



Snow and Ice Control Annual Report (2017- 2018)

Executive Summary

The City of Calgary Transportation Department is committed to the provision of a safe, customer focused, efficient and sustainable transportation system that supports mobility choices. The Roads Business Unit is committed to a well-maintained road system for all travel modes and is responsible for The City's Snow and Ice Control (SNIC) Program Plan. The Roads Maintenance Division delivers The City's SNIC Program Plan based on Council Policy TP004. The goal of the SNIC Policy is to provide reasonable winter driving conditions for road users that are properly equipped for winter driving; and are operated in a manner consistent with good winter driving habits. Roads Maintenance was committed to mobility choices by providing services supporting pedestrians, vehicular traffic, transit services and cyclists.

Highlights of the 2017/2018 SNIC Program include:

- The 2017/2018 SNIC expenditures for 16,257 lane kilometres of roadway totalled \$45.8 million over the course of the winter season.
- The amount of snowfall received during the 2017/2018 winter season was comparable to 2013/2014 winter season, where actual expenditures exceeded the budgeted amount due to increased efforts to address the heavy snowfall. The volume of snow removed from the roadways was much higher than anticipated and thus exceeded the budgeted amount.
- Three snow route parking bans were activated during the 2017/2018 SNIC season.
- From October 2017 to April 2018, Roads received 27,699 SNIC service requests.
- Performance measure targets for completing SNIC on Priority 1 routes within 24 hours was 94% and 90% for Priority 2 routes within 48 hours. During the 2016/2017 season, Roads achieved 100% success on both performance measures.
- The total snowfall for the 2017/2018 SNIC season was 181.8 cm. The average snowfall from last five winter seasons is 137cm that indicates that the 2017/2018 SNIC season experienced an above average snowfall amount.
- \$3.45 Million was withdrawn from the SNIC Reserve by Transportation at the end of 2017. A subsequent \$9.1 Million was withdrawn from the SNIC Reserve in the second quarter of 2018.

Table of contents

Executive Summary	ii
Introduction	1
Background	1
Seven Day Plan	1
3-1-1 Service Requests	3
Snow and Ice Control Materials	3
Snow Storage Sites	4
Budget Review 2017/2018	5
P1 Route Collision Data	7
SNIC Policy Metrics	7
2017/2018 Snow Route Parking Bans	8
Personnel, Equipment and Infrastructure	9
SNIC Budget Details	11
Program To Improve Mobility-Challenged Access During SNIC	13
Bike Lanes	14
Contingency Plan	15
Standby Resources	15
Common Fleet Operating System (CFOS)	16
Calgary Road Conditions Map	16
Communications Summary and Strategy	16
Communications goals	17
SNIC communications tactics and messaging	17
Key messages	18
2017-2018 Lessons learned	19
Glossary	20

Introduction

The annual Roads SNIC Program Plan (Program Plan) provides detailed plans and strategies to meet the expectations set out in Council's SNIC Policy TP004 (SNIC Policy). The SNIC Policy and the Program Plan continue to evolve to adapt to and respond to changing weather patterns, funding levels, innovation, best practices and lessons learned. The SNIC Policy and Program Plan are established to address normal winter weather conditions, with high-level strategies to address "extreme winter conditions" and "snow emergencies". Trained personnel and the resources are deployed to provide safe travel on city infrastructure for all modes during the SNIC season.

Background

The aim of the SNIC Policy is to provide reasonable winter driving conditions for vehicles/cycles that are properly equipped for winter driving; and are operated in a manner consistent with good winter driving habits. Council and Administration remain committed to the delivery of excellent SNIC services within a policy framework that is efficient, effective and fiscally responsible. Extreme winter conditions and snow emergencies that occurred in the 2013/2014 winter season are addressed in the plan as they are likely to occur again in the future. Council and Administration are aware that response to extreme winter weather conditions requires a systematic approach with stakeholder awareness and collective commitment to a safe and well-maintained road system for all travel modes.

Seven Day Plan

The SNIC response is broken down into a 7 Day Plan. This plan allows The City to quickly address the impact of any snow event to provide mobility for citizens and communicate the expected level of service. The plan is a systematic response that addresses high-volume and high-risk transportation assets first and then moves to lower volume and lower risk assets. If another snow event occurs prior to completing the plan, the response resets back to Day One. Figure 1 provides additional details on the 7 Day Plan.

SNIC RESPONSE TIME FRAMES – SNOW EVENT START TO END

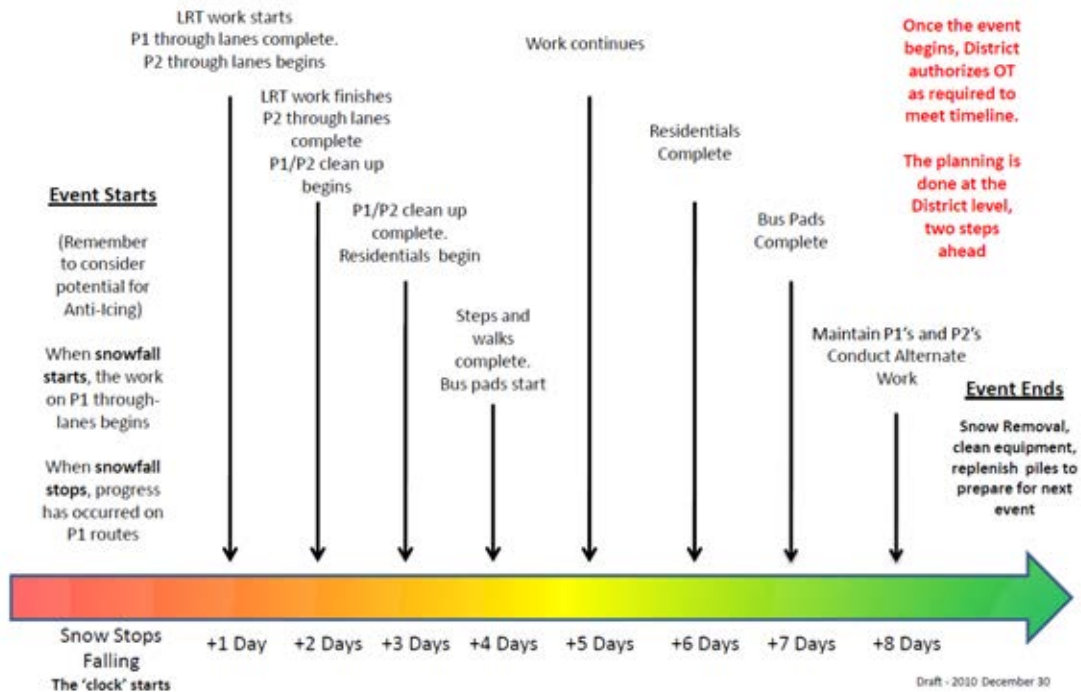


Figure 1: 7 Day Plan

During the 2017/2018 SNIC season it snowed 181.8cm. Maintenance activated the 7 Day Plan 31 times in 2017/2018, and due to overlapping snow events, it was restarted 19 times. Table 1 shows the snow fall comparison for the last five SNIC season.

SNIC Season					
Month	2013/14	2014/15	2015/16	2016/17	2017/18
	(cm)	(cm)	(cm)	(cm)	(cm)
September	0	28.2	0	0	0
October	4.4	1.2	3	13	1.4
November	27.8	43.2	11.6	2.9	27.4
December	52.4	7.6	24.1	26.1	32.2
January	23.3	34.6	15.3	14.5	11
February	6.4	13.7	1.8	35.8	43.3
March	36.2	6.2	2.4	16.7	41.9
April	13.6	5.4	0	16.6	24.6
May	15.6	5.5	0	0	0
Totals	180	145.5	58.2	125.6	181.8

Table 1: Season comparison 2012-2018

3-1-1 Service Requests

During the 2017/2018 SNIC season, Roads Maintenance received 27,699 service requests (SR). The top three SR types were Snow Plowing requests at 11,775, Sand and Salt request at 3,440 and Snow and Ice causing flooding at 2,675. Table 2 shows the historical data from the past five seasons.

Historical 3-1-1 Data					
	2013/14	2014/15	2015/16	2016/17	2017/18
Total SNIC SRs	35,871	6,832	5,514	14,184	27,708

Table 2: SRs from 2012-2018

Roads was able to adhere to our 3-1-1 service level completion agreement 100 per cent of the time. In addition, 94 per cent of all SRs were resolved at the first request, without the need to be re-opened. The average response time of a SNIC SR open to close was 4.5 days.

Snow and Ice Control Materials

The Roads Maintenance division uses four primary types of materials for SNIC operations: road salt (sodium chloride), sanding chips, calcium chloride brine and sodium chloride brine. Sanding chips are six millimetre rock particles which are mixed with up to three per cent salt. The liquid brines help the material stick to the road surface, and are also used as an anti-icing agent applied directly to the road surface. As an anti-icing agent, sodium chloride brine and calcium chloride brine perform over different temperature ranges. The sodium chloride brine is used during warmer winter temperatures whereas calcium chloride brine is used during colder winter temperatures.

A five-season comparison of SNIC material consumption is shown in Table 3. Road salt usage during the 2017/2018 SNIC season was 87,286 tonnes, which is approximately 38 per cent higher when compared to the past five seasons averages. Sanding chip consumption during the 2017/2018 SNIC season was 67,322 tonnes, which is approximately 32 per cent higher compared to the past five season average. Calcium chloride brine usage was 1,033,869 litres.

Studies have shown that without pre-wetting, only 46 per cent of the material applied to a roadway will actually stay in the middle third of the roadway. However, if the material is pre-wet, 78 per cent will stay in the middle third of the roadway. This practice increases the efficiency of the sanders, reduces costs and helps minimize our impact on the environment.

SNIC Season	Road Salt/NaCl (tonnes)	Sanding Chips (tonnes)	Calcium/Sodium Chloride Brine (litres)	Snow Days	Snowfall (cm)
2013/14	79,252	40,927	1,793,791	60	180
2014/15	53,680	61,449	764,000	46	145
2015/16	45,082	24,891	491,230	25	58
2016/17	43,215	59,550	647,520	66	126
2017/18	84,286	67,322	1,033,869	62	182
Average	61,103	50,828	946,082	52	138

Table 3: Five-year comparison of SNIC materials consumption, snow days and total snow fall

Roads has conducted a trial using Beet 55 as an anti-icing and de-icing agent on pedestrian and cycling infrastructure. Beet 55 is a trademarked liquid organic accelerator derived from sugar beet molasses providing a sustainable, renewable, and environmentally safe alternative to other anti-icing and de-icing products. When the Beet 55 product is blended with salt brine it gives a better performance in terms of snow and ice control than using pure salt brine.

This product was used for anti-icing for Cycle Track infrastructure. It provided a better ability to clean the snow off the track and not allow the bond of snow and ice to the pavement making for icy conditions. When the product was used on sidewalks in a de-icing capacity, it reduced the amount of time spent on scraping off the snow. The Beet 55 product has produced positive results and Roads are becoming more accustomed to working with the product as well as seeing the benefits of making the work easier. Roads will continue to use of the Beet Brine in 2018/2019 season and may broaden the scope of the trial.

Snow Storage Sites

The City retains three snow storage sites to manage snow removed from roadways. These sites are identified in Table 4 below:

Site	Address	Capacity (cubic metres)
Highfield	1320-50 Ave. S.E.	672,760
Spring Gardens	1025-32 Ave. N.E.	494,100
Pumphouse	2140 Pumphouse Ave. S.W.	55,805

Table 4: Snow Storage sites

During the 2017/2018 winter season, these three snow storage sites were at capacity after the major storms during the first 3 months of 2018. Snow removal activities were conducted on Priority 1 and Priority 2 routes, plus some residential roadways.

\$5.9 million was spent on snow removal during the 2017/2018 SNIC season. This is higher than the \$4.5 million spent during the 2016/2017 SNIC season.

A 2012 Condition Assessment identified areas for improvement to the Highfield and Spring Gardens snow storage sites, up to and including full reconstruction. The Condition Assessments combined with capacity issues had led to a recommendation that the Highfield and Spring Gardens snow storage sites be rehabilitated and two additional locations be developed. The new locations would replace the Pumphouse site and accommodate surplus snow during extreme winter conditions. The estimated cost to reconstruct the two old sites is \$16 million which includes storm water management upgrades and new pavement. The estimated cost to develop two new sites is \$36 million, and includes land costs, design, provincial approvals and construction. These amounts are currently unfunded.

Roads Maintenance reviewed the effectiveness of the Mechanical Snow Melters and found that the water discharged will not meet environmental guidelines for discharging into the storm water system.

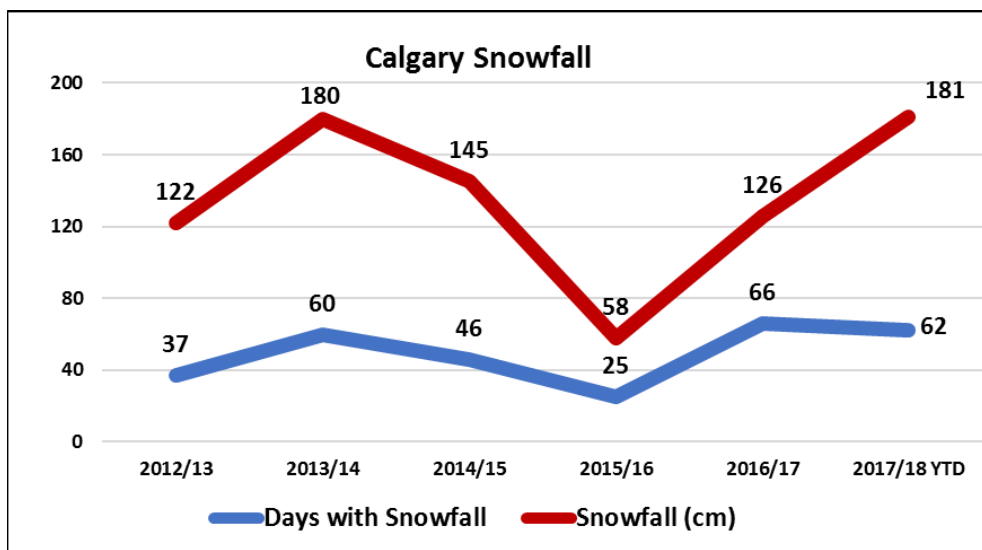
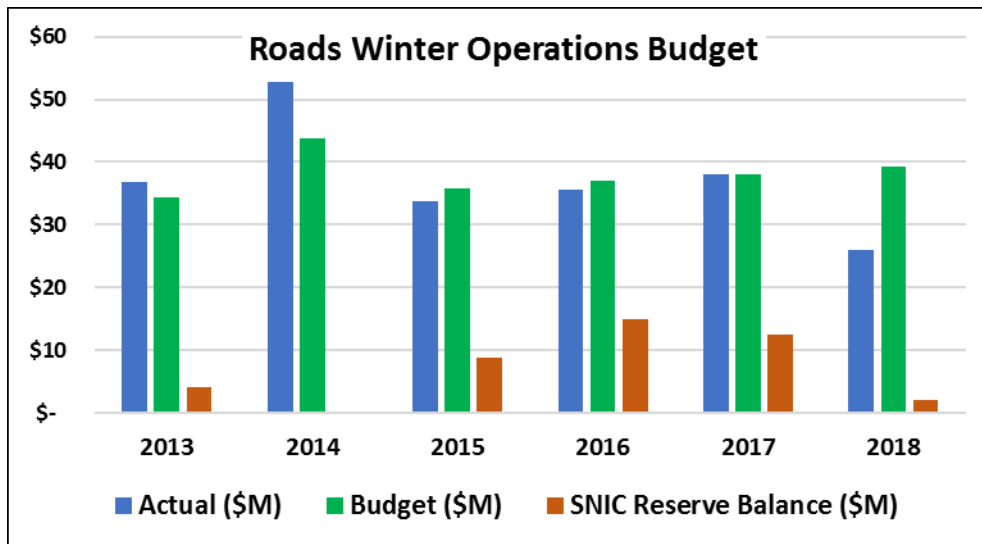
Budget Review 2017/2018

The graph in Figure 2 shows the SNIC budget and actual expenditures compared to snow fall and snow days for the past 5 years.

During the 2017/2018 SNIC season, 181.8 cm of snow was reported to have fallen in the City of Calgary over 62 snow days. The amount of snow which fell in 2017/2018 was 28 per cent higher when compared to the past five years. The amount of snowfall received so far in 2018 is comparable to 2013/14, where actual expenditures exceeded the budgeted amount because of the increased effort to address the heavy snowfall. The volume of snow removed from the roadways was much higher than anticipated and therefore expenditures exceeded budget.

Budget expenditures for the 2017/2018 winter season totalled \$50.6 million. Expenditures by category were as follows: Equipment (37.6 per cent), Labour (39.7 per cent) and Materials (22.7 per cent). Equipment and labour costs are the main costs and don't change proportionally to the snow fall.

The current balance in the SNIC Reserve is \$2.45 million. At the fiscal end of 2017, Transportation withdrawn \$3.45 million. An additional \$9.1 Million was withdrawn from the SNIC Reserve in the second quarter of 2018.



*Figures on the left indicate millions of dollars.

Figure 2: Expenditures and Snow Days 2013-2018

P1 Route Collision Data

One of the goals of SNIC activities is to provide the opportunity for safe movement of citizens. Comparison of collisions during the latest five calendar years of complete collision data (Figure 3) shows that Priority 1 SNIC routes generally have 5 per cent fewer collisions attributed to 'Slush/Snow/Ice' road surface conditions than other routes. Furthermore, the number of 'Slush/Snow/Ice' related collisions on priority routes, per 1,000 population, has been decreasing from 2011 to 2016. The exception to the previous statement is 2017 and the reason was that the amount of snow was greater the last 5 year's average.

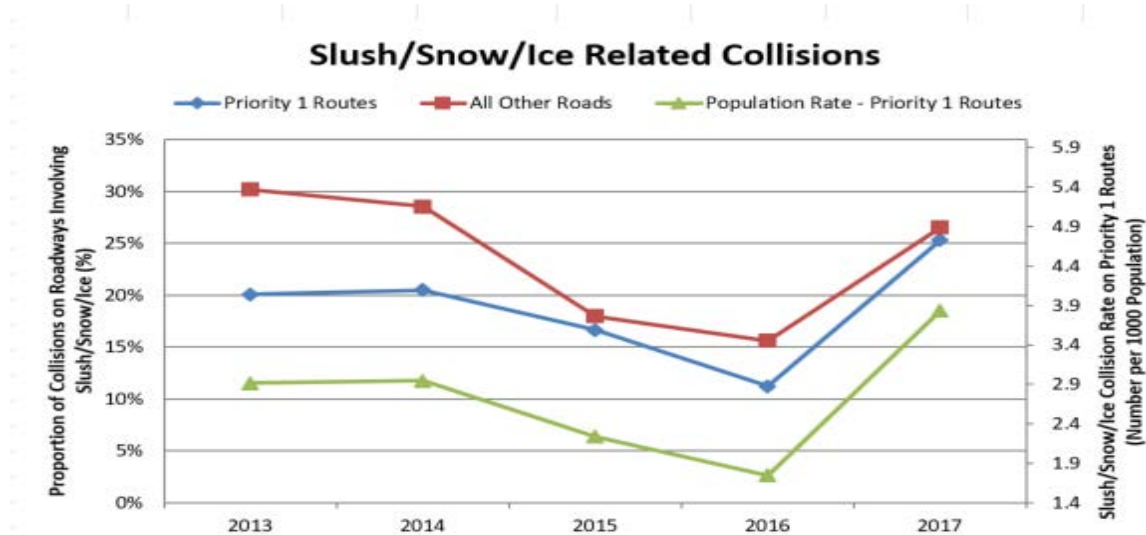


Figure 3: Snow Related Collisions

SNIC Policy Metrics

The SNIC program service levels are based on the Council-approved SNIC Policy. The purpose of the policy is to:

- Maintain reasonable conditions on roadways and sidewalks so as to minimize hazards and economic loss to the community
- Ensure safe access for emergency vehicles providing Fire, Police and Emergency Medical Services
- Provide guidelines for management and operating personnel to handle winter maintenance operations
- Outline citizens' responsibilities regarding sidewalk snow and ice control on private property

To align with the approved SNIC service levels outlined in the SNIC Policy, three Key Performance Indicators (KPIs) were identified (See Figure 4: Roads Maintenance KPIs and Performance Achieved).

Roads Designation	Response Time
Priority 1 Routes	Through lane ploughed and sanded completed with 24 hours of the end of snowfall (100% sanded/salted and 90% ploughed)
Priority 2 Routes	Through lane ploughed and sanded completed with 48 hours of the end of snowfall (100% sanded/salted and 90% ploughed)
Priority 3 Routes	Within 4 days after Priority 2 routes complete (sanded and ploughed when temperature condition allow)
Priority 4 Routes	Within 4 days after Priority 2 routes complete (sanded and ploughed when temperature condition allow)

Figure 4: SNIC service levels

Performance Indicators	2017-18 Achieved
Percent of time Roads completes SNIC on Priority 1 through lanes within 24 hours. (100% sanded/salted and 90% ploughed)	94%
Percent of time that Roads completes SNIC on Priority 2 through lanes within 48 hours. (100% sanded/salted and 90% ploughed)	90%
Satisfaction with conditions and services on main roads due to level of snow and ice control (2018 Annual Survey)	66%

Figure 5: Roads Maintenance KPIs and Performance Achieved

2017/2018 Snow Route Parking Bans

A Snow Route parking ban is considered when a snow accumulation of five centimetres or greater is forecast. Snow routes include major roadways and most bus routes. A major advisory is issued when a significant snow event is expected in the forecast. This advisory is meant to serve as a warning that parking bans may soon be in effect on snow routes. Vehicles should be moved as quickly as possible following the notice.

A parking ban is declared when crews finish ploughing Priority 1 routes, but before they start on Priority 2 routes. Parking bans are in effect for up to 72 hours or until The City declares that they have been lifted. The parking ban is announced on local radio and TV stations and is publicized via email, the internet and social media. Snow clearing operations are ongoing. Vehicles that remain parked on these roads during the ban are subject to enforcement, up to and including a parking tag and tow. Business Improvement Areas (BIAs) and the downtown core have overnight bans (9 pm. to 6 am.).

During the 2017/2018 winter season, three snow route parking bans were activated. They are as follows:

- 1) February 5, 2018 at 9am. to February 7, 2018 at 7am (46 hours).
- 2) February 10, 2018 at 10am to February 12, 2018 at 6pm (56 hours).

3) March 4, 2018 at 10am to March 6, 2018 at 2pm (52 hours).

Personnel, Equipment and Infrastructure

The Roads Business Unit commits personnel, material, equipment, infrastructure, capital and operational funds to SNIC operations as follows:

- 430 personnel working rotating shifts, available 24/7 throughout the season
- Material, including equipment consumables (i.e. plough blades) and snow remediation substances (salt, de-icing liquids and abrasives).

The various machinery and equipment includes:

- 76 City owned tandem trucks and 15 leased trucks equipped to plough and apply materials
- 27 graders
- 9 snow blowers
- 10 smaller single axle trucks equipped to plough and apply materials in residential areas such as cul-de-sacs where tandems are unable to work
- 10 front end loaders

Roads infrastructure includes nine district depots and three snow storage sites, as well as the right-of-way infrastructure. The 2017/2018 SNIC season budget supported the maintenance operations for the right-of-way infrastructure shown below

Description	Lane-km	Linear-km	SNIC Service	Quantity
Expressways	1,559	522	Yes	-
Arterial Roadways	1,991	702	Yes	-
Collector Roadways	3,717	1,314	Yes	-
Residential Streets	8,687	3,242	Yes	-
Gravel Roadways	302	143	Yes	-
TOTAL	16,257	5,923	-	-
Back Lanes Paved	991	462	As required - WRS*	
Back Lanes Gravel	2,128	1,238	As required - WRS*	
Marked, On-Street Bike Lanes	-	59	Yes – 49	-
Sidewalks (Roads)	-	5,712	Yes – 302	-
Engineered Walkways	-	-	No	2078
Vehicle Bridges	-	-	Yes	194

Description	Lane-km	Linear-km	SNIC Service	Quantity
Pedestrian Bridges	-	-	Yes	138
Park Bridges	-	-	Yes	125
LRT Bridges	--	--	Yes - select locations	33
LRT Stations	--	--	Yes - select sidewalks	47
Bus Zones	--	--	Yes	6,144
Stairs/Steps	--	--	Yes	2,947

Data obtained from The City's ArcGIS. *WRS – Waste and Recycling Services business unit

Table 6: Infrastructure Right-of-Way

SNIC Budget Details

The tables below show the annual SNIC budget and actual cost for winter season of 2017/2018.

Line #	Activity	For the period of October 2017 to December 31 2017	
		Budget	Actual
1	Snow Removal P1 and P2	\$1,327,945	\$263,747
2	Snow Removal Residential	\$769,931	\$7,426
3	Ploughing P1 and P2	\$591,352	\$827,637
4	Sanding and Salting P1 and P2	\$4,176,482	\$9,442,911
5	Residential Sanding and Ploughing	\$1,386,947	\$1,645,585
6	Transit SNIC LRT Stations*	-	-
7	Transit SNIC Bus Zones*	-	-
8	Snow Dump Site Maintenance	\$46,000	\$3,571
9	Separate Bikeways	\$135,905	\$90,231
10	Snow Fencing	\$68,636	\$210,268
11	Anti Icing	\$152,000	\$187,860
12	Material Handling and Storage	\$97,989	\$91,857
13	Sidewalk SNIC Clearing	\$1,121,991	\$1,177,482
14	Winter Supplementary Work**	\$651,023	\$2,420,343
15	Winter Operation	\$10,526,201	\$16,368,918
16	SNIC Reserve Fund Transfer 2017***		(\$3,445,643)
17	2017 TOTAL		\$12,923,275.40

*The Calgary Transit budget and expenditure details are noted in Table 7 below

**Includes environmental control, sweeping, depot maintenance, pothole repairs.

***This transfer was for SNIC 2017

Table 7: 2017 SNIC expenditures and budget

		For the period of October 2017 to December 31 2017	
Line #	Activity	Actual	Recovery
1	Transit SNIC LRT Stations	\$308,423	\$306,613
2	Transit SNIC Bus Zones	\$772,058	\$584,729

Table 8: Calgary Transit-2017 SNIC activity expenditures versus recovery

		Year to Date – For the period of January 2018 to April 30 2018		Variance	Fiscal Year 2018
Line	Activity	Budget	Actual	Per cent	Budget
1	Snow Removal P1 and P2	\$84,445	\$5,155,972	6,106%	\$566,830
2	Snow Removal Residential	\$1,797,362	\$432,976	24%	\$2,168,000
3	Ploughing P1 and P2	\$110,454	\$2,552,866	2,311%	\$1,483,379
4	Sanding and Salting P1 and P2	\$15,369,669	\$16,027,306	104%	\$23,765,858
5	Residential Sanding and Ploughing	\$3,200,449	\$4,891,908	153%	\$3,569,000
6	Transit SNIC LRT Stations*	-	\$19,837	-	\$0
7	Transit SNIC Bus Zones*	-	\$8,584	-	\$0
8	Snow Dump Site Maintenance	\$66,004	\$617,978	936%	\$115,000
9	Separate Bikeways	\$283,105	\$214,805	76%	\$339,763
10	Snow Fencing	\$100,200	\$5,422	5%	\$171,591
11	Anti Icing	\$327,379	\$252,199	77%	\$380,000
12	Material Handling and Storage	\$227,374	\$32,360	14%	\$220,243
13	Sidewalk SNIC Clearing	\$1,255,717	\$2,617,635	208%	\$248,221
14	Winter Supplementary Work**	\$2,475,904	\$1,561,794	63%	\$3,902,893
15	Winter Operation	\$25,298,062	\$34,391,642	136%	\$36,930,778
16	SNIC Reserve Fund Transfer		(\$9,093,577)		
17	2018 Total	\$25,298,062	\$25,298,065	136%	\$36,930,778

*The Calgary Transit budget and expenditure details are noted in Table 9 below**Includes environmental control, sweeping, depot maintenance, pothole repairs. Brackets indicate that Roads went above budget in spending costs.

Table 9: 2018 SNIC expenditures and budget

		Year to Date –For the period of January 2018 to April 30 2018	
Line	Activity	Actual	Recoveries
1	Transit SNIC LRT Stations	\$621,729	\$1,879,944
2	Transit SNIC Bus Zones	\$1,918,613	\$593,501

Table 10: Calgary Transit 2018 YTD expenditures and recoveries

Line #	Description	2013-14 Season	2014-15 Season	2015-16 Season	2016-17 Season	2017-18 Season	Five Year Average
1	SNIC Clearing (Plough/Sand)	\$6,777,794	\$4,243,699	\$3,779,906	\$4,784,258	\$4,892,733	\$4,895,678
2	Snow Removal	\$12,194,096	\$216,217	\$382,029	\$361,323	\$432,975.70	\$2,717,328
3	Total	\$18,971,890	\$4,459,916	\$4,161,935	\$5,145,581	\$5,325,709	\$7,613,006

Table 11: Residential SNIC clearing and removal expense

Program to Improve Mobility-Challenged Access During SNIC

In the 2015 to 2018 Council approved Action Plan, \$2 million was allocated to improve accessibility for citizens with mobility challenges during the SNIC season. This funding was jointly given to Calgary Transit, Calgary Neighbourhoods (CN) and Roads. During the spring of 2015, the mobility-friendly program focused on bus pads and bare pavement bus stops with large windrow accumulation. These locations included bus stops with high numbers of transit ramp deployments (to assist citizens with mobility challenges), including hospitals, senior homes, and locations where mobility-challenged individuals frequently visit. Snow clearing would begin during the snow event and continue until all the identified locations were clear following the snow event. Calgary Transit and CN worked together to provide a list of priority locations. Calgary Transit controlled funding for this program. Roads have a contract in place that would allow this work to be completed as on-demand SNIC work.

During the 2017/2018 SNIC season, Roads' contractor provided service to over 700 bus stop locations and 5.15 km of sidewalk.

Below is a sample communication from the contractor indicating that a bus stop was completed (Figure 6).



Figure 6: Contractor communication

Bike Lanes

The downtown cycle track pilot project was approved in Dec 2016. The City's cycle track, bike lanes, multi-use pathways, neighbourhood greenways (bicycle boulevards), shared lanes, and signed bicycle routes all contribute to mobility choices.

The City has approximately 8 km of cycle track that is cleared within 24 hours after snow stops falling. All 44 km of marked, on-street bike lanes are swept within 48 hours after snow stops falling.

- Cycle Track: 7.2 km (SNIC Clearing within 24hours)
- Bicycle Lane: 42.7 km (SNIC Clearing same as the Priority as the road it is on)
- Shared Lane: 18.8 km (SNIC Clearing same as the Priority as the road it is on)
- Neighbourhood Greenway: 12.8 km (SNIC Clearing same as the Priority as the road it is on)
- Signed On-Street Bikeway: 333.1 km (SNIC Clearing same as the Priority as the road it is on)

Contingency Plan

The SNIC Contingency Plan outline includes:

- The emergency declaration (who, what, when, where, why and how)
- The engagement of the emergency operations centre (24/7 staffing)
- The layered, targeted and timely engagement of City and contracted resources
- The return-to-routine operations
- The after-action review and report

City resources include all business unit's SNIC assets. Contracted resources refer to individual and/or SNIC assets from Fleet Services' hired truck contract and the annual Roads SNIC contract. The Fleet Services' hired truck contract can react within a short time frame and can offer various SNIC assets at hourly rates. The Roads SNIC contract retains an on-demand component that can react within a short timeframe to augment City resources with trouble spot snow clearance/removal operations. An on-call surge and reserve capability (consisting of an increase of 10 per cent and 20 per cent, respectively) of the Roads SNIC assets could be contracted to react within a prescribed timeframe. This increase would provide further improvements to SNIC service delivery during extreme weather/snow events.

Standby Resources

The City retains contracted standby resources to augment City personnel and equipment for SNIC operations. Our Maintenance Division, in conjunction with the Supply Management Division, has a contract to provide the following SNIC services:

- Transit Trouble Spots: 219.53 lane-km
- District Trouble Spots: 502.74 lane-km
- Northwest District: 2,034 Steps and 4.2 km of abutting sidewalk and Southwest District: 1,254 steps and 1.1 km of abutting sidewalk for a total of 3,288 steps and 5.3 km of abutting sidewalk on-demand service to augment City forces

District and Transit Trouble Spots and request for on-demand services have been contracted since 2010. On-demand services are used to create a surge capability to assist with snow events for a limited duration. This surge would act as a targeted force while awaiting the call-out of a larger reserve force. While a simple 10 per cent surge and 20 per cent reserve may address the majority of snow events, the necessary funding for retention fees would require further study. In the past, Edmonton has spent \$3.4 million per annum on a retainer program for hired graders. While that was beneficial during times when snow events warranted the surge in services, it proved equally costly when the call-out was not required. Edmonton ended their retainer program in 2008/2009.

The Roads Maintenance Division also engages the Fleet Services business unit. Fleet Services maintains a rental equipment tender and hired truck contract that is reviewed every two and six years respectively. Also, a limited number of all-inclusive snow removal teams (i.e. personnel, graders, loaders, bobcats and dump trucks) can be formed to assist with snow removal operations when required.

Common Fleet Operating System (CFOS)

The City has 162 units equipped with the CFOS. Of these 179 units, 51 of the Global Positioning System (GPS) units are mobile (can be moved from truck to truck) in order to accommodate our growing rental fleet, as well as outfit short term City contractors. Using this GPS data, Roads is now able to automatically update the public facing SNIC maps, displaying our progress status to the public. Sanding routes change color automatically to show their maintenance status. The SNIC Road Conditions map can be found at Calgary.ca.

Calgary Road Conditions Map

During the 2017/2018 Season, Roads implemented a new public map that shows live updates on the snow and ice maintenance status on our roadways. This map also shows the current location of our snow ploughs.

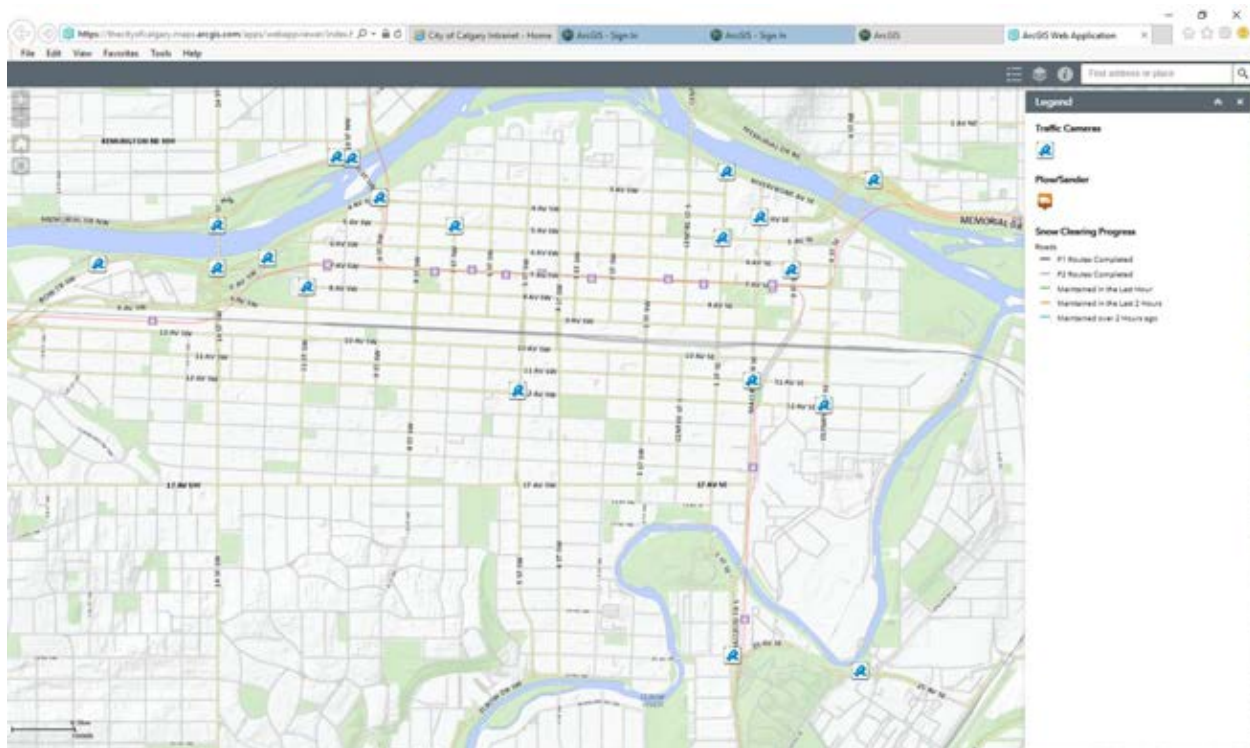


Figure 7: Calgary.ca Road Conditions Map

Communications Summary and Strategy

During the 2017/2018 season, communications switched to a centralized model. The goal of this change of operations was to create greater collaboration between City business units on larger scale programs, including SNIC. Communications goals still focus on proactive communications for Roads operations throughout the year, especially during the SNIC season and can include both internal and external stakeholders.

Communications goals

1) Deliver a citizen-focused and proactive communications approach regarding Snow and Ice Control that is based on historic trends.

- Use data from previous years to make information available to the public and media on multiple channels so people can find what they need
- Provide a coordinated approach to snow communications, across BUs
- Develop strong internal communications strategy to ensure cohesive messaging, accuracy and timeliness of information

2) Educate and provide information on our operational initiatives so the public and our stakeholders can make informed travel decisions.

- Educate citizens of the Roads Maintenance SNIC response during a typical winter (Seven Day Plan)
- Promote SNIC map to show real time response to snowfall
- Provide quick and accurate responses to citizen questions and concerns across social media channels and 311

3) Continue to build understanding for our operations.

- Build awareness and understanding about our Snow and Ice Control services and other seasonal operations or campaigns
- Establish the City's Seven Day Snow Plan as a planned, strategic approach to SNIC

SNIC communications tactics and messaging

The following table shows the methods of communication were used during the 2017/2018 SNIC season:

Tactic	Details
On-call Communications	After hours media line, ability to enact a snow route parking ban after-hours. Available from 6 am to 8 am, 4 pm to 10 pm on weekdays, and 8 am to 8 pm on weekends.
Daily SNIC Update (only on snow days and during seven day plan)	Daily update provided to numerous stakeholders, including web. Information regarding where City was on seven-day plan, and information on upcoming weather was included.
Social Media	Social media was used on a daily basis to post daily updates, and to provide updates on snow route parking bans.
Media availabilities	Several media availabilities were held throughout the SNIC season to provide local news with clips and quotes regarding SNIC and Snow Route Parking Bans.

Radio advertising	Radio advertising on City's Traffic Radio station, and at the start of SNIC season on all Calgary radio stations through a media buy.
Report to Calgarians	Two report to Calgarians were available for use, both as part of a media buy and on social media. One concerned SNIC, the other was focused on Snow Route Parking Bans.

Table 12: Methods of communication were used during the 2017/2018 SNIC season

Key messages

We are working to keep Calgarians on the move.

- Relate answers back to what we have accomplished – how many lane kilometers of roads have been plowed and sanded.

Roads can respond to snow and ice 24-7.

- Crews and equipment are at work 24 hours a day to ensure an immediate response.
- Our units are equipped with a real-time GPS system that tells us exactly which roadways have been sanded, salted, or plowed.

The City has a planned, measured response to snow and ice that keeps roads safe.

- We keep Calgarians on the move by providing responsive service that can be immediately adapted to changing road conditions.
- Anti-icing helps prevent snow and ice buildup by applying a calcium chloride solution to designated roads before a snowfall.

Drive with caution and watch for our crews.

- Motorists are urged to slow down and drive defensively during winter driving conditions.
- Keep a safe distance - help our crews do their jobs by staying three car lengths behind sanders and plows.
- No sudden moves (braking, lane changes, etc.)

Have appropriate tires.

Snow Route Parking Bans

A snow route parking ban is a temporary parking restriction that can be put into effect on roads that are designated as snow routes. Parking bans are intended to support plowing operations. Crews are able to clear snow more effectively and efficiently when they don't have to work around parked cars. Snow routes include major roadways, collector roads and most bus routes, and are marked by blue signs with a white snowflake.

Priority System/7 Day snow event plan

The City's 7 day snow event plan begins as soon as the snow stops falling. Roads sand, salt, and plow roads and sidewalks based on a Council-approved priority system. This keeps the

greatest number of vehicles moving safely in the shortest period of time and ensures Roads has the right amount of people and equipment maintaining the road at the right time.

2017-2018 Lessons learned

- Service levels to pedestrians must be increased to meet policy requirements and improve citizens satisfaction;
- Snow route parking bans are a tool that assist roads during plowing operations. Roads will continue to activate the snow route parking ban as required;
- Additional snow dump capacity is required, and;
- Continue to use snow gates on graders. Provide additional training to operators and improve the reliability of the snow gates;
- Continued education of 7-Day Plan is important early in the season and prior to each major snowfall.
- Ongoing coordination with Calgary Parking Authority prior to, and during the snow route parking ban was important for cohesive messaging.
- Continue to inform Council and their offices with timely information and key messages.

Glossary

BIA	Business Improvement Area
CFOS	Common Fleet Operating System
CN	Calgary Neighbourhoods
CPS	Calgary Police Service
CSC	Customer Services & Communications
GPS	Global Positioning System
KPI	Key Performance Indicator
LRT	Light Rail Transit
SNIC	Snow and Ice Control
SR	Service Request