Supports Item No. 1
CS&B Committee Agenda
December 3, 2009

CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Report Date:	November 25, 2009
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Meeting Date:	December 3, 2009

TO: Standing Committee on City Services and Budgets

FROM: General Manager, Engineering Services

SUBJECT: Snow and Ice Treatment Review

RECOMMENDATIONS

A. THAT, Council endorse the snow and ice treatment procedures and objectives outlined in this report

B. THAT, Council approve an amendment to the Street and Traffic By-law (No. 2849) generally in accordance with Appendix A to require all property owners or occupants to be responsible for clearing snow and ice from the sidewalks that are adjacent to their property every day of the week.

AND THAT Council instruct the Director of Legal Services to bring forward for enactment an amendment to the Street and Traffic By-law generally in accordance with Appendix A.

C. THAT, Council approve amendments to the Ticket Offences By-law (No. 9360) to include non-compliance with sidewalk snow and ice clearing under section 76 of the Street and Traffic By-law as a ticket offence.

AND THAT Council instruct the Director of Legal Services to bring forward for enactment an amendment to the Ticket Offences By-law to include such non-compliance as a ticket offence.

D. THAT, Council approve development of communications programs and a web-based registry for persons and organizations that wish to provide sidewalk clearing services to support residents who may not be able to clear snow and ice from sidewalks

GENERAL MANAGER'S COMMENTS

The General Manager of Engineering Services RECOMMENDS approval of A through D.

COUNCIL POLICY

Council establishes the service level objectives to authorize the City Engineer to utilize the available equipment and staff to strive towards achievement of those service level objectives.

SUMMARY

The Lower Mainland experienced extreme winter conditions from December 13, 2008 to January 8, 2009. On January 20, 2009, Council directed staff to review and renew the current snow and ice treatment procedures and other aspects of snow and ice treatment and to report back to Council.

PURPOSE

The purpose of this report is to review the current snow and ice treatment procedures and other aspects of snow and ice treatment on City streets and sidewalks.

This report does not include discussion of the enhanced snow and ice treatment during the Olympic period, which includes changes for ploughing and snow removal for the Olympic Lanes, treatment of the pedestrian corridors, and treatment of side roads around venues to ensure full availability of the City's transportation network during the Olympic Period.

BACKGROUND

The City provides snow and ice treatment services on City roads. The City also administers Section 76 of the Street and Traffic By-law which currently requires property owners, with the exception of single family residences and duplexes outside the downtown peninsula, to clear snow and ice from the sidewalks abutting their properties from Monday to Saturday.

The objectives for snow and ice treatment are to support public safety, maintain mobility to support the basic functions of the City, and minimize economic loss to the community during snow and ice events.

Under the current procedures, the City does not treat snow and ice on 950 km of side roads nor the 800 km of lanes in the City.

Staff Review of the Snow and Ice Treatment Procedures

As directed, City staff conducted a review of the City's existing snow and ice treatment procedures and considered the feedback received from the public. Staff also conducted interviews with staff from City departments and outside organizations, including the following:

Vancouver Emergency Management
BC Ambulance Service
Coast Mountain Bus Company
CUPE 1004
Environment Canada Weather Service
Vancouver Coastal Health Authority
Vancouver School Board
West Vancouver Blue Bus
Public Works Association of BC
Regional Engineers Advisory Committee
Regional Municipal Operations Managers
Persons with Disability Committee
Senior's Advisory Committee

In general, the consensus by all the organizations was that the City did a good job keeping the main routes open throughout the winter event. The key concerns were:

- Traction of buses challenges with inclines
- Windrows at the curbs that obstructed
  - Bus Stops
  - Crosswalks
  - On-street parking
- Unploughed side streets
- Residential area sidewalks that were not cleared of snow
- Inconsistent clearing of sidewalks in the commercial areas
- Blocked catch basins that resulted in large puddles or flooding

The overall result of all these concerns was reduced mobility. The most significant concern was that some people became homebound and routine access to food, medicine, and other necessities became very difficult.

A summary of the winter event, the City's response and impact on the public is included in **Appendix B**. The issues identified during the review are included in the discussion items in the following section.

DISCUSSION

Based on the snow and ice treatment review, City staff identified operational changes suggested amendment to the By-law requirements for snow and ice clearing on sidewalks.

Snow and Ice Treatment Procedures

Staff reviewed the existing procedures and recommend operational changes as noted below:

Arterial and Major Routes

The Arterial and Major Routes component includes bus routes, arterial routes, collector routes, bridges, and emergency access routes. These routes form the basic road network for emergency vehicles, transit, goods movement, and movement of the public.

Overall consensus is that the arterials and major routes were well serviced during the winter event. During the event, parking on these major routes became an issue as the windrows built up in the parking lane. In some cases, drivers continued to park along the windrows and ended up encroaching on the travel lanes. City crews initiated snow removal activities along some corridors to regain space for parking to help the travel lanes.

Operational changes include improved communications with the City's partners and the spot use of a sand/salt mixture for the few areas that buses have traction issues. The City also added a snow blowing attachment to the bob cat to provide snow blowing capacity.

Bicycle Routes

The City has 200 km of bicycle routes. Under the current procedures, the City provides snow and ice treatment for the motor vehicle travel lanes of the top 12 bicycle routes on about 95 km of roads.

During the review, staff identified that the primary concern for bicycle routes is ice, particularly black ice. While ice treatment cannot completely remove ice, the treatment provides safer conditions for cyclists than untreated routes.

Overall, the 12 bicycle routes have been marginally maintained under ice conditions as traditional salting requires vehicle traffic to work the salt into the pavement. Due to lower vehicle traffic, the salt takes longer to become effective on bicycle routes. As an operational change, City staff plan to apply salt brine to improve the effectiveness of ice treatment on these routes.

Far fewer people cycle under snow conditions and snow treatment does not keep the bicycle routes free of snow under all conditions; however, the bicycle routes recover to ridable conditions faster if the motor vehicle travel lanes have been ploughed and salted.

Under the existing procedures, the 12 bicycle routes are First Priority Locations and all other bicycle routes remain untreated. As bicycles are the second highest transportation priority after pedestrians and the Greenest City Action Team recommends that the City increase the safety and attractiveness of cycling, staff recommend that snow and ice treatment be expanded to all bicycle routes.

Secondary Routes

In addition to the arterial and major routes, City crews treat snow on about 60 km of other roads that either pose a substantial safety risk (steep hills) or have clear public benefit (access to hospitals and other primary health care facilities). Ice is treated only if problem conditions are reported and verified by City staff.

During the review, BC Ambulance Service and Vancouver Fire and Rescue Services staff requested that the secondary routes be expanded to include approximately 10 km of additional roadways to provide better access to and from fire and ambulance stations, care homes, and other facilities.

As an operational change, staff plan to treat the additional 10 km of roadways for snow and ice to support mobility by emergency service vehicles.

Bus Stops and Crosswalk Intersections

The City has approximately 1,650 bus stops and approximately 7,000 street intersections. Under the Street and Traffic By-law, property owners or occupiers are required to clear snow and ice from the sidewalks, including sidewalk bus stops. Sidewalk clearing is required by 10:00 am, which is after the morning commute.

As needed for safety purposes, City crews occasionally perform ice treatment at the busiest bus stops and crosswalk intersections (downtown core and Broadway corridor)

before 10:00 am for the morning commute. As an operational change, City staff will perform ice treatment for any bus stop or crosswalk intersection, where considered necessary for safety.

Under snow conditions, windrows from the ploughs can obstruct bus stops, crosswalks, and catch basins. To minimize windrows, City crews salt the roads to initiate melting of the snow and plough only when the snow accumulates over an inch or so and ploughing becomes necessary.

Under extreme snow conditions, crews manually remove the windrows that obstruct the bus stops and the crosswalk intersections or block catch basins. During last winter, the windrows from the ploughs built up along the curbs and obstructed bus stops and crosswalk intersections. City crews were challenged to manage the windrows due to the heavy and prolonged accumulation and the fact that the windrows froze, which hampered manual clearing. One third of the 544 letters and emails, logged by the City from December 2008 to February 2009, related to sidewalks, bus stops or crosswalk obstruction.

Operational changes will include changes in ploughing to minimize windrows at bus stops and crosswalk intersections, deployment of staff to clear the windrows in a more proactive manner when ploughing of heavy snowfall is initiated, and the use of mechanical clearing devices, such as bob cats, back hoes and snow blowers.

Walkways and Stairs not adjacent to a property

City crews provide snow and ice treatment to walkways, pedestrian underpasses and overpasses, sidewalks on bridges, seawalls, stairs within the street right-of-way, and sidewalks where there is no abutting property owner.

Overall, these walkways and stairs are adequately treated for snow and ice. Minor operational changes to manage heavy snowfall as experienced last winter will include the expanded use of small equipment, such as mechanical salt spreaders and walk behind snow blowers.

City-Owned Parking Lot

Under the City's current procedures, City crews provide snow and ice treatment to the parking lot at Hastings and Windermere. Historically, this parking lot was a component of the Park and Ride system. During the review, staff identified that this parking lot no longer serves as an official Park and Ride lot and is not a key component in the City's transportation network; thus, an operational change will be that City crews will no longer clear this parking lot of ice or snow.

Side Streets and Lanes

Under the current procedures, the City does not treat 950 km of side streets. Under normal winter conditions, the side streets generally remain passable or become passable shortly after a snow event and virtually all properties are within 3 blocks of a treated street.

Under the City's current procedures, the City does not treat snow or ice on the approximately 800 km of lanes. Due to low speeds and traffic volumes, snow and ice on the City's lanes do not pose a substantial safety risk. The City's lanes are also not a critical component to maintain mobility for the basic functions of the City during snow and ice events.

The exception for snow and ice treatment on side streets and lanes is when emergency or medical service vehicles require access to a street or lane. As necessary, City crews will salt or clear a street or lane to provide access for emergency vehicles. Based on the interviews, first responders were able to access and service all parts of the City without City crew support. City crew support is generally needed for secondary support or when vehicle access is required to support the first response.

During the winter event, many of the side streets and lanes became virtually impassable, which resulted in significant disruption for residents. Well over half of the 544 letters and emails, logged by the City from December 2008 to February 2009, relate to side streets.

For future winter events under which the side streets become impassable, the operational changes should include the provision for City crews to treat side streets. In such a case, the City would use graders, back hoes and bobcats. The City's experience from this last winter is that regular snow ploughs are not effective for ploughing packed and rutted snow on the City's narrow side streets.

The key challenge for side street snow treatment is the windrow on the narrow streets, which could be manageable for one or two passes depending on the snow accumulations. As this measure would be implemented under unusual conditions, a single pass is expected to be adequate to make the side streets passable by prudent drivers operating vehicles equipped with proper winter tires.

Parking prohibitions on one side of the street during snow events were considered; however, past experience with such parking prohibitions was not successful as heavy snowfall events occur too infrequently to foster a sustained change in the parking behaviour by vehicle owners.

Sidewalk Snow and Ice Clearing

Section 76 of the Street and Traffic By-law requires all property owners or occupiers, except single family residences and duplexes outside the downtown peninsula, to clear ice and snow from the sidewalks along their properties by 10 am the next day (except on Sundays).

During the extreme winter conditions of last winter, compliance with the by-law requirements was very high. City inspectors inspected approximately 10,000 properties, responded to 395 complaints, issued 702 warnings, and forwarded 19 cases to City prosecutors. To date, six cases have been taken forward and all resulted in guilty pleas, resulting in fines of almost $25,000.

One third of the 544 letters and emails, logged by the City from December 2008 to February 2009, relate to sidewalks. The vast majority suggested that sidewalk clearing be applied to all properties. The City also received concerns regarding those who are not physically or financially able to clear the sidewalks. Expansion of the by-law requirement would require an

accompanying program to promote and encourage community support for those who are unable to clear their sidewalks.

Proposed By-law Changes

Staff recommend that Council amend the Street and Traffic By-law to require all property owners or occupants to be responsible for clearing snow and ice from the sidewalks adjacent to their property for all days of the week.

Education and awareness of the sidewalk clearing requirements will continue to be the preferred methods to promote by-law compliance. Prosecution is last resort for continued non-compliance. As full prosecution is expensive for both parties, the ability to issue tickets would provide an alternative to promote compliance. The City would retain the option for full prosecution for the more serious situations.

Staff recommends that the City amend the Ticket Offences By-law (No. 9360) to include non-compliance with sidewalk snow and ice clearing as a ticket offence.

Community Support

To support those residents who cannot physically clear snow and ice from the sidewalks and do not have the financial capacity to pay for sidewalk clearing services, the City will also encourage youth organizations, high school community service programs, and community organizations to provide sidewalk clearing services for free or by a donation. Preliminary contact with community recreation centre staff and the Downtown Community Court, which assigns community work assignments, indicates preliminary support for such a program.

Staff recommends the following:

- That the City create a web-based registry of persons and organizations that provide sidewalk clearing services for free or by donation. Such a registry would also assist the City's 311 Call Centre to respond to public inquiries.

- That the City create a communication program to encourage volunteerism in the community to help clear snow and ice from the sidewalks.

Enhanced Communications

During the duration of the winter event, City staff and elected officials were featured in over half of the 119 media stories. In addition, the City ran public service radio announcements and print advertisements about sidewalk clearing. Six community advisories were sent out and the City web site was updated six times.

Going forward, it is recommended that the City should proactively encourage the public to use snow tires, have access to a snow shovel, maintain a supply of salt or sand for sidewalks and walkways, and plan for alternative modes of transportation during snow events. In addition, communications should also be developed for specific conditions, such as severe cold weather, heavy snowfall, and snow-covered catch basins. These communications should be in multiple languages and available through web site, print, radio and other outreach methods.

To support amendments to the Street and Traffic By-law regarding the sidewalk clearing requirements, Staff recommend that the City develop a communications program to communicate the by-law changes and to encourage individuals and organizations to register their sidewalk clearing services.

Snow Fleet

Given the extreme winter conditions experienced last December and January, the City's snow fleet, vehicles and equipment performed well. One of the lessons from this past winter was that the smaller and lighter plough trucks had difficulty on the narrow side streets. As many of the bicycle routes not currently treated are along narrow residential streets, four-wheel drive capability would be beneficial to improve performance and safety. The City's fleet currently has five trucks that could benefit from a four-wheel drive system, all of which would be due for replacement at varying times over the next seven years.

For future vehicle purchases, four-wheel drive capability should be provided on any new vehicle to be outfitted with snowploughs, salting units, brine tanks, or other snow and ice treatment equipment, when, in the opinion of the City Engineer, this feature is operationally necessary.

ALTERNATIVES/OPTIONS

The alternative to the recommendations of this report is to continue with the current snow and ice treatment procedures and maintain the existing Bylaw requirements for snow and ice removal on City sidewalks.

FINANCIAL IMPLICATIONS

The recommendations in this report have financial implications to the City's annual operating budget. For context, the snow and ice funding mechanism differs from typical City activities.

Funding Mechanism

Snow and ice treatment is highly dependent on our variable and unpredictable winter weather. The degree to which staffing and equipment resources will be required to be redeployed from other activities during this period makes it difficult to develop the annual budget for snow and ice removal. To manage the variability and uncertainty, the annual budget is supported by funding from Contingency Reserve.

The annual Snow and Ice Control budget within Engineering Services is set to fund annual internal equipment rental and maintenance costs, plus a nominal amount to deal with limited snow and ice treatment typically expected in the second half of the year. The equipment charged directly to the snow and ice control budget includes salting and ploughing attachments for dump trucks. For 2009, this budget was set at $940,300.

In the summer, a transfer from Contingency Reserve is made to the Snow and Ice control budget to cover the actual snow and ice treatment costs incurred during the first half of the year.

During year end, a review of the Engineering Services budget is undertaken to identify any savings resulting from the reallocation of staff and equipment resources from their normal activities to snow and ice control activities. Where identified, these savings are used to offset expenditures within the Snow and Ice Control budget relating to the second half of the year. Where savings can not be identified, a further adjustment is made from Contingency Reserve, to the extent of available funding, to cover these expenditures.

The table below indicates the amounts budgeted for equipment costs and the preliminary snow fight costs for the last five years. The transfer from Contingency Reserve represents the additional amount required, above the preliminary snow and ice control estimate, to undertake snow and ice control activities for the year.

	2005	**2006**	**2007**	**2008**	**2009**
Equipment Costs	$478,800	$588,600	$666,100	$693,700	$748,200
Preliminary snow and ice control costs	$166,500	$169,800	$173,200	$181,300	$192,100
Transfer from Contingency Reserve	$924,400	$772,613	$812,700	$1,872,012	$1,230,800***
Funded within Engineering Operating Budget			$137,433	$449,536	
Total Snow and Ice Control Costs	$1,569,700	$1,531,013	$1,789,433	$3,196,548	$2,171,100***

*** - for 2009 – these figures represent the amounts up to June 30, 2009 – any further snow or ice treatment costs incurred in the second half of the year will affect the transfer from the Contingency Reserve and the funding from the Engineering Operating Budget

The snow and ice control costs (other than the initial internal equipment costs) are related to staff and equipment diverted from other operations. Staff may be diverted from sanitation activities to drive dump trucks to salt or clear snow as an initial response. Additional equipment and staff may be diverted from capital projects or maintenance activities to support the snow and ice control activities as required. The equipment and staff are charged at standard rates to the snow and ice control accounts.

Financial Implications of Recommendations

After reviewing the annual expenditure within the Snow and Ice Control budget since 2002, the annual expenditures have ranged from $0.7m to $3.2m, with the median at $1.5m. The fluctuation in expenditures is due to the varying and unpredictable winter weather and associated response.

Based on an average cost, the recommendations in this report are expected to increase the overall snow and ice costs by $5,500 per day for Ice treatment and $9,000 per day for Snow

treatment, as outlined below. Actual cost implications are dependent on actual treatment activities during the year and will depend on winter conditions.

	Ice Treatment	Snow Treatment
Current Level of Service (Average daily cost)	**$17,000/day**	**$50,000/day**
Supplemental Bus Stop/Crosswalk Treatment	$1,000/day	n/a*
Expansion to all Bike Routes	$4,000/day	$8,000/day
Add 10 km to Secondary Routes	$ 500/day	$1,000/day
Total Additional Daily Cost	**$5,500/day**	**$9,000/day**

* No additional daily cost; however, this service will be deployed earlier in a heavy snow event.

Note: Treatment of side streets is on the order of $90,000 per implementation and has not been included above, as conditions that would trigger this level of service are historically infrequent

Over the past five years, treatment was initiated an average of 51 times per year for ice and 4 times per year for snow. Based on these averages the additional cost for weather-related activities would be:

	Ice Treatment	Snow Treatment
Average days of treatment (2004-2008)	51 days	4 days
Additional average daily cost	$5,500/day	$9,000/day
Additional average annual cost	$281,000/year	$36,000/year

Average Cost Implications	
Enhanced Ice Treatment	$281,000/year
Enhanced Snow Treatment	$36,000/year
Enhanced Communications Plan	$50,000/year
Total Additional Operating Costs	**$367,000/year**

Note: For changes to sidewalk clearing requirements under the Street and Traffic By-law, no additional net costs are incurred by the City as inspectors are drawn from other areas disrupted by snow and ice conditions.

The financial implications of the recommendations for one-time expenditures are on the order of:

Equipment Purchases (Snow buckets for backhoes)	$30,000
Web Registry for Sidewalk Clearing	$10,000
Total One-time Costs	**$40,000**

Equipment purchases would be made via the Truck and Equipment Plant Account, and would be repaid through increased annual rental rates from Equipment Services.

Fleet changes of moving to four-wheel drive on the smaller trucks, would be addressed when the existing units are replaced over the next 7 years. The incremental capital costs to purchase four-wheel drive units, is currently estimated at $4,000 per vehicle, and would be funded through the Truck and Equipment Plant Account, with an incremental increase to the operating costs for increased rental rates, estimated to be $500 per unit per year, including additional maintenance costs and slightly increased fuel consumption.

ENVIRONMENTAL IMPLICATIONS

Impacts of Road Salt

The expansion of snow and ice treatment will result in an additional use of road salt. For the most part, road drainage is discharged into the marine environment (English Bay, False Creek, and the harbour) or into inter-tidal estuary areas (Fraser River). Where road drainage is directed to fresh water environments, the City conducts an annual environmental monitoring program. The monitoring has not identified any negative impact on the environment related to the use of road salt.

Proposed Fleet Changes

The change to four-wheel drive for the smaller trucks is expected to increase fuel usage by 5% per unit or approximately 200 liters/year of extra fuel for each unit. The corresponding greenhouse gas emissions would increase by 5% or approximately 500 kg/year from each unit. The increased emissions are balanced off with the improved safety of the operators and improved mobility for snow clearing operations in areas with narrower road widths.

CONCLUSION

Based on the review of the snow and ice treatment procedures and other aspects of snow and ice treatment, staff recommends improvements which include:

- Changes to the snow and ice treatment procedures, including expansion of snow and ice treatment to the full bike route network

- Amendments to the Street and Traffic By-law (No. 2849) to require all property owners or occupiers to clear snow and ice from the sidewalks seven days per week

- Amendments to the Ticket Offences By-law (No. 9360) to include non-compliance with sidewalk snow and ice clearing requirements as a tickets offence

- Develop and maintain a web-based registry of persons and organizations that provide sidewalk clearing services for residents who may not be able to clear snow and ice from sidewalks and provide a communications plan to encourage participation.

* * * * *

APPENDIX B
Suggested Terms for Amendment to the Street and Traffic By-law

BY-LAW NO. _____

A By-law to amend Street and Traffic By-law No. 2849 regarding snow removal from private property

THE COUNCIL OF THE CITY OF VANCOUVER, in public meeting, enacts as follows:

1. This By-law amends the indicated provisions of the Street and Traffic By-law.

2. Council repeals sections 76, 76A, and 76B, and substitutes:

"76. The owner or occupier of any parcel of real property shall, not later than 10:00 a.m. every day, remove snow and ice from any sidewalk adjacent to such parcel for a distance that coincides with the parcel's property line.

76A. If an owner or occupier of any parcel of real property fails to remove snow and ice, as required by section 76, the City Engineer may authorize the removal by another person and the costs of such removal shall be at the expense of the owner or occupier as the case may be, and the city may recover such expense by action in a court of competent jurisdiction."

3. A decision by a court that any part of this By-law is illegal, void, or unenforceable severs that part from this By-law, and is not to affect the balance of this By-law.

4. This By-law is to come into force and take effect on the date of its enactment.

ENACTED by Council this day of , 2009

_____
Mayor

_____
City Clerk

APPENDIX B
SNOW AND ICE TREATMENT BACKGROUND

This appendix summarizes the background relating to the winter event from December 2008 to January 2009 and the City's snow and ice treatment response, impact on the public, and the pilot project to clear the untreated side streets.

This review was requested by Council on January 20, 2009, following the unusually severe snow conditions that the City experienced this past winter. The following items and issues were considered by staff during the review:

- Summary of 2008-09 Extreme Winter Conditions and the City's Response
  - Challenges caused by the snow and ice to seniors and those with disabilities
  - Emergency response challenges under the snow and ice conditions
- Review of the Snow and Ice Treatment Procedures including
  - Arterial and major Routes
  - Bike Routes
  - Secondary routes
  - Bus Stops and Crosswalk Intersections
  - City-Owned Parking Lot
  - Side streets
  - Lanes
- Snow and Ice Clearing on Sidewalks
- Utilization and adequacy of current fleet of equipment
- Communications with the Public
  - Multiple languages
  - "Snow helpline", community support for residents with mobility issues

Winter in Vancouver

Winter weather in Vancouver is highly variable and the City's response is dependent on the conditions. Snow and ice treatment may include salting, sanding, ploughing, snow-blowing, manual clearing, snow removal, or other activities as appropriate to meet the specific circumstances. Deployment of City resources can range from two night trucks for monitoring and spot salting to 24-hour treatment using the entire fleet of snowploughs, backhoes, graders, Bombardier ploughs, snow blowers, and other resources available to the City.

In addition, the snow and ice conditions vary considerably between the areas of the City for the same winter events. For example, one part of the City may have significant snowfall while another, such as the downtown core, may experience rain with temperatures above freezing.

Extreme Winter Weather - December 2008 / January 2009 Storm

The lower mainland experienced extreme winter conditions from December 13, 2008 to January 8, 2009. Environment Canada forecasted snowfall and possible accumulation starting on Saturday, December 13, 2008.

During this period, a total of 102 cm of snowfall was recorded at the Environment Canada monitoring station at Vancouver International Airport (YVR). Cold temperatures, dipping to -12°C resulted in significant accumulation of snow on the ground over the period.

The maximum reported snow on the ground as measured at YVR was 41 cm on Christmas Day. While snowfall and snow accumulation is not measured within the City of Vancouver, staff observations and reports by the public indicated that accumulations were of similar magnitude but also varied significantly throughout the City.

To put this event in perspective, Environment Canada (Meteorological Service) noted the following regarding winter weather similar to the severity experienced during the period of December 2008-January 2009:

1. Has occurred eight times since 1874

2. Last occurred in the winter of 1968-69

3. Occurs most frequently in December and/or January

4. Is extremely rare in February and non-existent in March and November. Multiple snowfalls are extremely rare and major single snowfalls typically don't last very long, melting faster due to higher average temperatures in those months

To compound the winter conditions last winter, early January also saw heavy rains with over 100 mm of rain in the first 11 days, with a peak rainfall of 34 mm measured on Jan 10 at YVR. Heavy rains coupled with snow-covered catch basins increased the risk of flooding.

City Snow and Ice Response- December 2008 / January 2009

In response to the Environment Canada weather forecast, City crews started salting activities on Saturday, December 13, 2008 in preparation for the snowfall. City staff and equipment were deployed 24 hours per day to monitor, treat ice, and clear snow throughout the period. During the heavy rainfall in early January, City crews were dispatched to clear catch basins of snow to prevent flooding.

For the winter event, the City fleet included 46 snowplough trucks with salter units, 5 snowploughs without salter units, 14 backhoes, 4 walk-behind snow blowers, 2 graders, 2 Bombardier snowploughs, and one bob-cat available for snow and ice treatment during this period.

During the period, the City deployed an average of 21 pieces of equipment and 90 manual workers during the day shifts and an average of 10 pieces of equipment on the night shift. The peak daily activity was 42 pieces of equipment and 330 workers deployed for manual snow and ice treatment of bus stops, crosswalk intersections and catch basin clearing.

For City sidewalks, property owners or occupants are responsible for clearing snow and ice from the sidewalks that surround their property by 10 am, except on Sundays, under Section 76 of the Street and Traffic By-law (No. 2849). The By-law applies to all properties in the City except single family residences and duplexes outside the downtown peninsula.

Six City inspectors inspected approximately 10,000 properties, responded to 395 complaints during the winter event, and issued 702 warnings. Prosecution is the last resort after all other efforts of education, awareness and cooperative resolution have failed. Nineteen cases were forwarded to City prosecutors for follow-up and 17 of these cases, many with multiple offences, were scheduled for prosecution. To date, six of the prosecutions were taken forward and all six pled guilty, resulting in fines of almost $25,000.

Impacts on the Public

Overall, City crews were successful with the snow and ice treatment for the roadways and walkways under the current snow and ice treatment procedures. One challenge with the continuous snowfall was maintaining the bus routes, particularly those with hills, as transit buses are not outfitted with snow tires.

Another challenge was the snow clearing at bus stops and crosswalk intersections. The accumulation of windrows along the curb from the snow ploughs created a barrier for persons with mobility challenges to board buses or cross the street without assistance. The accumulation of packed snow on or around the bus stop passenger areas also posed slippery conditions and a potential barrier to persons with mobility challenges.

Sidewalks in single family residential areas outside of the downtown peninsula are not required by By-law to be cleared of snow and ice. Some residents chose to clear their sidewalks and others did not. As the event continued, the accumulation of snow on the un-cleared sidewalks became a concern as many persons with mobility challenges became homebound. The un-cleared sidewalks also created problems for emergency services to access residences with stretchers and other equipment.

Residential garbage collection continued throughout the winter event. As the snow accumulated, the City's garbage trucks were chained up and City garbage collection was maintained at about 75% of the regular service levels for most of the City. In areas with hills, garbage collection was significantly disrupted. City garbage collection was fully recovered, including the backlog, by January 12, 2009.

The City's recycling and yard waste service was suspended on December 15, 2008. Recycling trucks are lighter than garbage trucks and could not be chained up due to the minimum clearance between the tires and the side hopper over the rear tires. Service was restarted January 13, 2009.

The largest impact on residents was the lack of snow and ice treatment on untreated side streets. Residents are able to manage the short-term disruption of the normal pattern of snowfall followed by a quick melt within a few days. As the event continued and the snow accumulated on the untreated side streets, the disruption to residents increased.

The accumulations caused wheel ruts and slippery conditions which significantly impaired operation of private vehicles that were not equipped for snow conditions. As the extreme conditions continued and the snow accumulated, the build-up of the snow between the wheel ruts was such that some vehicles did not have adequate clearance. This made some roads impassable even to vehicles properly equipped for winter conditions.

Private vehicle use and commercial services, particularly those not equipped for snow conditions, were significantly impaired due to the accumulation of snow on the untreated side streets and many people were forced to use other modes of transportation.

Emergency Service providers also faced challenges on the untreated side streets, but were able to quickly adapt and continue effective emergency response activities. Emergency service vehicles experienced difficulty in part due to the slippery conditions and in part due to the impaired mobility of other vehicles (most of which were not equipped for snow conditions). Non-emergency home health care services were also disrupted.

The most severe portion of the winter event occurred over the Christmas break. The Vancouver School Board is responsible for treating snow and ice on the sidewalks adjacent to the school property in the same manner as all other properties under the Street and Traffic By-law. The School Board is also responsible for areas on their property, such as walkways, driveways and parking lots.

When school resumed on January 5, 2009, many of the roads adjacent to schools were untreated and posed challenges to school buses transporting students with special needs. The untreated side streets also posed challenges to parents who drive their children to school. In single family residential areas outside the downtown, snow-covered sidewalks posed challenges for parents and students walking to school.

Pilot Project for Side Street Snow Treatment

Due to the extreme nature of the last winter, staff took the opportunity to conduct a pilot project to plough side streets to understand the challenges of clearing side streets with the existing City fleet.

On January 5-6, 2009, City staff conducted the pilot project to clear snow from the travel lanes of untreated side streets. The City dedicated 36 snowplough trucks, two graders, two backhoes, and two Bombardier snowploughs to the untreated side streets.

The main finding was that the snowplough trucks are not effective to treat the narrow residential streets after snow has accumulated to a significant extent on the roadway. The significant accumulation and the packed snow in the wheel ruts posed significant challenges which resulted in low productivity and inconsistent clearing. The pilot project generated complaints from residents as the snow windrows either filled in shovelled-out parking spots or blocked in parked cars.

During the two day pilot project, approximately 8% of the untreated side streets were treated and in most cases the packed snow remained, even after ploughing. The two graders were the most effective pieces of equipment for clearing both the deep and packed snow. The backhoes were also relatively effective and could be more effective with right type of bucket.

Based on the results of the Side Street Pilot Project, staff determined that the City has two basic options for snow treatment on side streets:

1) Initiate snow treatment on side streets for every snow event before snow can accumulate in significant amounts on the roads and form packed snow and wheel ruts.

   A daily single pass treatment of snow on side streets is feasible with the City's existing fleet of snowplough trucks and other equipment (including backhoes and graders) if treatment is implemented before significant accumulations or packed snow can occur.

   The additional cost to perform snow treatment on side streets before snow can accumulate in significant amounts is estimated to be on the order of $30,000/day. This treatment could be required for every snowfall event.

   The City would also require approximately $10,000 of equipment purchases to outfit two backhoes with special snow buckets.

2) Initiate snow treatment in situations where snow has accumulated on the side streets and the forecasted weather conditions will, in the opinion of the City Engineer, cause the side streets to become impassable.

   The Side Street Pilot Project demonstrated that the City's snowplough trucks are ineffective for large accumulations of snow combined with packed snow in the wheel ruts. To treat snow of side streets after significant accumulations of snow, the City would rely on backhoes and graders for a single pass treatment to make the street passable to vehicles with snow tires. Much of the equipment required, such as graders, would be hired from contractors.

   The additional cost to perform snow treatment on side streets after snow has accumulated in significant amounts is estimated to be on the order of $90,000/event.

   The City would also require approximately $30,000 of equipment purchases to outfit six backhoes with special snow buckets.

Bicycle Routes

The 12 bicycle routes treated under the current procedures are:

Ontario Street Route	West 8th Avenue Route
Cypress Street Route	Windsor Street Route
Adanac Street Route	Union Street Route
Cassiar Street Route	Carrall Street Route
West 10th Avenue Route	West 1st Avenue Route
East 10th Avenue Route	Grandview Highway North Route

At this time, staff believe that the added bike routes can be treated with the existing fleet of snowplough trucks and equipment. Staff will evaluate the effectiveness of the existing equipment on these new routes under the wide variation of winter conditions.

Utilization of the Fleet

The City's snow fleet now totals 77 pieces of equipment, including 51 snowplough trucks with salter units, 14 backhoes, 6 walk-behind snow blowers, 2 graders, 2 Bombardier snowploughs, one bob-cat, and one brine truck. Since the winter event, the 5 snowploughs without salter units were upgraded with salter units, 2 additional walk-behind snow blowers were purchased, a snow blower attachment was acquired for the bob-cat, and a brine unit was added. The City also has five front-end loaders that support the City's snow fleet with salt and sand loading.

With exception of the walk-behind snow blowers and the two Bombardier snowploughs, all other equipment is normally used for other operational purposes. As conditions dictate, equipment is shifted to snow treatment duties.