



Snow and Ice Control Annual Report (2018 / 2019 Winter Season)

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 and providing services supporting vehicular traffic, transit services, the cycling community and pedestrians. The Roads Business Unit, in partnership with Calgary Parks and Calgary Transit, 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 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.

Highlights of the 2018/2019 SNIC Program include:

- The 2018/2019 SNIC expenditures for 16,257 lane kilometres of roadway and various pedestrian infrastructure totalled \$49.8 million.
- The amount of snowfall received in the 2018/2019 winter season is comparable to the 2013/2014 winter season, where actual expenditures exceeded the budgeted amount due to increased effort to address the heavy snowfall. The volume of snow removed from roadways in 2019 was high and exceeded the budgeted amount.
- Two snow route parking bans were activated during the 2018/2019 SNIC season.
- During the 2018/2019 SNIC season, Roads received 36,744 SNIC service requests.
- Roads completed SNIC on Priority 1 routes within 24 hours 92 per cent of the time and 92 per cent for Priority 2 routes within 48 hours. During the 2017/2018 season, Roads achieved 100 per cent performance on completing SNIC on Priority 1 routes within 24 hours and 90 per cent for Priority 2 routes within 48 hours.
- The total snowfall for the 2018/2019 SNIC season was 169.8cm, which is above the average snow fall from last five winter seasons (136cm).
- Council approved a one-time \$9.5 million commitment from the Fiscal Stability Reserve through the One Calgary process for the 2018 / 2019 SNIC season for enhanced SNIC Services. The \$9.5 million was added to the SNIC Reserve. \$4.0 million of the \$9.5 million approved by Council was spent during 2018 / 2019 SNIC season.
- \$8.1 million was withdrawn from the SNIC Reserve by Transportation at the end of 2017. \$4.4 million was withdrawn from the SNIC Reserve in the second quarter of 2018.

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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 align with funding levels, innovation, best practices, lessons learned and stay ahead of changing weather patterns. The SNIC Policy and Program Plan are established to address normal winter weather conditions, with strategies to address "extreme winter conditions" and "snow emergencies". Trained personnel and the required resources are deployed to provide safe mobility on city infrastructure 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.

In 2018 July, Council directed Administration to enhance the SNIC services through a one-time \$9.5 Million budget commitment from the Fiscal Stability Reserve for the 2018/2019 SNIC season. The enhanced services were as follows:

- Provide SNIC services to additional 100 kilometers of pathway.
- Clear all sidewalks adjacent to City property within 24 hours.
- Plow windrows away from high priority wheelchair ramp locations.
- Communications campaign to advise residents of new fines and responsibilities for 2018/19 winter season (TV, Web, Radio, Print).

Seven Day Plan

The SNIC response is broken down into a Seven Day Plan. This plan allows us to quickly address the impact of any snow event on the mobility of our citizens and communicate the 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, our response resets back to Day One. Figure 1 provides additional details on the Seven Day Plan. The response timeframe was updated to include the enhanced service approved by Council in 2018 July.

SNIC RESPONSE TIME FRAMES – SNOW EVENT START TO END

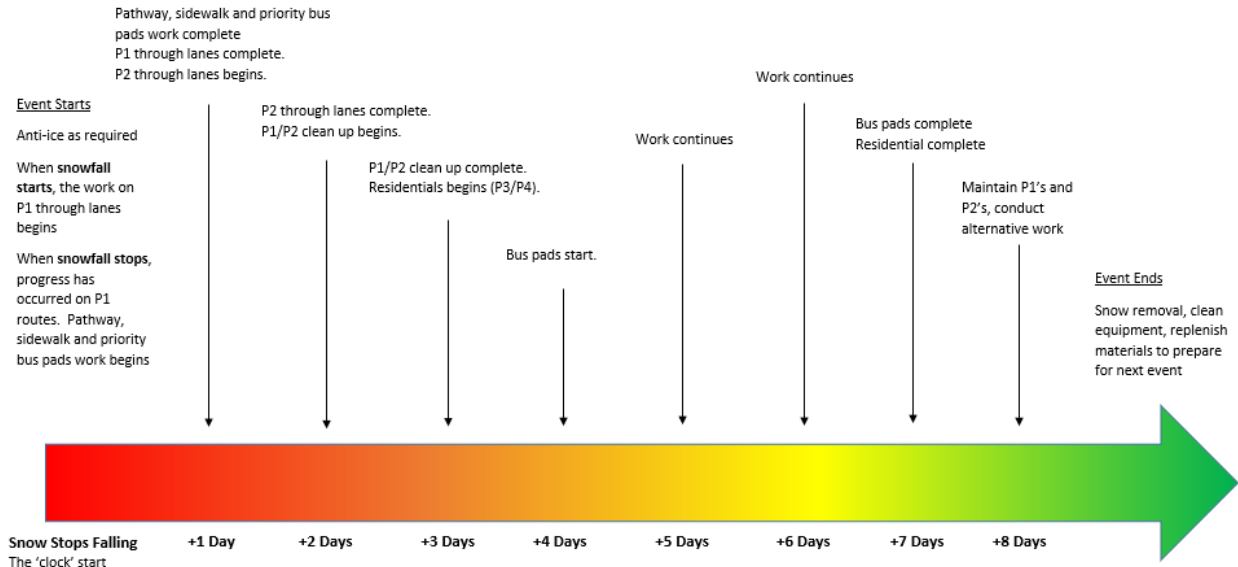


Figure 1: Seven Day Plan

During the 2018/2019 SNIC season it snowed 169.8 centimetres. The City activated the Seven Day Plan 25 times in 2018/2019 and due to overlapping snow events, it was restarted 13 times. Table 1 shows the snow fall comparison for the last five SNIC seasons.

Historical SNIC Seasons					
Month	2014/15	2015/16	2016/17	2017/18	2018/19
	(cm)	(cm)	(cm)	(cm)	(cm)
September	28.2	0	0	0	1.8
October	1.2	3	13	1.4	48.4
November	43.2	11.6	2.9	27.4	27.9
December	7.5	24.1	26.1	32.2	14.9
January	34.6	15.3	14.5	11	10.2
February	13.7	1.8	35.8	43.3	33.8
March	6.2	2.4	16.7	41.9	8.2
April	5.4	0	16.6	24.6	16.9
May	5.5	0.2	0	0	7.7
Totals	145.5	58.4	125.6	181.8	169.8

Table 1: Season comparison 2014-2019

3-1-1 Service Requests

During the 2018/2019 SNIC season, Roads received 36,744 service requests (SR). The top three SR types were Snow Plowing requests at 17,865, Sand and Salt requests at 7,556 and Snow and Ice causing flooding at 3,403. Table 2 shows the historical data from the past five seasons.

Historical 3-1-1 Data					
	2014/15	2015/16	2016/17	2017/18	2018/19
Total SNIC SRs	6,832	5,514	14,184	27,708	36,744

Table 2: SRs from 2014-2019

Roads met the 3-1-1 Service Level Completion Agreement 99 per cent of the time. This is derived from ONTIME data (SR on time/SR count). In addition, 96 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 5 days (the average response time between SR created date to the date it was last closed for all SRs, excluding duplicates).

Snow and Ice Control Materials

The Roads Maintenance Division uses four main SNIC materials in its operations: road salt (sodium chloride), sanding chips, calcium chloride brine and sodium chloride brine. Sanding chips are six-millimetre rock particles which contains with up to three per cent salt. The liquid brines help the material stick to the road surface and is 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 2018/2019 SNIC season was 70,177 tonnes, which is approximately 18 per cent higher when compared to the past five seasons averages. Sanding chip consumption during the 2018/2019 SNIC season was 46,477 tonnes, which is approximately 11 per cent lower compared to the past five season average. Calcium chloride brine usage was 1,144,593 litres.

Studies have shown that without pre-wetting, only 46 per cent of the material applied to a roadway will 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)
2014/15	53,680	61,449	764,000	46	145.5
2015/16	45,082	24,891	491,230	25	58.4
2016/17	43,215	59,550	647,520	66	125.6
2017/18	84,286	67,322	1,033,869	62	181.8
2018/19	70,177	46,477	1,144,593	62	169.8
Average	59,288	51,938	816,242	52	136.2

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

Roads have conducted a trial using Beet 55 as an anti-icing and de-icing agent on pedestrian cycling infrastructure, Priority 1 and Priority 2 routes. Beet 55 is a trademarked liquid organic accelerator alternative to other anti-icing and de-icing products. When this is blended with salt brine at 65 per cent salt brine and 35 per cent Beet 55, the freezing point will be lower than by using pure salt brine but higher than by using calcium chloride at 30 per cent concentration. Roads 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.	~600,000
Spring Gardens	1025-32 Ave. N.E.	494,100
Pumphouse	2140 Pumphouse Ave. S.W.	55,805

Table 4: Snow Storage sites

In 2018, the Highfield snow storage size was reduced by approximately 10% due to land acquired for the Green Line LRT Project.

During the 2018/2019 winter season, snow removal activities were conducted on Priority 1 and Priority 2 routes, plus some residential roadways. Four million was spent on snow removal during the 2018/2019 SNIC season. This is \$5.9 million lower spend than during the 2017/2018 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, have 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.

Budget Review 2018-2019

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

During the 2018/2019 SNIC season, 169.8 centimetres of snow was reported to have fallen in the City of Calgary over 62 snow days. This was 28 per cent higher when compared to the average of the past five years.

Budget expenditures for the 2018/2019 winter season totalled \$49.8 million. Expenditures by category were as follows: Equipment (36.5 per cent), Labour (46.7 per cent) and Materials (16.8 per cent). Equipment and labour costs are the main costs and don't change proportionally to the snow fall. When crews are not working on SNIC activities, they work on environmental control, winter sweeping, depot maintenance and pothole repairs.

The current balance in the SNIC Reserve is \$1 million. At the fiscal end of 2018, Transportation withdrew \$8.1 million. Four million-four hundred thousand dollars was withdrawn from the SNIC Reserve in the second quarter of 2019.

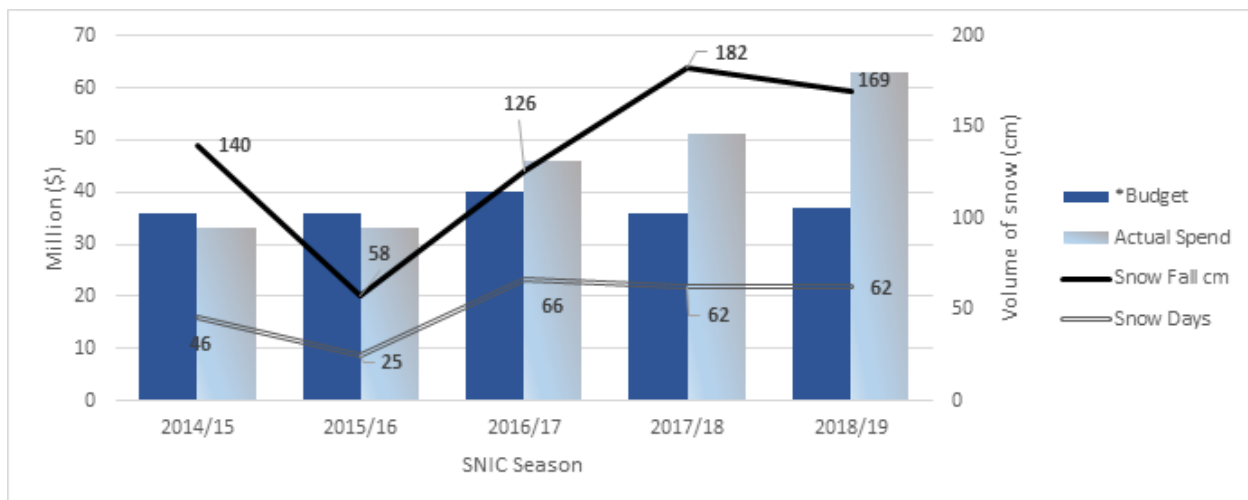


Figure 2: Expenditures and snow days 2014-2019

Priority 1 Route Collision Data

One of the goals of SNIC activities is to provide for safe movement of citizens. A comparison of collisions during the last five calendar years of complete collision data (Figure 3) shows that Priority 1 SNIC routes generally have five 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, decreased from 2011 to 2016 but have increased since 2016. The increase since 2016 may be related to the higher than average five-year snow falls since 2017 and 2018.

Slush/Snow/Ice Related Collisions

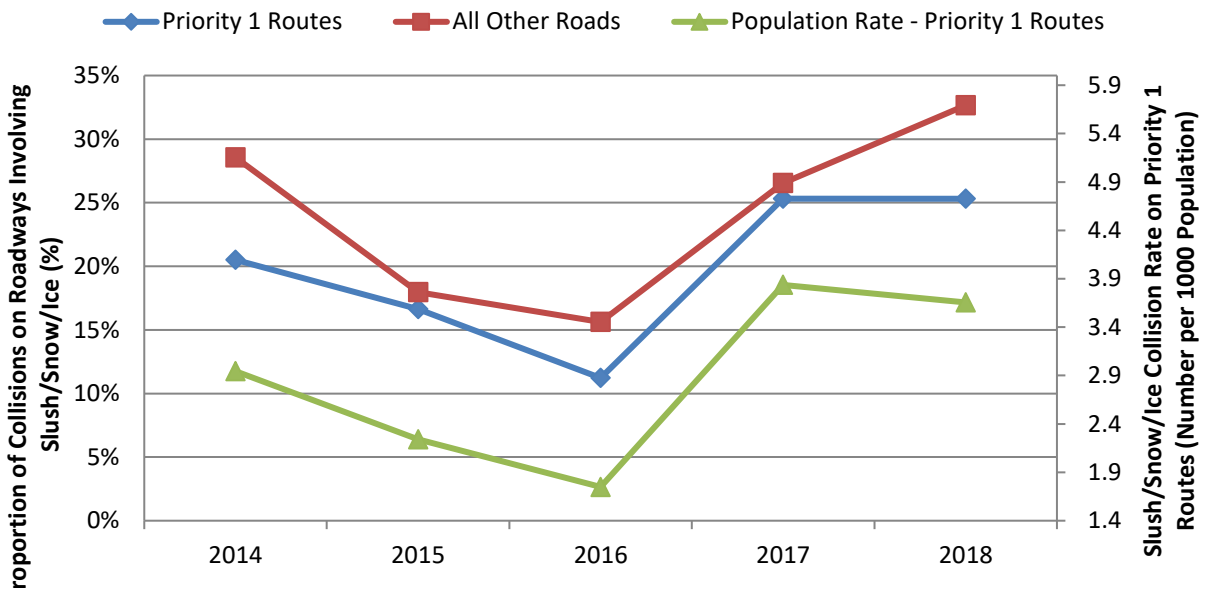


Figure 3: Snow Related Collisions

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 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 in the handling of winter maintenance operations; and
- 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 within 24 hours of the end of snowfall (100% sanded/salted and 90% ploughed)
Priority 2 Routes	Through lane ploughed and sanded; completed within 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	2018/19 Achieved
Percent of time Roads completes SNIC on Priority 1 through lanes within 24 hours. (100% sanded/salted and 90% ploughed)	92%
Percent of time that Roads completes SNIC on Priority 2 through lanes within 48 hours. (100% sanded/salted and 90% ploughed)	92%
Satisfaction with road travel conditions due to Snow and Ice Control.	*77%

*The Roads Annual Survey conducted by NRG Research Group was completed in 2018.

Figure 5: Roads Maintenance KPIs and Performance Achieved

2018/2019 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 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. 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 p.m. to 6 a.m.).

During the 2018/2019 winter season, two snow route parking bans were activated as follows:

- 1) 2018 October 3 at 10 a.m. to 2018 October 5 at 6 a.m.
- 2) 2019 February 18 at 12 p.m. to 2019 February 20 at 5 p.m.

Personnel, Equipment and Infrastructure

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

- Up to 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
- 9 front-end loaders

Roads infrastructure includes nine district depots and three snow storage sites, as well as the right-of-way infrastructure. The 2018/2019 SNIC season budget provided the maintenance operations support for the right-of-way infrastructure shown below:

Description	Lane-kilometers	Linear-kilometers	SNIC Service	Quantity
Expressways	1,604	404	Yes	-
Arterial Roadways	2,273	652	Yes	-
Collector Roadways	4,129	1,305	Yes	-
Residential Streets	9,452	3,387	Yes	-
Gravel Roadways	297	125	Yes	-
TOTAL	17,755	5,873	-	-
Back Lanes Paved	1,092	509	As required - WRS*	-
Back Lanes Gravel	2,066	1,196	As required - WRS*	-
Cycle Track		7.2	Yes	-
Bicycle Lane		44.6	Yes	-
Shared Lane		18.8	Yes – same priority as adjacent roadway	-
Neighbourhood Greenway		16	Yes – same priority as adjacent roadway	-
Signed On-Street Bikeway		327.9	Yes – same priority as adjacent roadway	-
Sidewalks (Roads)	-	5,749	Yes – 958	-
Engineered Walkways	-	-	No	2,078
Vehicle Bridges	-	-	Yes	194
Pedestrian Bridges	-	-	Yes	149
Park Bridges	-	-	Yes	132
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 system. *WRS – Waste and Recycling Services business unit

Table 5: Infrastructure Right-of-Way

SNIC Budget Details

The tables below show the annual SNIC budget and actual cost for the winter season of 2018/2019.

	For the period of October 2018 to December 31 2018	
Activity	Budget	Actual
Snow Removal P1 and P2	376,896	1,241,013
Snow Removal Residential	712,230	35,694
Ploughing P1 and P2	761,422	989,855
Sanding and Salting P1 and P2	8,443,426	10,989,205
Residential Sanding and Ploughing	720,310	2,217,503
Transit SNIC LRT Stations*	-	(7,226)
Transit SNIC Bus Zones*	-	66,546
Snow Dump Site Maintenance	10,000	242,049
Separate Bikeways	49,514	79,667
Snow Fencing	71,391	104,016
Anti-Icing	100,000	214,146
Material Handling and Storage	33,250	150,875
Sidewalk SNIC Clearing	1,110,035	2,138,414
Winter Supplementary Work**	1,082,948	2,805,444
2018 Winter Operation (Oct-Dec)	13,471,422	21,267,202
SNIC Reserve Transfer		(8,083,790)

Table 6: 2018 SNIC expenditures and budget

	For the period of October 2018 to December 31 2018	
Activity	Actual	Recovery
Transit SNIC LRT Stations	\$337,325	\$344,550
Transit SNIC Bus Zones	\$852,912	\$786,366

Table 7: Calgary Transit-2018 SNIC activity expenditures versus recovery

Activity	Year to Date –		Variance Per cent	Fiscal Year 2019 Budget
	For the period of January 2019 to May 31 2019			
	Budget	Actual		
Snow Removal P1 and P2	1,637,856	3,971,335	242%	1,869,933
Snow Removal Residential	348,143	53,733	15%	918,536
Ploughing P1 and P2	898,717	1,551,360	173%	1,516,057
Sanding and Salting P1 and P2	14,222,814	13,851,748	97%	23,992,609
Residential Sanding and Ploughing	2,155,898	2,636,707	122%	3,636,811
Transit SNIC LRT Stations*	-	343		-
Transit SNIC Bus Zones*	-	-		-
Snow Dump Site Maintenance	69,467	90,171	130%	117,185
Separate Bikeways	202,087	177,113	88%	340,903
Snow Fencing	101,719	25,710	25%	171,591
Anti-Icing	229,544	218,379	95%	387,220
Material Handling and Storage	131,686	61,118	46%	222,143
Sidewalk SNIC Clearing	1,466,296	3,173,348	216%	2,473,513
Winter Supplementary Work**	2,330,208	2,731,233	117%	3,930,857
Winter Operation	23,794,435	28,542,298	120%	39,577,358
SNIC Reserve Fund Transfer		(4,366,355)		
2019 Total	23,794,435	24,175,943	102%	

Table 8: 2019 SNIC expenditures and budget

Activity	Year to Date –For the period of January 2018 to May 31 2019	
	Actual	Recoveries
Transit SNIC LRT Stations	\$514,787	\$514,444
Transit SNIC Bus Zones	\$991,084	\$991,084

Table 9: Calgary Transit 2019 YTD expenditures and recoveries

October 2018 Snow Storm

Snow event one of the 2018/2019 winter season started on 2018 October 1 at 11 p.m. Snow stopped on 2018 October 3 at 8 a.m. A total of 39.1 centimeters of snow fell in Calgary during this event. Mutual aid from Edmonton, Red Deer, Medicine Hat and Okotoks provided 34 units to assist with snow and ice control. A snow route parking ban was declared from 2018 October 3 at 10 a.m. to 2018 October 5 at 6 a.m. The cost for the snow event was \$1,173,544.

Enhanced SNIC Services

In 2018 July, Council directed Administration to enhance SNIC services through a one-time \$9.5 million budget commitment from the Fiscal Stability Reserve for the 2018/2019 SNIC season. The funds were added into the SNIC Reserve. The enhanced services are as follows:

- Provide SNIC services to additional 100 kilometers of pathway;
- Clear all sidewalks adjacent to City property within 24 hours;
- Plow windrows away from high priority wheelchair ramp locations; and
- Communications campaign to advise residents of new fines and new responsibilities for 2018-19 winter season (TV, Web, Radio, Print).

With the enhance SNIC services, the pathways and sidewalks snow clearing must be completed 24 hours after snow stops. The City provide services to 715 kilometers of pathway, 958 kilometers of sidewalk, 136 traffic calming curbs, 2,431 traffic islands and medians, 17.6 kilometers of walkways and pedestrian bridges, and 165 miscellaneous locations (including stairs).

Five hundred wheelchair ramp locations were selected for enhanced windrow clearing. During the clearing of traffic islands and medians, the windrows in front of crosswalks are cleared. In addition, the windrows were cleared if any pathway and sidewalk snow clearing route goes through a wheelchair ramp.

The City received feedback from the Advisory Committee on Accessibility. Below are the highlighted themes of the comments received:

- Lane aprons continue to be an issue
- Extra funding and focus has helped to improve the snow clearing for pedestrians. While additional funds may help with addressing more locations, training and understanding mobility challenges can help City staff/contractors take better care when clearing areas. This awareness has started, and will hopefully continue to improve.
- Challenges continue with sidewalk areas that have been cleared, then snow clearing vehicles come afterward and create issues. This highlights the need for vehicle drivers to also understand the mobility challenges faced by pedestrians, and for a coordinated approach to snow clearing.
- Additional funding be used for an awareness campaign that is focused on public education rather than punitive measures.
- Private sidewalks continue to be a challenge. While notices and fines have helped, again awareness and understanding are critical.

With the knowledge gained after the first season with Enhanced SNIC Services, The City will continue to work with stakeholders to improve the experience for pedestrians during the winter seasons.

The City will continue to identify efficiencies for Enhanced SNIC Services to reduce the cost of providing this service.

The table below shows the SNIC expenditures on pathways and sidewalks during the 2018-2019 winter season.

For the period of October 2018 to December 31 2018				
Sidewalk SNIC Clearing	Department	Budget	Expenditures	Recovery from Enhanced Budget
	Roads	1,110,035	1,878,313	768,278
	Parks	224,766	1,791,240	1,566,474
	2018 Total	1,334,801	3,669,553	2,334,752
For the period of January 2019 to May 31 2019				
Sidewalk SNIC Clearing	Department	Budget	Expenditures	Recovery from Enhanced Budget
	Roads	1,466,296	2,007,825	541,529
	Parks	1,392,289	2,557,812	1,165,523
	2019 Total	2,858,585	4,565,637	1,707,052
2018-2019 Season Total		4,193,386	8,235,190	4,041,804

Table 10: SNIC expenditures on pathways and sidewalks during the 2018-2019 SNIC season

Program to Improve Mobility-Challenged Access During SNIC

In the One Calgary Budget, \$2 million was allocated to improve accessibility for citizens with mobility challenges during the SNIC season. This funding was initially allocated in the 2015 to 2018 Action Plan. 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 Community Neighbourhoods worked together to provide a list of priority locations. Calgary Transit controlled funding for this program. Roads has a contract in place that would allow this work to be completed as on-demand SNIC work.

During the 2018/2019 SNIC season, Roads' contractor provided service to over 1,200 bus stop locations and 5.15 kilometers 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 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 kilometers of cycle track that is cleared within 24 hours after snow stops falling. All 44 kilometers of marked, on-street bike lanes are swept within 48 hours after snow stops falling.

- Cycle Track: 7.2 kilometers (SNIC clearing on downtown cycle tracks the same as all downtown roadways, typically within 24 hours. Cycle tracks outside of downtown are the same as the priority of the roadway it is on)
- Bicycle Lane: 44.6 kilometers (SNIC clearing within 48 hours)
- Shared Lane: 18.8 kilometers (SNIC clearing same as the Priority as the road it is on)
- Neighbourhood Greenway: 16.0 kilometers (SNIC clearing same as the Priority as the road it is on)
- Signed On-Street Bikeway: 327.9 kilometers (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 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.

SNIC Contractors and Hired Equipment

The City retains the service from contractors to augment City personnel and equipment for SNIC operations. Our Maintenance Division and Parks, in conjunction with the Supply Management Division, has contracts to provide the following SNIC services:

- Transit Trouble Spots: 219.53 lane-kilometers
- District Trouble Spots: 503.81 lane-kilometers
- 1148 Priority bus pads
- 958.4 kilometers of sidewalks
- 715.3 kilometers of pathways
- 2431 traffic islands and medians
- 17.6 kilometers of walkways and pedestrian bridges
- 165 miscellaneous locations, including stairs.
- 136 traffic calming curb locations

Our 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. In 2019, a hired graders contract was issued to the market and the City was unable to obtain enough bids from contractors to meet the number of hired graders requested.

Common Fleet Operating System (CFOS)

The City has 643 units equipped with the CFOS. 122 units are cellular, meaning real time data; 467 are WIFI units, which will upload recorded data when at a WIFI hotspot (located in most depots near certain building and/or fuel pumps); and 54 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 Calgary Road Conditions map can be found at Calgary.ca.

Calgary Road Conditions Map

The City continues to use the public map that shows live updates on the snow and ice maintenance status on our roadways. This maps also shows the current location of snow ploughs.

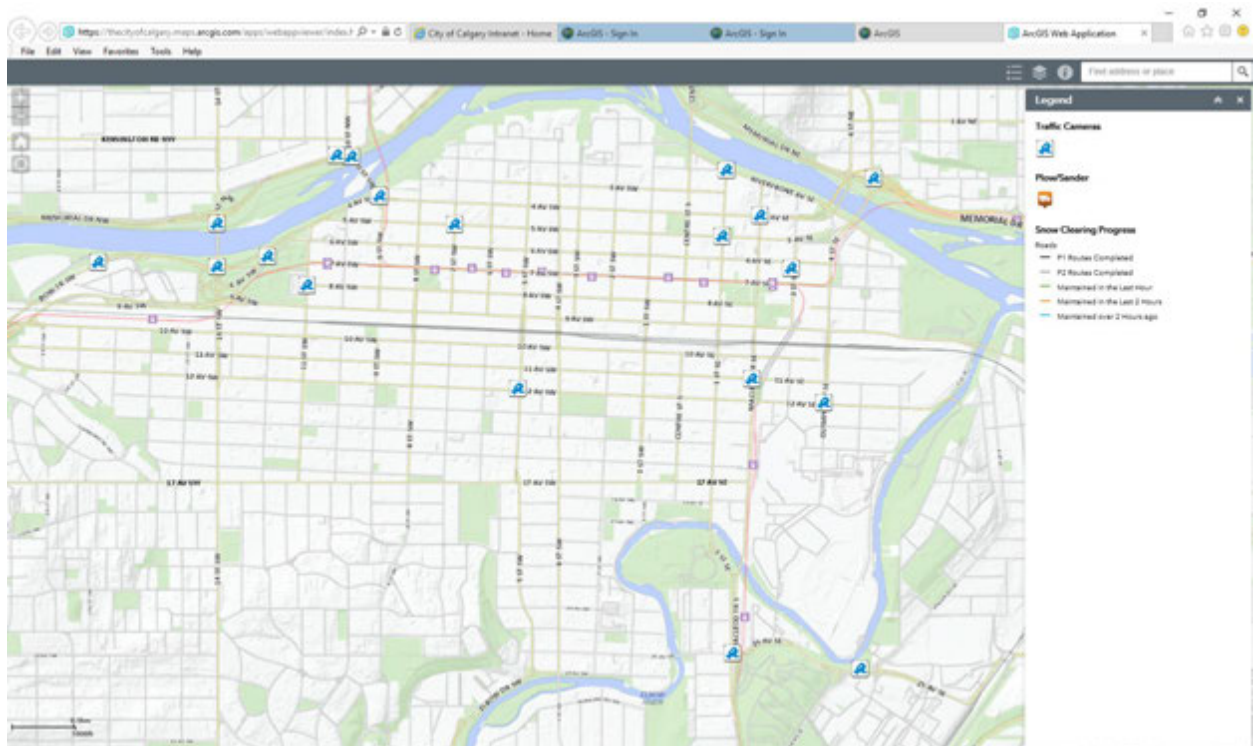


Figure 7: Calgary.ca Road Conditions Map

Innovation and Planned Improvements for 2019/2020

Innovation is an important component of the annual SNIC Program and The City of Calgary continues to pursue cost-effective and efficient practices to improve the delivery of services to citizens and visitors.

For the upcoming 2019/2020 Winter Season, a number of improvement initiatives are planned:

- More detailed information from over half of the units in service (49 total) will provide information on the application rate, use of blast and plow down and other information.
- New Brine storage tanks at each depot, which will make it easier for staff to ensure they have liquids to apply to the dry salt and abrasive materials.
- Roads will shift staff to winter shifts earlier which means staff will be on shift 24 hours per day 7 days per week by the end of September
- Utilization of a stacker to ensure that salt storage areas are filled with salt, which was purchased at more cost-effective summer rates.
- Piloting software applications to generate routing. This will allow for the ability in the future to move to mobile mapping to assign trucks based on storm patterns.
- Continue pilot of beet brine product when conditions warrant as pre-treating road surfaces. With smaller brine tanks, The City will also have greater opportunity to use these materials as well in pre-treatment applications.

Communications Summary and Strategy

Communications continued the approach of delivering snow communications from a One City, One Voice perspective. As part of the recent Notice of Motion for improving accessibility for Calgarians, Communications was tasked with educating the public about new fines for failing to shovel their sidewalks, and the improved pedestrian clearing programs that would be undertaken by The City.

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
 - Provide a coordinated approach to snow communications, across Business Units;
- 2) Educate and provide information on our operational initiatives so the public and our stakeholders can make informed travel decisions.
 - Educate citizens about the SNIC response and promote SNIC map to show real time response to snowfall; and
 - Provide quick/accurate responses to citizen questions across media channels/3-1-1.
- 3) Continue to build understanding for our operations.
 - Build awareness and understanding about our Snow and Ice Control services and Establish the City's Seven Day Snow Plan as a planned, strategic approach.

SNIC communications tactics and messaging

The following table shows the methods of communication that were used during the 2018-2019 SNIC season:

Tactic
<ul style="list-style-type: none">• On-call Communications• Daily SNIC Update (only on snow days and during seven day plan)• Social Media• Media Availability• Radio Advertising• Report to Calgarians

Table 11: Methods of communication were used during the 2018/2019 SNIC season

Key messages from the beginning of the 2018/2019 SNIC season

Budget

- The 2018 Snow budget was \$39.2 million. This budget was for the cycle between January 1, 2018 through December 31, 2018, after which the budget was replenished.
- In 2018, Council approved a one time spend of \$9.5 million to improve snow clearing for pedestrians for the 2018-19 winter season.

SNIC Seven Day Snow Clearing Plan

- Roads has a pre-planned, measured response to snowfall that helps make roadways safe and efficient called Snow and Ice Control (SNIC).
- Roads are cleared based on a Council-approved priority system— the Seven Day Snow Plan - the more traffic there is on a roadway, the higher the priority. The highest priority roads are classified as Priority 1s, and the lowest, are Priority 4s.
- Residential routes are worked on after major roadways have been addressed.
- Crews only remove snow on Priority 1 roads and in the downtown core.
- Crews push the snow to the curb on Priority 2 roads (bus routes)
- Crews will flat-blade the snow in residential areas to ensure all roads are “passable.”
- If crews plowed the snow to bare pavement in the resident areas, it would create such large windrows, no one would be able to park on the street.

9.5 million Dollars (Notice of Motion 2018)

- Windrows will be knocked down at 500 high priority wheelchair ramp locations.
- Sidewalks in front of City owned properties will be cleared within 24 hours after the end of snowfall. Parks has expanded their pathway clearing by 100kilometers.
- Calgary has approximately 5,700 kilometres of sidewalks. Of these, The City is responsible for clearing snow from approximately 10 per cent of these sidewalks.

Sidewalk Bylaw

- The majority of sidewalks in Calgary are still the responsibility of the adjacent property owner. These sidewalks must be cleared within 24 hours by property owner/occupant. Failure to remove snow after 24 hours of snowfall ending can result in a fine.
- When a complaint is submitted to 3-1-1, a Peace Officer issues a Snow and Ice Removal Notice, which gives the owner/occupant of a parcel 24 hours to clear the sidewalk. If after 24 hours the sidewalk has not been cleared, the file is then sent to a contractor to clear the sidewalk at the owner’s expense.
- The fine for not removing snow/ice from a sidewalk/pathway is \$250, with an escalating scale for subsequent convictions to the same property owner/occupant over a 12-month period.

Specified Penalty	Second offense in a 12-month period	Third and subsequent offense in a 12-month period
\$250	\$500	\$750

**If the ticket goes to court, the judge cannot award a fine of less than \$150.*

- The City is focusing on educating property owners during the 2018/19 snow season and is hoping to achieve compliance through voluntary action as much as possible. Property owners should be aware that fines may be issued for owners/occupants who repeatedly fail to clear their sidewalks/pathways in 2018/19.
- To report an un-cleared sidewalk contact 3-1-1.
- Consider being a Snow Angel and clearing the sidewalk of a neighbour who could use your help.

Parks and Pathways

- The City will be clearing over 600kilometers of sidewalks adjacent to City-owned land within 24 hours of snowfall ending city-wide.
- Please contact 3-1-1 to report any sidewalks along City owned land that may have been missed. If a sidewalk was missed in our initial mapping, contacting us will allow us to add that section to maps which our snow removal crews use.
- Not all pathways are cleared of snow. Of the 850 kilometers of pathways that exist city-wide, Council has approved clearing for up to 500 kilometers.
- How we determine which pathways to clear:
 - Pathway use during winter.
 - The steepness of the pathway and the safety of both citizens who use the pathway and crews who maintain it.
 - Whether the pathway is required for access to LRT stations, schools, business districts or recreation centres.
 - Whether the pathway connects to, or is part of the primary cycle network.
 - Before a snow event (prior to snowfall, snow in the forecast).

Roads

- City Roads crews are monitoring the forecast and are preparing for the upcoming snow. This includes applying an anti-icing agent and aggregate to bridge decks and trouble spots around the city.
- As soon snow begins to fall, crews begin SNIC operations on Priority 1 roadways as part of our Seven Day Plan. Priority 1 routes include major commuter roads and downtown streets (Crowchild Trail, Glenmore Trail).
- Crews will continue to maintain Priority 1 roads as the snow keeps falling to keep the highest number of Calgarians travelling safely.

- Once Priority 1 roads have been completed, up to 24 hours after the snow has stopped falling around the city, crews will move onto Priority 2 routes.
- Deerfoot Trail, Highway 22X and Stoney Trail are maintained by Alberta Transportation, working with their own snow clearing plan.

Winter Safety

- Leave extra time for your commute – plan ahead and ensure you get where you need in time while considering winter may have other plans for you.
- Visit Calgary.ca/snow for some winter driving tips to help you commute safely during the snowy weather.
- Safety on the roadway is a shared responsibility. Slow down, drive to conditions, and keep a safe distance from the vehicle in front of you.
- Take care when shoveling snow, as it is a strenuous activity and can cause your blood pressure and heart rate to climb quickly, putting stress on your heart. Push snow rather than lift and take a break if you feel tired or short of breath. Consider being a Snow Angel and shoveling the sidewalk of a neighbour with mobility issues.
- You can pick up a free sand/salt mixture to help melt ice on your sidewalk.
- Wear shoes or boots that provide traction on snow and ice; boots made of non-slip rubber or neoprene with grooved soles are best.
- Focus on trying to keep your balance.
- Point your feet out slightly like a penguin. Spreading your feet out slightly while walking on ice increases your centre of gravity.
- Walk slowly and take small steps or shuffle your feet on icy paths.
- Keep your head up and don't lean forward.
- Keep your hands out of your pockets. You can help break your fall with your hands free if you do start to slip.

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/Seven-Day snow event plan

The City's Seven-day snow event plan begins as soon as the snow stops falling. Communications has many messages tailored for citizens that are distributed through various channels. These messages highlight that Roads sands, salts, and plows roads and sidewalks based on a Council-approved priority system. This keeps the greatest number of vehicles moving safely in the shortest period and ensures Roads has the right amount of people and equipment maintaining the road at the right time.



We work 24/7 to get you to work

When it snows, we have a plan

Once a snowfall ends, the Council-approved seven-day snow plan comes into effect city-wide.

The plan sets out which roads, sidewalks, bikeways and pathways our crews will clear, to what extent, and on which day. While it's still snowing, and before the plan is activated, crews are out on major roads plowing snow to prevent build-up and applying anti-icing material.

Over 16,000 lane kilometres

Did you know? This would be equivalent to driving back and forth between Calgary and Edmonton 54 times.



Average annual snowfall in Calgary is 130 cm.

Day 1

OF SEVEN-DAY PLAN



Completed within 24 hrs.

- 4,030 lane km of roads (25% of all roads)
- 477 km of pathways
- 617 km of sidewalks

Major roads are Priority 1

City Crews work during snowfall and 24 hours after snowfall ends, plowing and removing snow on Priority 1 routes.

- Major roads plowed to bare pavement include: Crowchild Tr., Memorial Dr. and Macleod Tr.
- Downtown
- Pedestrian overpasses
- LRT platforms
- Downtown cycle tracks
- Designated sections of pathways and sidewalks along City-owned properties

Equipment/staff for a typical snowfall:

- 100–120 pieces of heavy equipment working daily
- 1,000–1,200 total hours
- 330 staff working 24/7 through the winter

Did you know? Deerfoot Trail and Stoney Trail are maintained by the province.



20,000 vehicles per day

Keeping our sidewalks and pathways clear

Property owners are required to clear adjacent sidewalks within 24 hours of snowfall ending, or risk being fined up to \$750.



Did you know? There are over 5,500 kilometres of sidewalks in Calgary. The City is responsible for clearing 11% of these sidewalks.

Day 2

OF SEVEN-DAY PLAN



Completed within 48 hrs.

- 3,144 lane km of roads: (20% of roads)

Priority 2 roads include bus routes

After 24 hours, Priority 2 roads are plowed.

- Intersections and crosswalks controlled by traffic lights
- Emergency routes (e.g. hospitals and fire stations)
- Bus routes and roads with on-street bike lanes
- Includes roads such as Kensington Rd. and Acadia Dr.



5,000 – 19,999 vehicles per day

Did you know? Priority 2 routes are snow routes, and may be subject to a parking ban.



Snow Route Parking Ban: during a ban, parking is temporarily restricted on designated snow routes for up to 72 hours.

Day 3-7

OF SEVEN-DAY PLAN



Priority 3 & 4 routes:

- 9,083 lane km (55% of roads)

Feeder, collector and residential streets

After 48 hours, Priority 3 plowing includes:

- Feeder/collector routes
- Turn lanes and on/off ramps
- Windrows at busy crosswalks and wheelchair curb ramps
- Playground zones
- Designated hills

After 72 hours, Priority 4 clearing includes:

- Designated residential streets
- Bus pads



Responsible clearing

The City follows a Council-approved Seven-Day snow plan, to maintain a safe network while being budget conscious. Our snow plan does not include:

- Plowing residential roads down to bare pavement
- Snow removal from residential areas
- Clearing back lanes, alleyways or engineered walkways



What we lay down

Keeping our roads clear and safe takes a lot of material. In 2018 we used:

- Nearly 95,000 tonnes of salt
- Almost 42,000 tonnes of pickle (salt/gravel mix)
- Over 1.2 million litres of anti-icing agents



Did you know? Most of the gravel material we lay down is picked up during The City's Street Sweeping program in the spring.

What it costs when it snows

\$1.2 million is the cost to clear Calgary's roads

\$85,000–\$100,000 is the cost to clear Calgary's sidewalks

\$25,000–\$35,000 is the cost to clear Calgary's pathways

\$6 is the average monthly household cost for snow clearing on your property tax.



Learn more at calgary.ca/snow

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