage reports from the Alberta Energy Regulator in 2017.
- 70% of reported damages occurred in two provinces: Ontario (46%) and Alberta (24%).
- Almost 45 damages occurred per work day (assuming 254 work days per year).
- Distribution natural gas and telecommunication facilities, the highest reporting stakeholders, were affected in 89% of damages, 45% and 44% respectively.
- Contractor was the most commonly listed excavator type in damages (72%).
- Hoe/trencher was the most common equipment type used in damages (47%). Equipment type was omitted in almost one third (32%) of reported damages.
- Work on water and sewer systems accounted for 25% of damages. 21% of damages did not report type of work performed or it was classified as other.
- The most common known root cause of damages was no notification made to the One Call Centre.
- 63% of damages due to excavation issues were caused by a failure to use hand tools where required.
- 60% of damages due to location issues were caused by a facility not located or marked.
- Damages are reported to DIRT on a voluntary basis and thus do not reflect total damages per year.

Year and Location of Damages

Table 2 reports the total number of reported damages per year (2015-2017) by province/region and the percent of damages by province/region. The total number of reported damages Canada-wide totaled 11,383, 6% lower than in 2016.

Table 2. Damages per year, by province/region, 2015-17

	Number of damages			Percent of damages		
Province/region	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
British Columbia	1,133	1,269	1,477	10.9%	10.4%	13.0%
Alberta	2,644	4,356	2,764	25.3%	35.9%	24.3%
Saskatchewan	788	634	483	7.5%	5.2%	4.2%
Manitoba	-	-	177	0.0%	-	1.6%
Ontario	4,787	4,755	5,184	45.9%	39.1%	45.5%
Quebec	1,088	1,118	1,232	10.4%	9.2%	10.8%
Atlantic	-	17	66	0.0%	0.1%	0.6%
Total	**10,440**	**12,149**	**11,383**	**100.0%**	**100.0%**	**100.0%**

In 2017, 46% of reported damages were in Ontario, followed by Alberta (24%), British Columbia (13%), Quebec (11%), Saskatchewan (4%), Manitoba (2%) and Atlantic Canada (1%). Damage data from the Alberta Energy Regulator was not included in Alberta's total in 2017. Atlantic Canada did not start collecting data until 2016. Manitoba did not start collecting data until 2017 and data collected for Manitoba captures distribution natural gas and electric facilities.

Reporting Stakeholders

Figure 2 reports total damages by the five most common stakeholder groups for the period 2015-2017. Stakeholders involved with telecommunications and distribution natural gas most often reported damages.

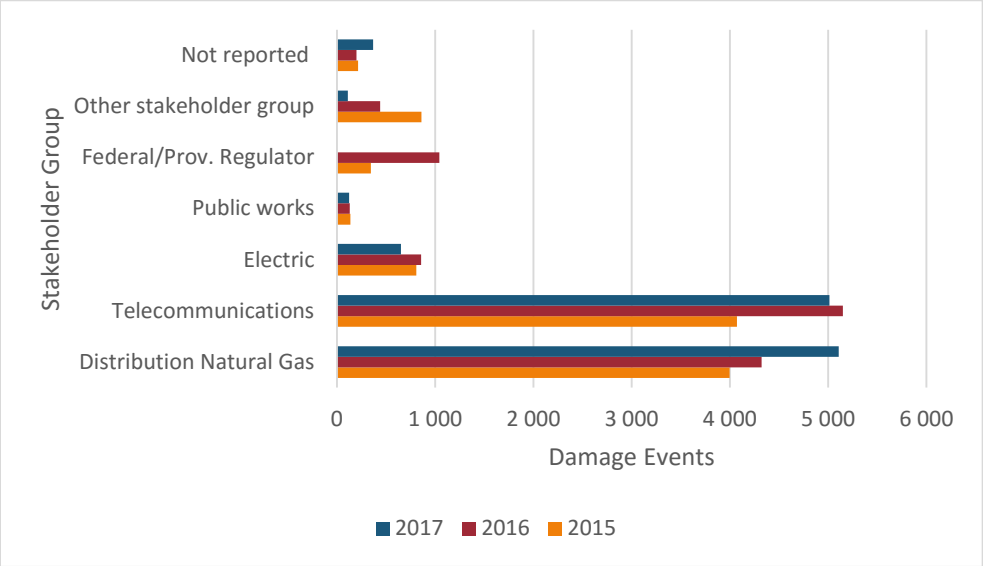

Figure 2. Damages by stakeholder group, 2015-17

As shown in Figure 3, in 2017, 89% of total damages were reported by stakeholders in the distribution natural gas and telecommunication sectors. For 3% of damage reports, the stakeholder group was not listed.

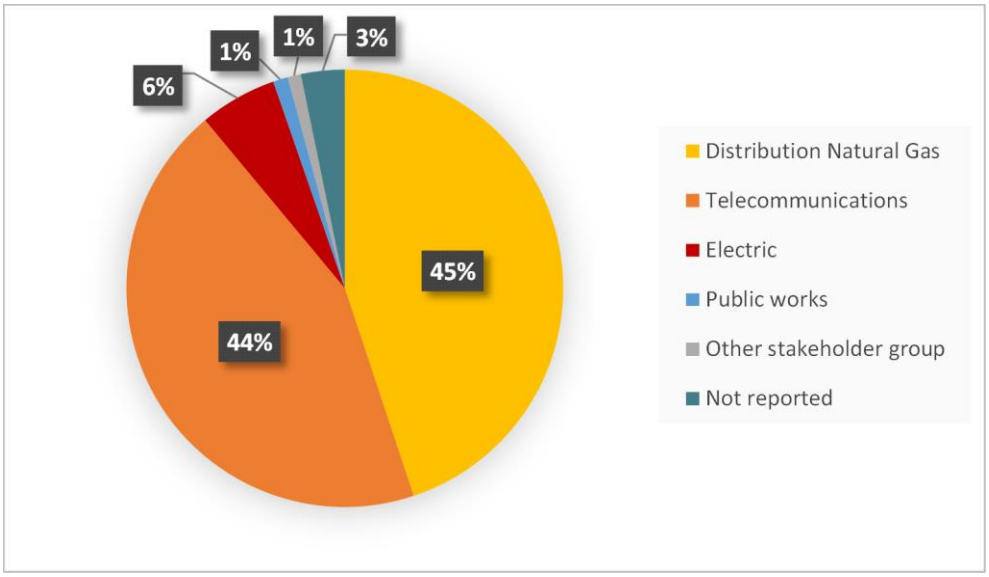

Figure 3. Percentage of damages by stakeholder group, 2017

Facilities Affected

Facilities affected describes the facility operation that is affected by a damage. Between 2015 and 2017, the number of damages increased by 7% in telecommunication and 2% in distribution natural gas facilities. The number of damages declined by 90% in liquid pipeline and by 23% in electric facilities (Figure 4).

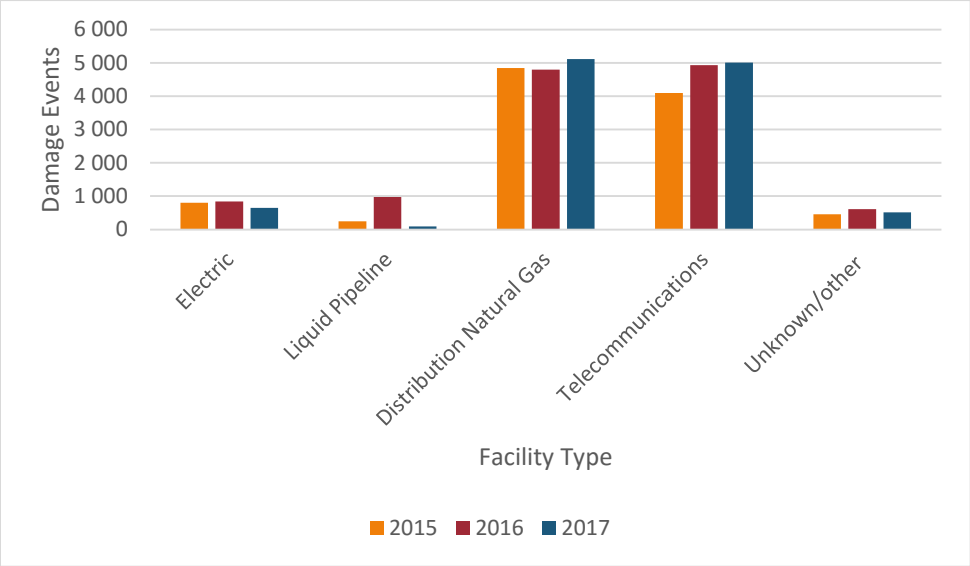

Figure 4. Number of damages by facility type, 2015-17

Of the 11,383 damages that occurred in 2017, distribution natural gas and telecommunication facilities were affected in 89% of the incidents (Figure 5).

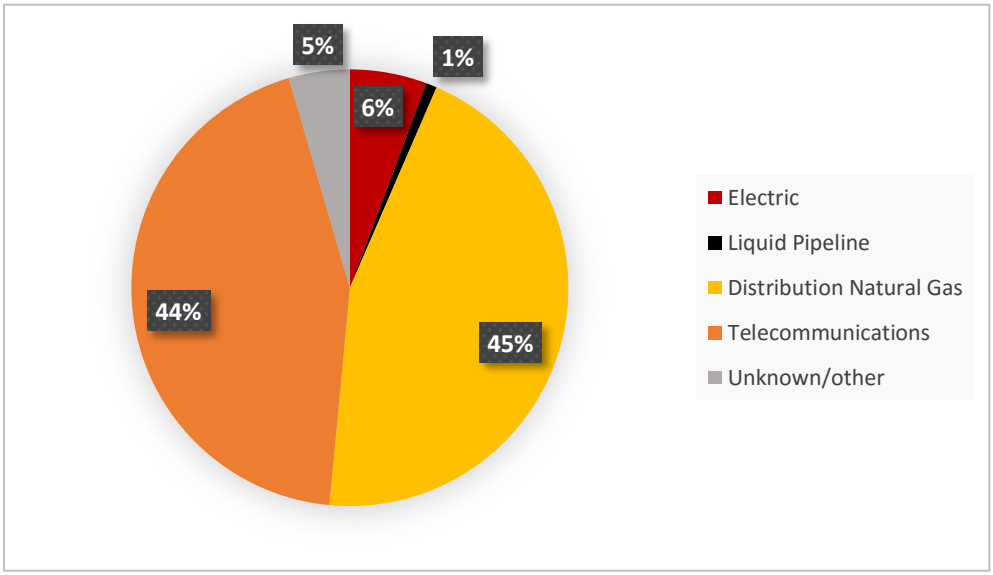

Figure 5. Damages by facility affected, 2017

Table 3 reports the percent of damages by facility type affected at a provincial level. The highest number of facilities affected were typically in the distribution natural gas or telecommunication sectors. In British Columbia, for example, 91% of damages affected distribution natural gas facilities. In Atlantic Canada, 79% of damages affected telecommunication facilities. Manitoba, which currently reports damages to distribution natural gas and electric facilities, had a high number of damages affecting electric facilities.

Table 3. Percentage of damages by facility type, by province/region, 2017

Province/region	Electric	Natural Gas	Liquid Pipeline	Telecommunications
Quebec	7%	41%	0%	52%
Alberta	6%	30%	1%	63%
British Columbia	0%	91%	4%	5%
Ontario	7%	46%	0%	47%
Saskatchewan	0%	27%	1%	72%
Manitoba	44%	56%	0%	0%
Atlantic	0%	21%	0%	79%
Total	**6%**	**47%**	**1%**	**46%**

Note: table does not include unknown.

Excavator Information

This section of the report describes the type of excavator and excavator equipment involved in damages.

Excavator Type

Figures 6 and 7 report the number and percentage of damages by type of excavator, respectively. Contractor is the most commonly listed excavator type in damages (72% of damages). However, this stakeholder group is also responsible for the majority of excavations and locate requests. Occupant was reported second most frequently (11% of damages). In 9% of damage reports, the field was left blank.

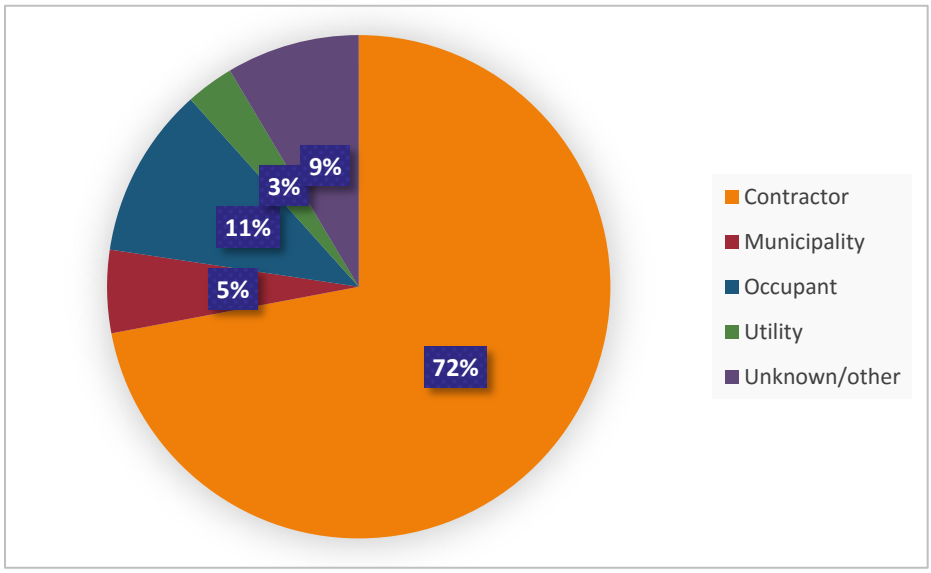

Figure 6. Percentage of damage reports by type of excavator, 2017

Contractor damages increased year over year from 2015 to 2017, while municipalities experienced an increase in damages from 2015 to 2016 and then a decline in damages in 2017. Occupant, utility owner and other/unknown experienced a decline in damages in 2017 from 2016 levels.

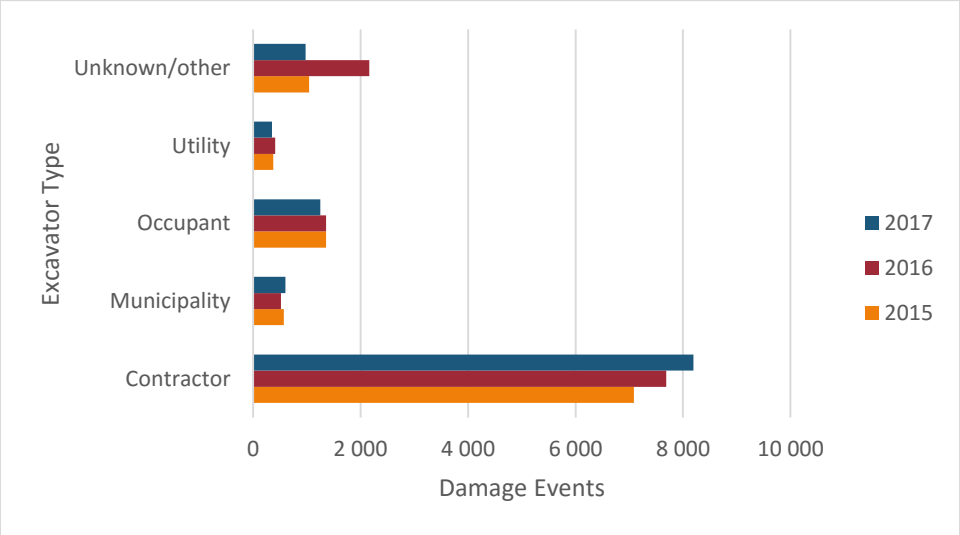

Figure 7. Damages by excavator type, 2015-17

Excavator Equipment Type

Figure 8 presents the percentage of damage reports by excavator equipment type used. Hoe/trencher was the most common equipment type cited in damage reports (47%) in the year 2017. Equipment type was omitted in almost one third (32%) of damage reports.

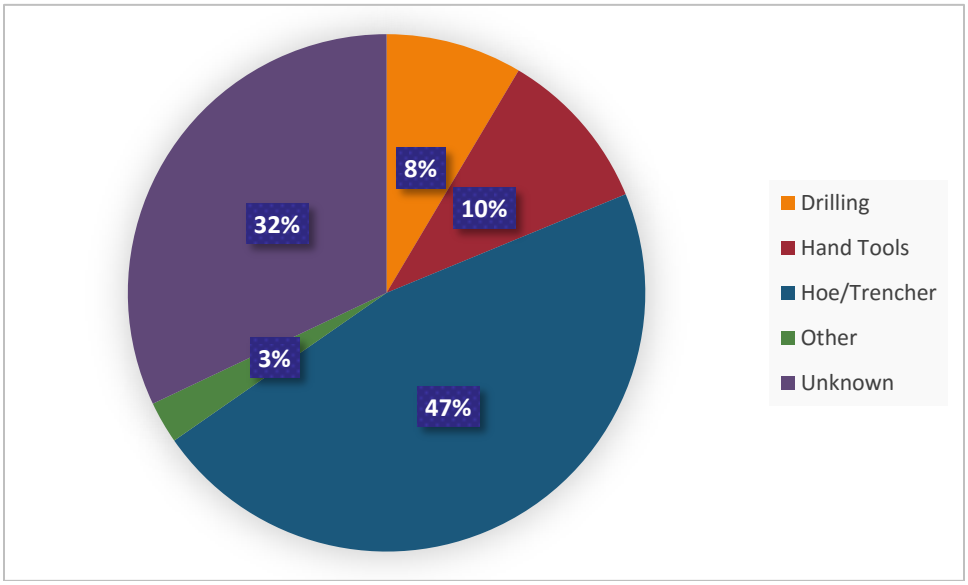

Figure 8. Percentage of damage reports by excavator equipment type, 2017

All categories of known equipment types increased in the year 2017 compared to the year 2016 with drilling increasing the most in percentage terms (14%) (Figure 9).

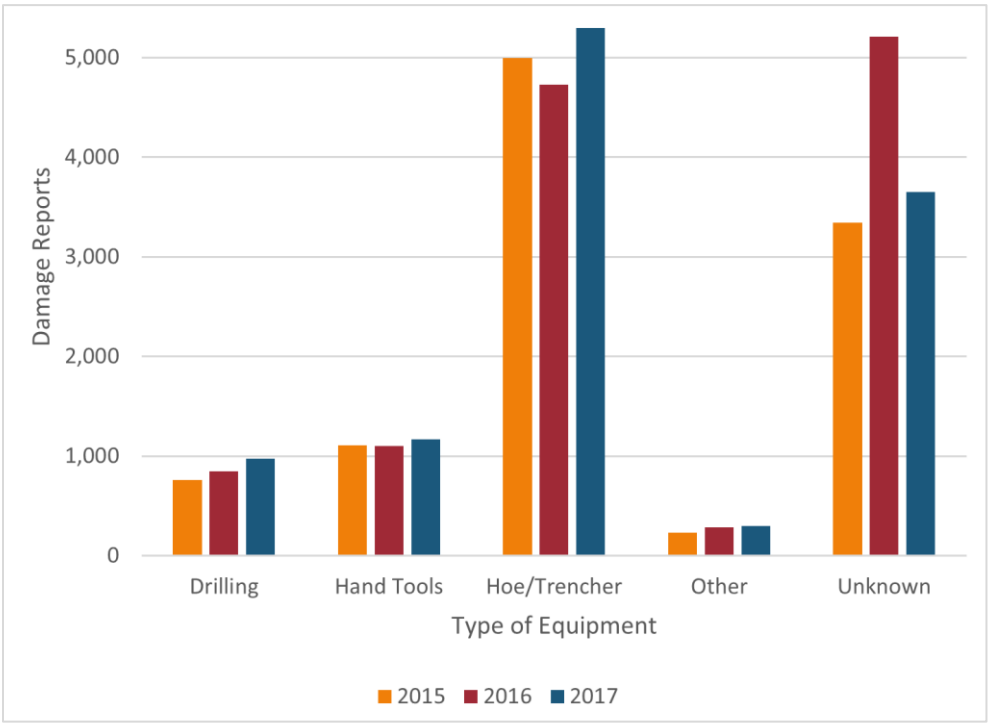

Figure 9. Damages by excavation equipment type, 2015-17

Work Details

Figure 10 displays the number of damages by the type of work performed for the years 2015 to 2017. The number of damages increased year over year for road/street, utilities, agriculture and water/sewer. For landscaping and unknown, the number of damages increased in 2016 from 2015 and then declined in 2017. Construction saw a decline in damages from 2015 to 2016 and then an increase to 2017.

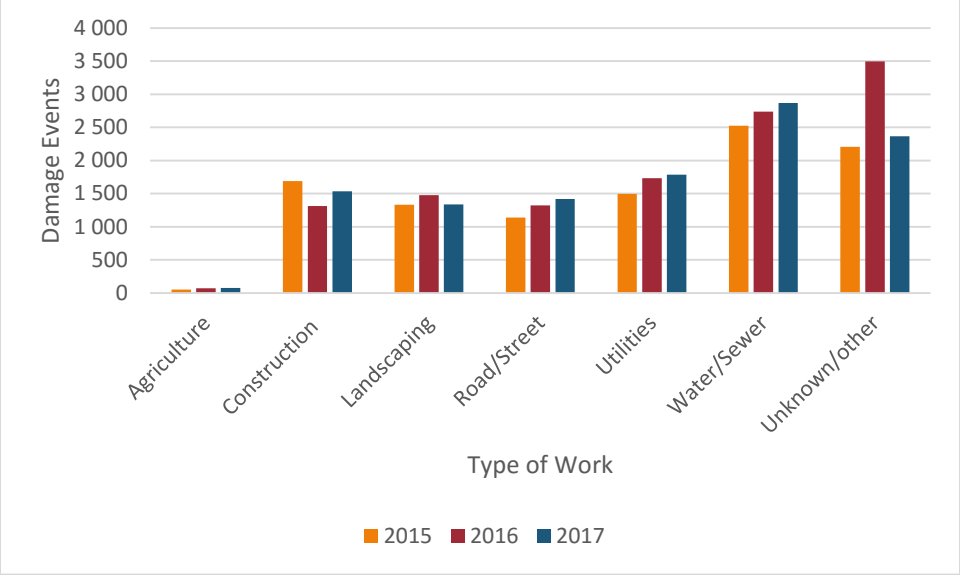

Figure 10. Damages by type of work performed, 2015-17

As shown in Figure 11, work on water and sewer systems accounted for 25% of damages in 2017. Twenty one percent (21%) of damages did not report type of work performed or it was classified as other.

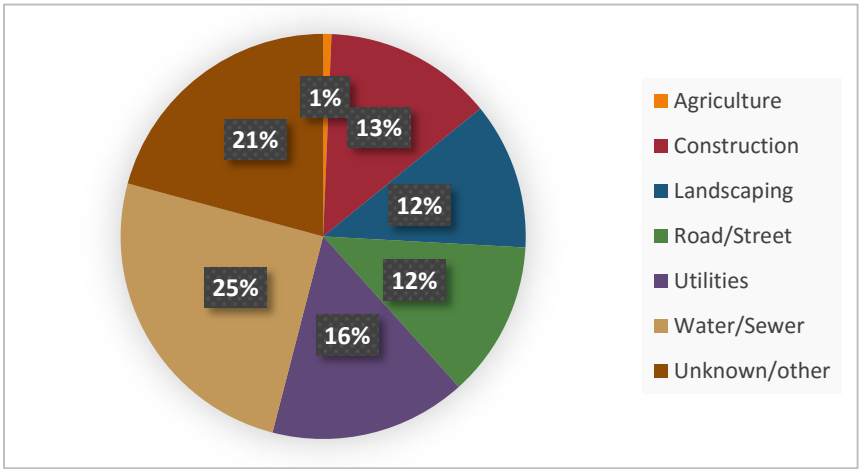

Figure 11. Percentage of damages by type of work performed, 2017

Table 4 reports damages by type of work performed and type of excavator for the year 2017. The top causes of damages were by contractors (72% of total damages) working on water/sewers, followed by utilities, construction, roads and landscaping. Work performed by occupants had the second highest rate of damages (11% of total damages). The type of work most likely to cause damage by occupants was landscaping.

Table 4. Damages by type of work performed and type of excavator, 2017

Work Type	Contractor	Municipality	Occupant	Utility	Fed/prov. Gvt	Unknown/ other	Total
Agriculture	22	0	51	0	0	2	75
Construction	1,197	23	219	17	1	71	1,528
Landscaping	821	30	410	15	0	57	1,333
Road/Street	1,150	112	44	35	3	71	1,415
Utilities	1,451	16	61	183	2	73	1,786
Water/Sewer	2,212	324	178	67	2	82	2,865
Unknown/ other	1,341	101	288	34	0	615	2,381
Total	**8,194**	**606**	**1,251**	**351**	**8**	**971**	**11,383**

Table 5 reports damages by type of work performed by province. The leading type of damage varied by province. Damages attributed to work performed on water and sewer systems was the most frequent in British Columbia (BC), Alberta (AB), Ontario (ON) and Quebec (QC). The leading cause of damages in Saskatchewan (SK) was construction. The leading cause in Manitoba (MB) was landscaping. The leading cause in the Atlantic Provinces was work on road/streets.

Table 5. Damages by type of work performed, by province, 2017

Work Type	BC	AB	SK	MB	ON	QC	Atlantic	Total
Agriculture	30	7	24	0	4	10	0	75
Construction	190	255	144	10	776	152	7	1,534
Landscaping	114	216	33	58	784	127	4	1,336
Road/Street	110	321	35	16	629	289	18	1,418
Utilities	148	486	98	28	954	65	8	1,787
Water/Sewer	458	502	82	41	1,377	394	13	2,867
Unknown/ Other	427	977	67	24	660	195	16	2,366
Total	**1,477**	**2,764**	**483**	**177**	**5,184**	**1,232**	**66**	**11,383**

Root Cause

Root cause describes the reason for reported damages. Of the 11,383 damages, the root cause is known for only 48% of damages. Figure 12 provides a breakdown of known root causes in 2017. The most common known root cause was no locate request made to the One Call Centre (51%) followed by excavation issues (27%) and locating issues (18%).

The most common known root cause was no locate request made to the One Call Centre.

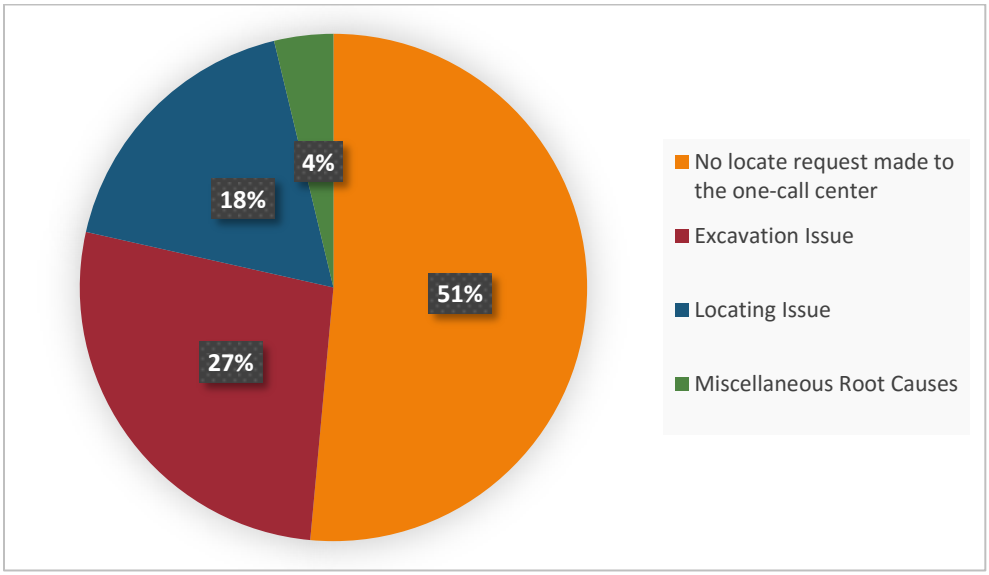

Figure 12. Known root causes

Of the 1,481 known root causes attributed to excavation issues, 63% were caused by a failure to use hand tools where required followed by failure to maintain clearance (15%). Figure 13 presents known root causes attributed to excavation issues.

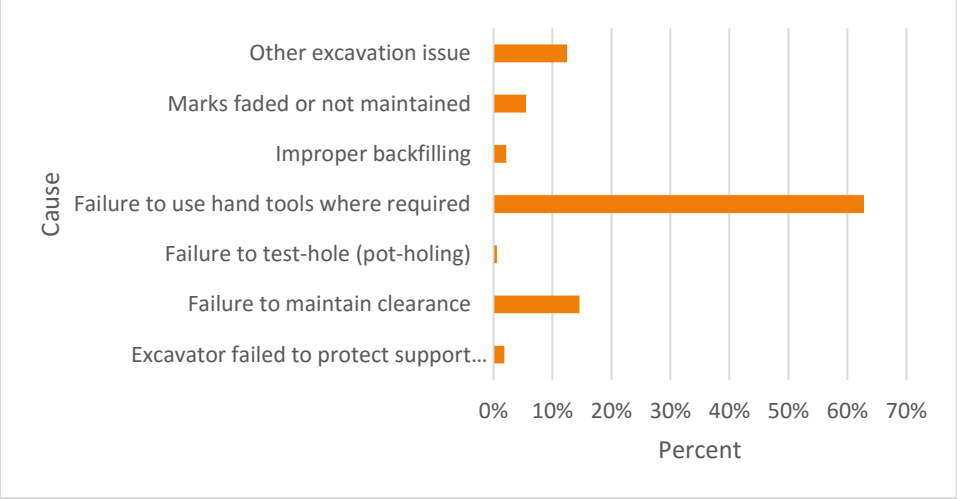

Figure 13. Known root cause by excavation issue

Of the 970 known root causes attributed to location issues, 60% were caused by a buried facility not located or marked, followed by inaccurate markings (31%) and incorrect facility records (9%). Figure 14 presents known root causes attributed to location issues.

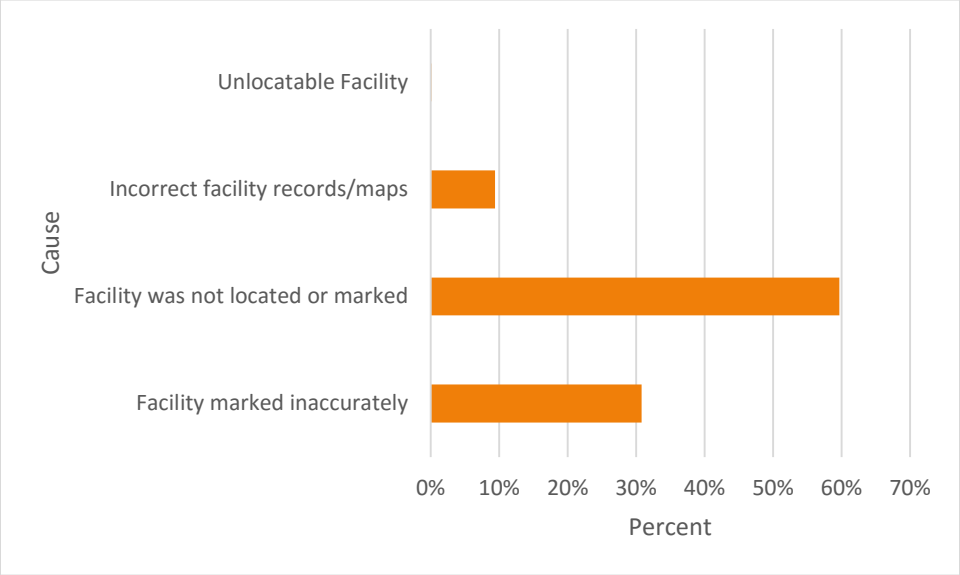

Figure 14. Known root cause by location issue

Of the 51% of damages attributed to no locate request made to the One Call Centre, 74% occurred at an electricity or distribution natural gas facility posing a high risk to public, worker and community safety (Table 6). This demonstrates that notifying the One Call Centre is a critical measure to prevent workplace injury.

Table 6. Breakdown of no locate request made to One Call Centre

Province/region	No locate request made to the One Call Centre	No locate request, electric	No locate request, natural gas	Percent of total – no locate, electric, natural gas
Quebec	320	0	143	45%
Alberta	303	11	212	74%
British Columbia	845	0	792	94%
Ontario	1,198	7	841	71%
Saskatchewan	104	0	0	0%
Manitoba	40	15	25	100%
Atlantic	4	0	0	0%
Total	**2,814**	**33**	**2,013**	**73%**

Table 7 shows the breakdown of locate requests placed via telephone versus the web as well as the number of registered members of One Call Centres by province/region.

Table 7. Registered members at One Call Centres and percent of phone versus web locate requests

Province/region	Registered Members	Phone Locate Requests (%)	Web Locate Requests (%)
Quebec	196	10	90
Alberta	871	17	83
British Columbia	341	37	63
Ontario	824	22	78
Saskatchewan	88	50	50
Manitoba	37	31	69
Atlantic	26	15	85
Total	**2,383**	**26**	**74**

Economic Driver Analysis

This chapter explores relationships between the DIRT data and broader economic variables. A statistical analysis was undertaken to test the presence of statistically significant relationships between the number of damages (dependent variable) reported via the DIRT system and a series of independent variables. The analysis considered data for 2015, 2016 and 2017 and focused on Quebec, Ontario, Alberta, Saskatchewan and British Columbia. Manitoba and the Atlantic region were excluded from the analysis due to limited data for 2015 and 2016. The statistical analysis revealed statistically significant relationships between the number of damages and the following variables:

- Notifications
- Population
- Population density
- Housing starts
- Housing under construction
- Labour force size
- Unemployment
- Employment
- Employment in construction
- Employment in utilities
- Number of residential building permits
- Value of residential building permits
- Value of non-residential building permits
- Gross domestic product (GDP)
- Underground distribution sector GDP
- Construction sector GDP
- Telecommunications sector GDP

The presence of a statistically significant relationship means that a change in any of the independent variables (listed above), all else being equal, correlates with a change in the dependent variable, or in this case, a change in the number of damages. Strong relationships between the number of damages and notifications, employment in the construction sector, construction sector GDP and housing starts were observed. Before exploring these specific relationships, it is useful to consider the trend in the damages across the regions captured in the analysis. Table 8 shows damages for the relevant regions for 2015, 2016 and 2017. As can be seen in the data, there was an increase in the number of damages in 2016 relative to 2015. In 2017, the damages decline, largely due to a decline in damage data in Alberta. Note that 2017 data for Alberta does not include damages from the Alberta Energy Regulator.

Table 8. Damages by region, 2015 to 2017

Region	2015	2016	2017
Quebec	1,088	1,118	1,232
Alberta	2,644	4,356	2,764
British Columbia	1,133	1,269	1,477
Ontario	4,787	4,755	5,184
Saskatchewan	788	634	483
Total with Alberta	10,440	12,132	11,140
Total without Alberta	7,796	7,776	8,376

The series of figures below demonstrates the time trend for notifications, employment in construction, construction sector GDP and housing starts in relation to damages. Given the impact the trend in damage data in Alberta has on the overall trend (i.e. the decline in damages in 2017 relative to 2016 in Alberta contributes to an overall decline in total damages for all regions that would otherwise not be observed), the relationships are presented both with Alberta and without Alberta data included.

Figure 15 demonstrates the trend in damages in relation to notifications. As can be seen in the figure, when Alberta is excluded from the data, both notifications and damages demonstrate a slight upward trend from 2015 to 2017 indicating that all else being equal, an increase in notifications will correlate with an increase in damages.

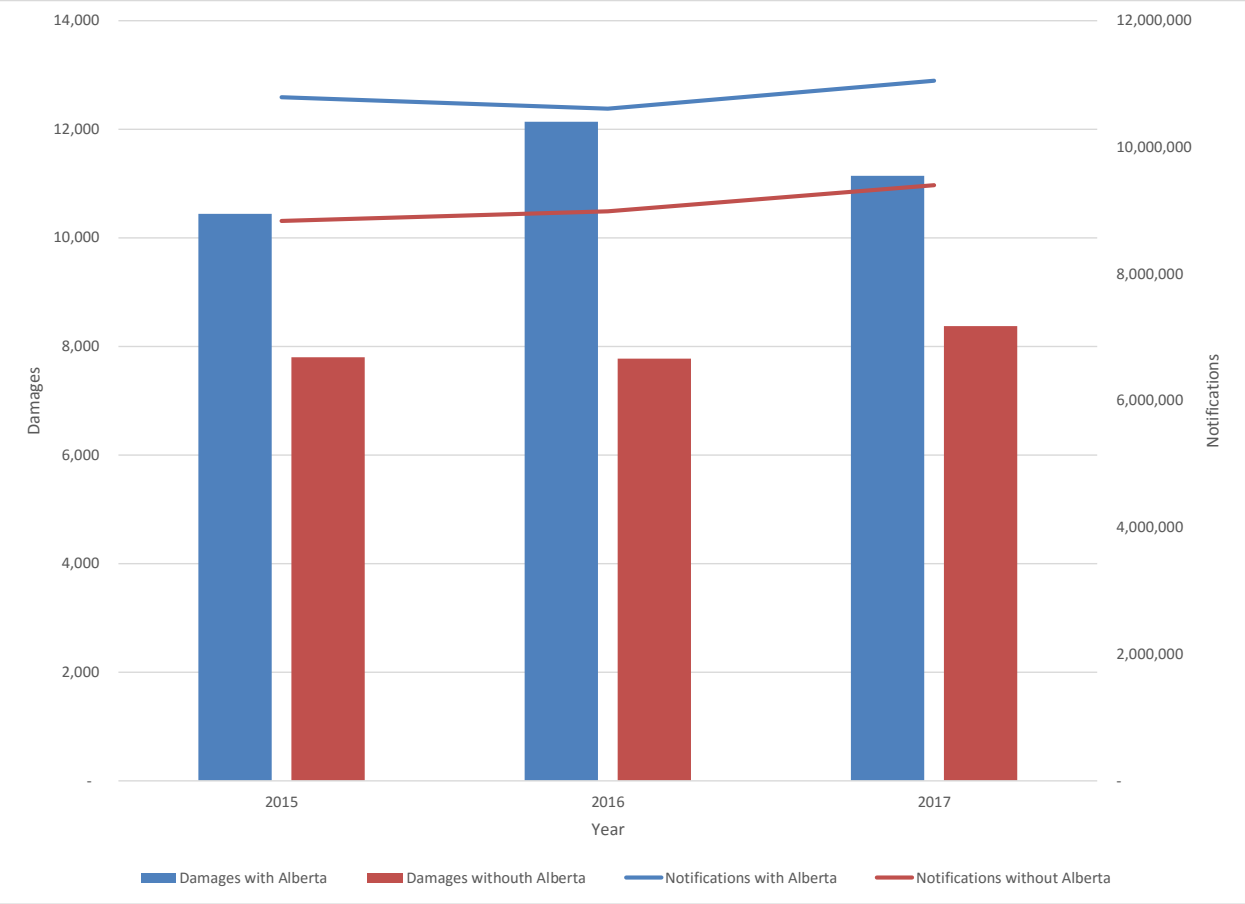

Figure 15. Damages in relation to notifications over time

The figure below demonstrates the relationship between damages and housing starts. Here again, the relationship is demonstrated both including and excluding Alberta data to demonstrate the impact of Alberta's decline in 2017 damage data on the overall damage trend across jurisdictions. The positive relationship between damages and housing starts (when Alberta data is excluded) is observable with both variables increasing between 2015 and 2017. Between 2016 and 2017, (excluding Alberta data) housing starts increased by 9% while damages increased by 8% over the same time period.

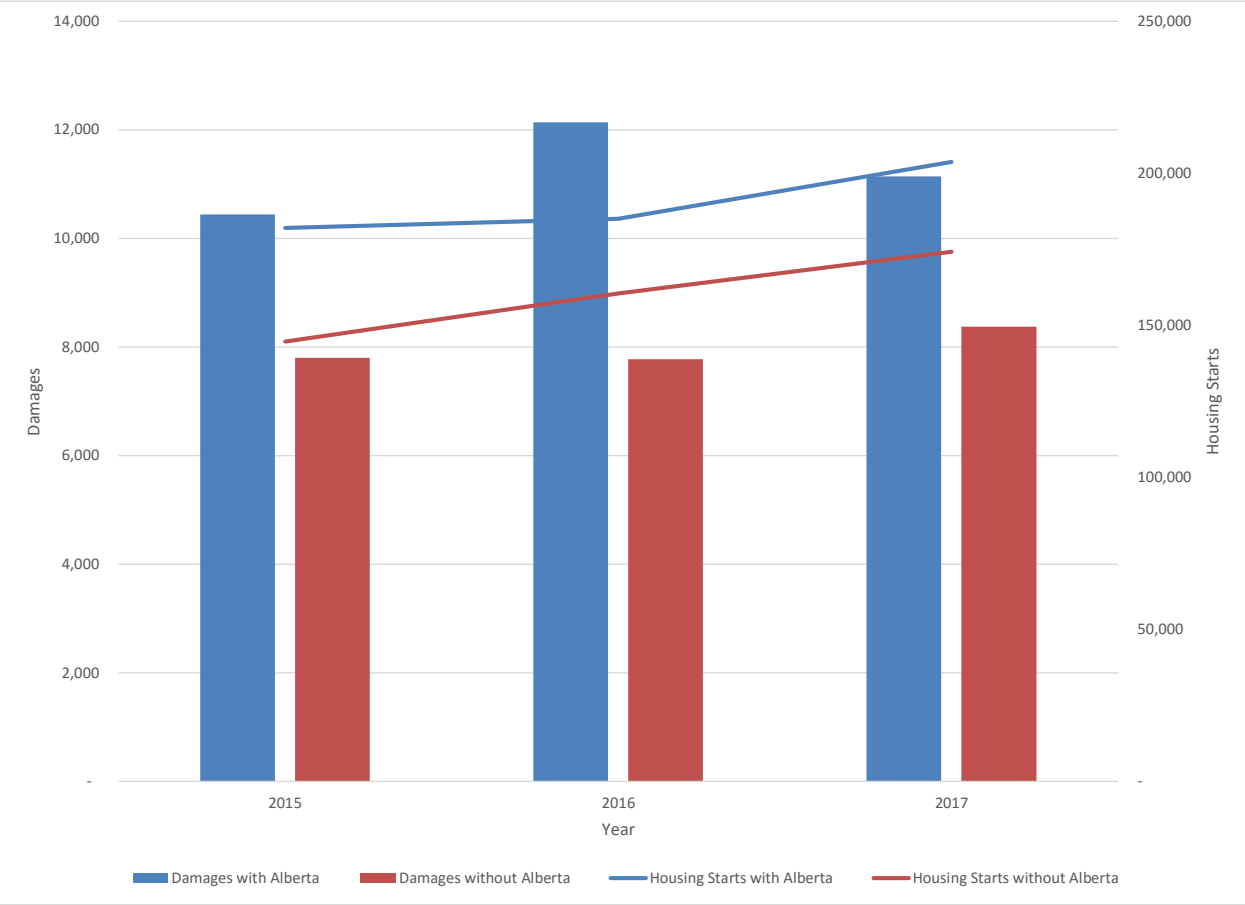

Figure 16. Damages in relation to housing starts over time

Figure 17 depicts the trend in damages in relation to employment in the construction sector. As was revealed by the statistical analysis, all else being equal, an increase in construction employment will correlate with an increase in damages.

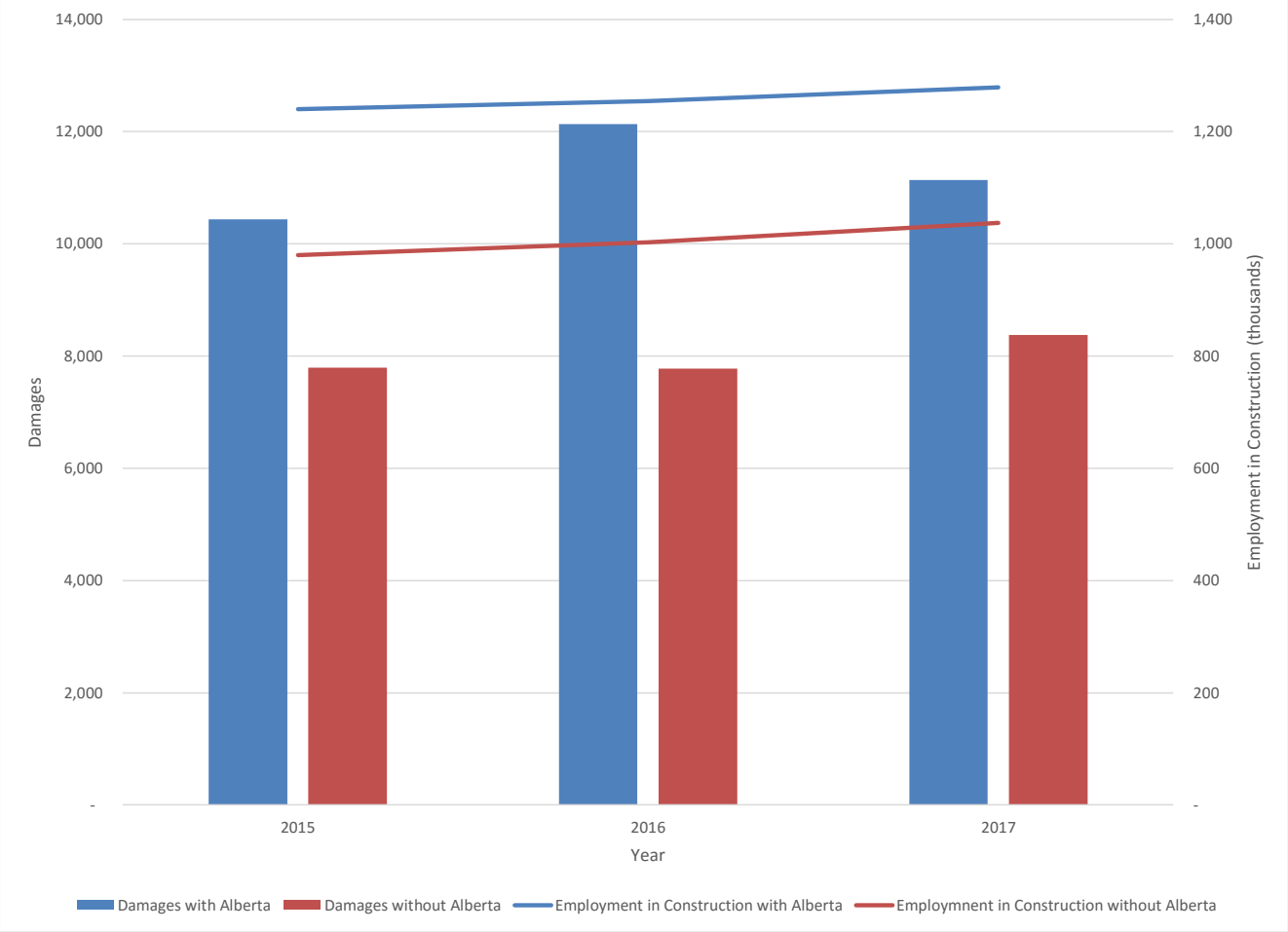

Figure 17. Damages in relation to employment in construction over time

The final figure in this series, Figure 18, demonstrates the relationship between damages and construction GDP. In keeping with the trends presented above, the figure depicts the positive relationship between damages and construction GDP such that an increase in GDP will correlate with an increase in damages.

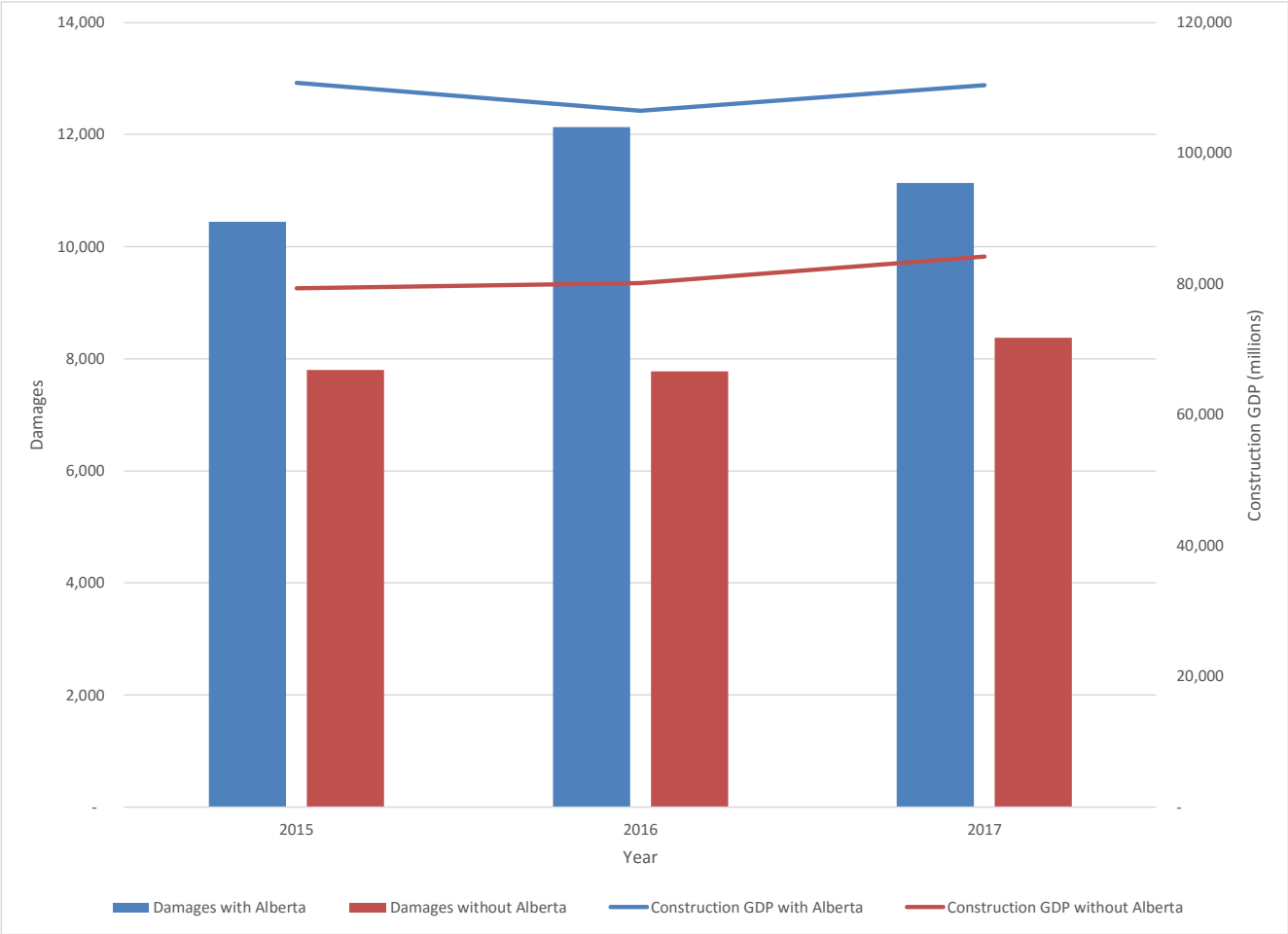

Figure 18. Damages in relation to construction GDP

The series of figures above and the statistical analysis that was conducted on the DIRT database demonstrate positive and statistically significant relationships between damages and a number of broader economic variables. Increases in the variables examined, including notifications, construction sector GDP, employment in construction and housing starts, correlate with increases in damages. This is not a great surprise given these variables are associated with excavation activities. Thus, the data demonstrates increases in activities that cause ground disturbance correlate with increases in damages. While this is not surprising, it is not ideal from a safety perspective. Over time, the objective should be a scenario where an increase in activities that cause ground disturbance corresponds with less damages.

Societal Costs

The societal costs related to damages are significant. They reflect both direct costs (e.g. the cost to repair damaged underground infrastructure) and indirect costs (e.g. the lost productivity due to downtime from a damages) including but not limited to:

- Service disruption
- Deployment of emergency services
- Evacuation
- Loss of product
- Environmental impact and mitigation
- Economic impact
- Work delays
- Administrative and legal costs

The societal cost of damage to underground infrastructure in Canada is estimated to be $1 billion per year, with the majority of those costs being indirect in nature (picture below).

The cost of damage to underground infrastructure is estimated to be $1 billion per year.

Conclusion

This report presents characteristics, themes and contributing factors leading to damages in Canada as reported via the DIRT system. Trends are presented by region and over time with a focus on 2017 data. Care must be taken when interpreting trends over time or when comparing between regions due to the voluntary nature of the DIRT system. Nonetheless, a number of useful observations can be made to design future damage prevention initiatives and encourage additional reporting via DIRT.

This year, damage data includes reports from the Atlantic region and Manitoba, an improvement over previous years' reporting. The majority of reported damages occur in Ontario, followed by Alberta. Damages are largely reported by telecommunications and distribution natural gas with the dominant facility affected being distribution natural gas in Quebec, British Columbia and Manitoba, and telecommunications in Alberta, Ontario, Saskatchewan and the Atlantic region. Currently, all damage reporting is done on a voluntary basis and varies from province to province.

Contractor is the most common type of excavator with year over year increases in damages between 2015 and 2017. The most frequent damage caused by contractors (72% of total damages) occurred working on water/sewers. Water/sewer repairs fall under municipal jurisdiction. To reduce damages, municipalities can require that all contractors comply with best practice standards and ensure workers are up to date with training requirements.

Another priority to prevent workplace injury is to increase locate requests with One Call Centres, especially in the distribution natural gas and electricity sectors. As indicated, the most common known root cause of damages was no locate request made to the One Call Centre (51%). Of those, 74% occurred at an electricity or distribution natural gas facility posing a high risk for public, worker and community safety.

Continued efforts to support jurisdictions and stakeholder groups to collect and input data into the DIRT database will help communities target education and awareness to reduce damage to buried utilities. Adopting best practices is also critical to reduce public risk and prevent workplace injury.

In addition to the expanded jurisdictions in 2017, this year a statistical analysis was conducted to test relationships between damages and a set of broader economic variables. The analysis demonstrated statistically significant relationships between damages and a number of independent variables, including employment in construction, construction GDP, notifications and housing starts. These activities are associated with ground disturbances and the analysis demonstrated that increases in these activities correlate with increases in damages. While this is perhaps a predictable outcome, it does reinforce the need for additional damage prevention education and safety when work is carried out in the vicinity of underground infrastructure. A preferable relationship would have these activities increasing in the context of reduced damages and hence a safer work environment. Given that the root cause of 51% of damages is no locate request to a One Call centre, a key factor in decoupling the relationship between damages and these broader economic trends, is increasing the number of excavations that are preceded by One Call requests.

Regional Profiles

The series of tables below provide summaries of damage data, along with some contextual economic data, for each of the regions currently reporting via the DIRT system in Canada. Time series data is provided for relevant provinces. For each province/region, a summary of whether damage prevention/One Call legislation exists is also provided.

British Columbia

British Columbia (www.commongroundbc.ca)	**2015**	**2016**	**2017**
PROFILE			
Population	4,694,699	4,757,658	4,817,160
Land area	922,503	922,503	922,503
Population density	5.1	5.2	5.2
Housing starts*	31,446	41,843	43,664
Employment in construction	201,500	211,300	228,600
Construction GDP ($ millions)	17,801	18,142	19,936
SUMMARY			
Locate requests	164,268	180,285	190,312
Notifications	768,501	793,254	880,229
Locate requests to notifications ratio	1:4.7	1:4.4	1:4.6
Damages	1133	1269	1477
Damages per work day	4.5	5.0	5.8
Damage ratio per 1,000 notifications	1.5	1.6	1.7
Damage ratio per 1,000 locate requests	6.90	7.04	7.76
DAMAGES BY TYPE OF WORK			
Landscaping	133	112	114
Construction	513	196	190
Water/Sewer	245	332	458
Road/Street	87	123	110
Utilities	78	127	148
Agriculture	22	27	30
Unknown/other	55	352	427
DAMAGES BY FACILITY TYPE			
Electric	1	0	0
Distribution Natural Gas	1076	1137	1325
Liquid Pipeline	56	45	56
Telecommunications	0	52	70
ROOT CAUSE			
Excavation Issue	408	460	516
No notification made to the One Call Centre	715	710	845
Locating Issue	3	10	13
Miscellaneous Root Causes	7	17	20
Unknown	0	72	83
Damage Prevention/One Call Legislation			
Partial legislation	BC Oil and Gas Commission and the National Energy Board governed pipelines are required to register with BC One Call		

* Note that not all housing starts will be associated with an excavation; in the case of condo developments, for example, one excavation will be associated with numerous housing starts.

Alberta

Alberta (www.albertacga.ca)	**2015**	**2016**	**2017**
PROFILE			
Population	4,177,527	4,236,376	4,286,134
Land area	640,330	640,330	640,330
Population density	6.5	6.6	6.7
Housing starts	37,282	24,533	29,457
Employment in construction	259,900	251,900	241,000
Construction GDP ($ millions)	31,410	26,366	26,183
SUMMARY			
Locate requests	410,548	366,766	378,360
Notifications	1,947,234	1,615,061	1,649,307
Locate requests to notifications ratio	1:4.7	1:4.4	1:4.4
Damages	2644	4356	2764
Damages per work day	10.4	17.1	10.9
Damage ratio per 1,000 notifications	1.4	2.7	1.7
Damage ratio per 1,000 locate requests	6.44	11.88	7.31
DAMAGES BY TYPE OF WORK			
Landscaping	316	399	216
Construction	212	265	255
Water/Sewer	388	672	502
Road/Street	309	375	321
Utilities	417	604	486
Agriculture	8	9	7
Unknown/other	994	2032	977
DAMAGES BY FACILITY TYPE			
Electric	157	207	152
Distribution Natural Gas	954	813	714
Liquid Pipeline	154	899	15
Telecommunications	1045	1967	1502
ROOT CAUSE			
Excavation Issue	386	577	576
No notification made to the One Call Centre	269	395	303
Locating Issue	404	682	505
Miscellaneous Root Causes	186	137	112
Unknown	1399	2565	1268
Damage Prevention/One Call Legislation			
Partial legislation	Alberta Energy Regulator and the National Energy Board governed pipelines are required to register with Alberta One-Call		

Saskatchewan

Saskatchewan (www.scga.ca)	**2015**	**2016**	**2017**
PROFILE			
Population	1,131,150	1,148,588	1,163,925
Land area	588,244	588,244	588,244
Population density	1.9	2.0	2.0
Housing starts	5,149	4,775	4,904
Employment in construction	56,200	51,300	50,700
Construction GDP ($ millions)	4,668	4,176	4,043
SUMMARY	5,149	4,775	4,904
Locate requests	141,964	130,622	144,855
Notifications	405,471	385,795	448,874
Locate requests to notifications ratio	1:2.9	1:3.0	1:3.1
Damages	788	634	483
Damages per work day	3.1	2.5	1.9
Damage ratio per 1,000 notifications	1.9	1.6	1.1
Damage ratio per 1,000 locate requests	5.55	4.85	3.33
DAMAGES BY TYPE OF WORK			
Landscaping	62	53	33
Construction	161	79	144
Water/Sewer	96	88	82
Road/Street	58	30	35
Utilities	133	85	98
Agriculture	17	26	24
Unknown/other	261	273	67
DAMAGES BY FACILITY TYPE			
Electric	197	220	1
Distribution Natural Gas	176	131	128
Liquid Pipeline	12	6	7
Telecommunications	403	277	347
ROOT CAUSE			
Excavation Issue	312	253	166
No notification made to the One Call Centre	54	170	104
Locating Issue	403	168	144
Miscellaneous Root Causes	16	30	69
Unknown	3	13	0
Damage Prevention/One Call Legislation			
Partial legislation	National Energy Board governed pipelines are required to register with Sask 1st Call		

Manitoba

Manitoba	2017
PROFILE	
Population	1,338,109
Land area	552,371
Population density	2.4
Housing starts	7,501
Employment in construction	48,300
Construction GDP ($ millions)	4,638
SUMMARY	
Locate requests	61,885
Notifications	136,024
Locate requests to notifications ratio	1:2.2
Damages*	177
Damages per work day	0.7
Damage ratio per 1,000 notifications	1.3
Damage ratio per 1,000 locate requests	2.86
DAMAGES BY TYPE OF WORK	
Landscaping	58
Construction	10
Water/Sewer	41
Road/Street	16
Utilities	28
Agriculture	0
Unknown/other	24
DAMAGES BY FACILITY TYPE	
Electric	77
Distribution Natural Gas	100
Liquid Pipeline	0
Telecommunications	0
ROOT CAUSE	
Excavation Issue	116
No notification made to the One Call Centre	40
Locating Issue	14
Miscellaneous Root Causes	7
Unknown	0
Damage Prevention/One Call Legislation	
Partial legislation	National Energy Board governed pipelines are required to register with ClickBeforeYouDigMB

* Note only distribution natural gas and electric facilities damages are currently being reported in Manitoba.

Ontario

Ontario (www.orcga.com)	**2015**	**2016**	**2017**
PROFILE			
Population	13,789,597	13,976,320	14,193,384
Land area	908,699	908,699	908,699
Population density	15.2	15.4	15.6
Housing starts	70,156	74,952	79,123
Employment in construction	487,300	503,700	512,500
Construction GDP ($ millions)	37,466	38,002	39,763
SUMMARY			
Locate requests	986,841	983,326	1,041,610
Notifications	7,127,099	7,295,368	7,498,270
Locate requests to notifications ratio	1:7.2	1:7.4	1:7.2
Damages	4787	4755	5184
Damages per work day	18.8	18.7	20.4
Damage ratio per 1,000 notifications	0.7	0.7	0.7
Damage ratio per 1,000 locate requests	4.85	4.84	4.98
DAMAGES BY TYPE OF WORK			
Landscaping	702	801	784
Construction	673	638	776
Water/Sewer	1439	1332	1377
Road/Street	499	526	629
Utilities	810	839	954
Agriculture	2	2	4
Unknown/other	662	617	660
DAMAGES BY FACILITY TYPE			
Electric	366	339	343
Distribution Natural Gas	2274	2325	2370
Liquid Pipeline	15	11	17
Telecommunications	2122	2074	2448
ROOT CAUSE			
Excavation Issue	1526	1416	2440
No notification made to the One Call Centre	1162	1210	1198
Locating Issue	241	203	260
Miscellaneous Root Causes	676	700	220
Unknown	1182	1226	1066
Damage Prevention/One Call Legislation			
Provincial legislation	National Energy Board governed pipelines and all buried infrastructure within public rights of way are required to register with Ontario One Call		

Quebec

Quebec (www.info-ex.com)	**2015**	**2016**	**2017**
PROFILE			
Population	8,254,912	8,321,888	8,394,034
Land area	1,356,625	1,356,625	1,356,625
Population density	6.1	6.1	6.2
Housing starts	37,926	38,935	46,495
Employment in construction	234,700	236,000	245,800
Construction GDP ($ millions)	19,398	19,830	20,489
SUMMARY			
Locate requests	225,254	231,385	259,670
Notifications	537,008	515,186	569,826
Locate requests to notifications ratio	1:2.4	1:2.2	1:2.2
Damages	1088	1118	1232
Damages per work day	4.3	4.4	4.9
Damage ratio per 1,000 notifications	2.0	2.2	2.2
Damage ratio per 1,000 locate requests	4.83	4.83	4.74
DAMAGES BY TYPE OF WORK			
Landscaping	119	113	127
Construction	130	131	152
Water/Sewer	359	301	394
Road/Street	184	269	289
Utilities	60	76	65
Agriculture	0	4	10
Unknown/other	236	224	195
DAMAGES BY FACILITY TYPE			
Electric	82	77	74
Distribution Natural Gas	362	372	467
Liquid Pipeline	4	10	0
Telecommunications	521	557	592
ROOT CAUSE			
Excavation Issue	459	450	500
No notification made to the One Call Centre	268	245	320
Locating Issue	41	64	48
Miscellaneous Root Causes	40	41	41
Unknown	280	318	323
Damage Prevention/One Call Legislation			
Partial legislation	National Energy Board governed pipelines are required to register with Info-Excavation		

Atlantic Region

Atlantic Region	2017
PROFILE	
Population	2,394,362
Land area	500,531
Population density	4.8
Housing starts	8,619
Employment in construction	82,400
Construction GDP ($ millions)	6,226
SUMMARY	
Locate requests	35,451
Notifications	54,422
Locate requests to notifications ratio	1:1.5
Damages	66
Damages per work day	0.3
Damage ratio per 1,000 notifications	1.2
Damage ratio per 1,000 locate requests	1.86
DAMAGES BY TYPE OF WORK	
Landscaping	4
Construction	7
Water/Sewer	13
Road/Street	18
Utilities	8
Agriculture	0
Unknown/other	16
DAMAGES BY FACILITY TYPE	
Electric	0
Distribution Natural Gas	14
Liquid Pipeline	0
Telecommunications	52
ROOT CAUSE	
Excavation Issue	60
No notification made to the One Call Centre	4
Locating Issue	0
Miscellaneous Root Causes	2
Unknown	0
Damage Prevention/One Call Legislation	
Partial legislation	National Energy Board governed pipelines are required to register with Info-Excavation