Resolution No. 31136

A RESOLUTION initiating an external consultant review of the Seattle Department of Transportation's snowstorm response and emergency preparedness, approving recommendations of the Executive's December 2008 Winter Storm After Action Report and Corrective Action Plan and outlining additional Council priorities and recommendations.

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Committee Action:

Date	Recommendation	Vote

This file is complete and ready for presentation to Full Council.

Full Council Action:

Date	Decision	Vote
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Law Department

Michael Fong/MF
2008 Winter Storm Response Resolution
May 20, 2009
Version #5

RESOLUTION 31136

A RESOLUTION initiating an external consultant review of the Seattle Department of Transportation's snowstorm response and emergency preparedness, approving recommendations of the Executive's December 2008 Winter Storm After Action Report and Corrective Action Plan and outlining additional Council priorities and recommendations.

WHEREAS, in December of 2008, Western Washington experienced a series of winter storms that brought high winds, snow, ice and freezing temperatures to the region; and

WHEREAS, the winter storms significantly impacted the residents and businesses in Seattle; and

WHEREAS, many lessons were learned about the City of Seattle's preparedness for and response to extreme winter weather conditions; and

WHEREAS, the City Council held several public meetings to review and discuss the performance of City departments during the winter storms; and

WHEREAS, the City Council is committed to responding to the concerns and issues raised by members of the public during and after the December winter storms; and

WHEREAS, the Executive released the December 2008 Winter Storm After Action Report and Corrective Action Plan (AARCAP) in February identifying specific actions and areas for improvement in order for the City to be better prepared for future extreme weather conditions and other emergencies; and

WHEREAS, the City Council has reviewed the AARCAP and identified additional priorities and areas of emphasis for City departments to become better prepared for future winter storms and other emergencies; and

WHEREAS, Council staff reviewed and released a report on SDOT's snow storm response operations and identified several areas in need of further review and evaluation and potential corrective action to improve the department's preparedness for future severe snowstorms and emergencies; and

WHEREAS, the Mayor and City Council agree that SDOT should retain a consultant to review operations and assist the department in developing a work plan to improve future response to severe snowstorms and other emergencies; and; and

WHEREAS, the City Council intends to continue its policy and oversight responsibilities with regard to the City's overall emergency preparedness and evaluate the Executive's

fulfillment of the objectives outlined in the AARCAP and additional Council priorities and monitor the consultant work associated with SDOT; NOW THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE MAYOR CONCURRING, THAT:

Section 1. The Mayor and City Council requests that SDOT hire an independent consultant to review the department's winter storm response operations and develop a comprehensive work plan to build upon and add to wherever advisable the corrective actions already identified in the After Action Report. This review will be coordinated by SDOT with support from the City Council's Central Staff. SDOT will submit to the City Council a proposed consultant scope of work and the Request for Qualifications (RFQ) for review no later than June 30, 2009. Development of the scope of work and RFQ should include addressing the issues identified in the Council staff report on SDOT's snowstorm response efforts attached hereto as Exhibit A. It is anticipated that funding for this review come from existing appropriation authority in SDOT's 2009 budget.

Section 2. The City Council hereby approves the recommended corrective actions identified in the 2008 Winter Storm After Action Report and Corrective Action Plan (AARCAP), which is attached as Exhibit B.

Section 3. The City Council hereby establishes the following as priorities from the AARCAP for implementing improvements to the City's future winter weather response efforts and overall emergency preparedness and a reporting schedule for Council review:

1. Seattle Department of Transportation (SDOT):

a. update the SDOT Winter Storm Response Plan to include a level 2 plan for responding to extreme weather conditions and review and make any modifications to primary and secondary roadway designations;

b. establish a Memorandum of Agreement with King County Metro Transit related to snow removal coordination and identify new and modified key plow routes to maintain transit service during a range of severity for snow and ice related roadway conditions; and

c. work with Office of Emergency Management to develop strategy for improving public awareness of sidewalk snow clearing responsibilities.

SDOT is requested to provide the Council's Transportation Committee a public briefing on and a copy of the revised plan, coordinated agreements with Metro and a sidewalk snow clearing communications strategy.

2. Office of Emergency Management (OEM): work with Seattle Department of Transportation to develop a master list of critical facilities that require priority plowing status during a severe snowstorm and a process for ensuring that access to these sites is met. OEM is requested to provide the Council's Emergency Management and Utilities Committee a progress report and a copy of the critical facilities list and procedures.

3. Seattle-King County Public Health (SKCPH) and OEM: develop a plan for emergency transport of health care employees and patients during severe weather conditions. SKCPH and OEM are requested to provide the Council's Culture, Civil Rights, Health and Personnel Committee a progress report.

4. Human Services Department (HSD):

    a. Work with Public Health, Aging and Disability Services, 2-1-1 Information Line and other partner agencies to develop strategies designed to address critical basic needs of people who become homebound in a disaster;

    b. Work with Greyhound and Amtrak to develop company plans to meet the needs of stranded travelers in the event of an emergency or disaster;

    c. Evaluate severe weather shelter capacity, particularly for women, and determine if additional capacity is necessary.

    HSD is requested to provide the Council's Public Safety, Human Services and Education Committee with a progress report.

5. Emergency Support Function (ESF) – 15: Communications: develop new policies and procedures to effectively communicate information with the public during an emergency or disaster with new online technologies. The Executive is requested to provide a report on these new policies to the Council's Energy and Technology Committee.

6. Seattle Public Utilities (SPU) and Department of Information Technology (DoIT): review Utilities Call Center operations and identify source and cause of reported dropped calls and incorrect routing of customers during the December snowstorm and take corrective action. SPU and DoIT are requested to update the Council's Energy and Technology Committee.

7. SPU: improve communication and coordination between SPU and solid waste collection contractors by implementing procedures for identifying timely and accurate

information from the field in order to adapt to operational conditions and meet performance expectations. Improve communication with the public on modified or cancelled collection days or procedures. SPU is requested to provide a progress report on this action item to the Council's Emergency Management and Utilities Committee.

The Executive is expected to meet the specific requests outlined in Section 3 to the specified City Council committees no later than November 1, 2009.

Section 4. In addition the items outlined in Section 2 of this resolution, Council requests the Executive to implement the following additional actions beyond the AARCAP to improve future City response efforts to a severe snowstorm event or other emergencies:

1. Adaptive Management: identify training opportunities and ways to institutionalize the importance and significance of adapting to emerging and changing conditions during an emergency or disaster.
2. Require formal communications protocol between Emergency Operations Center (EOC) and City Council: clarify, formalize and develop a mechanism for enabling the City Council to communicate public feedback and concerns to the EOC to inform emergency management decision making.
3. Review Community Notification System (CNS): submit a full report to the City Council on the City's use of the CNS for both internal and external communications since January 1, 2007. This report shall include a summary of all annual costs associated with administering the CNS, the purpose for each authorized use of the system, and any policy, operational or technical

barriers or challenges that may prevent the effective use of the CNS during an emergency or disaster.

4. Sidewalk and pedestrian access to government facilities: develop clear procedures and responsibilities in City winter storm response plans to include snow clearing responsibilities for critical government facilities including pedestrian access along bridges.
5. Review of post storm clean-up plans and procedures: evaluate SDOT's post storm clean up procedures and identify policy changes and cost implications for accelerating inspections, sand removal, lane re-striping and other roadway safety related work orders in the future.

The Executive is requested to provide a report on the items listed in Section 4 to the Emergency Management, Environment and Utilities Committees no later than November 1, 2009.

Adopted by the City Council the 26th day of May, 2009, and signed by me in open session in authentication of its adoption this 26th day of May, 2009.

President _____ of the City Council

THE MAYOR CONCURRING:

Gregory J. Nickels, Mayor

Filed by me this 4th day of June, 2009.

Carol Shenk
Acting City Clerk

(Seal)

Exhibit A. Council Staff Report on SDOT Snow Storm Response

Exhibit B. Action Report and Corrective Action Plan (AARCAP)

Legislative Department
Seattle City Council
Memorandum

Date: April 29, 2009
To: All Councilmembers
From: Mike Fong, Central Staff Analyst; Jane Dunkel and Claudia Gross-Shader, City Auditor's Office
Subject: Seattle Department of Transportation – December Snowstorm Response

BACKGROUND

Central Staff, with the assistance of the Auditor's office, was requested to review Seattle Department of Transportation's (SDOT's) internal documents, interview key staff and gain a better understanding of its operations related to and during its response to last December's snowstorm. More specifically, we were asked to address the following questions:

1. What does the information say (or not say) about SDOT's management of the snow emergency?
2. What does the information suggest about the quality of the After Action Report (AAR)?
3. Should Council retain outside expertise or ensure SDOT retain such expertise for a more in depth review and are there other recommendations for moving forward?

Council requested that this review be completed within three weeks. Roughly an equal amount of time was devoted to each of the following:

- Review of roughly 1,000 internal emails, approximately 700 pages of crew reports, snow and ice operational manuals, weather reports, dispatch logs, the Winter Storm Response Plan, and numerous other internal department documents.
- Interviews with SDOT senior management, operations staff, including crew chiefs and supervisors, and staff from the Office of Emergency Management (OEM) and a tour of the Charles Street maintenance facility.
- Internal review and development of findings, conclusions and options for next steps.

This memo will initially discuss staff's general observations about SDOT's AAR and then outline specific findings with regard to SDOT's preparedness, planning and operations related to snowstorm response. The final section of this report will summarize options for possible next steps. Attached as Appendix A is a full chronology of events related to the snowstorm beginning on December 13 thru December 27, 2009.

Throughout this process, SDOT provided Council staff with timely access to information requests and records while making their staff available upon request. While this review highlights some shortcomings and suggests areas for further evaluation and potential improvement, both our document review and personnel interviews revealed that SDOT staff was committed and worked extremely hard during an extraordinary snowstorm event.

Ultimately, our conclusion after three weeks of analysis is that additional external review of the department's snowstorm response is necessary in order to identify a comprehensive list of actions to ensure SDOT is prepared to respond more effectively to a future severe snowstorm event.

AFTER ACTION REPORT

SDOT identified eleven areas for improvement in their After Action Report (AAR). They are as follows:

1. Improve snow related coordination with Metro
2. Revised road salt policy
3. Institutionalize the early mobilization of SDOT's Incident Management Team for future winter storm events
4. Develop Winter Weather Response Plan for extreme weather conditions and sustained operations
5. Acquire emergency snow and ice clearing assistance from private contractors
6. Increase Public Information Officer capacity during prolonged events
7. Improve situational awareness; utilize Traffic Management Center resources
8. Reduce crew fatigue during prolonged events
9. Increase public awareness about the need to clear snow from public, business and government owned sidewalks
10. Utilize technology to improve the efficiency of snowplow operations (Global Positioning System)
11. Pursue an agreement with Washington State Department of Transportation (WSDOT) for emergency access to snow and ice clearing supplies when necessary

In general, we concur that these are all areas in need of improvement based on our review. However, we find the AAR incomplete for the following reasons:

- SDOT's narrative and critical analysis of "lessons learned" from the December snowstorm lack depth, especially when compared with the AARs from other jurisdictions that Council staff reviewed. According to the Office of Emergency Management, industry best practice for developing a comprehensive AAR requires 9-12 months of evaluation and review. In 2007, the City Light review by Davies Consulting to identify improvements following the 2006 windstorm was developed over a 4 month period. The SDOT AAR following this past December's snowstorm was drafted and finalized within 3-4 weeks.

- SDOT's AAR was drafted without direct input from line-staff, crew chiefs and supervisors or feedback from other City departments. The report was developed primarily by the department's senior staff. SDOT staff has also acknowledged that their AAR was not an exhaustive review of department operations and intended to identify mostly short term improvements.

- Council staff review has identified several additional items that appear to have been barriers and challenges to SDOT's ability to conduct a more effective snow response effort last December that are not identified in the AAR. The specific issues will be discussed in greater detail later in this memo.

Bottom line, SDOT was requested by the Mayor's Office to develop its AAR in a short period of time. This may have been appropriate given the snow and winter season was not yet over and additional snow response might have been needed in short order. However, as a result,

the report and its findings do not appear to be comprehensive. Below are our additional findings related to barriers and challenges faced by SDOT during the snowstorm response period that may require additional attention and further review.

SNOWSTORM RESPONSE FINDINGS

Given that SDOT has already identified a set of improvements necessary to enhance its future response to snowstorms, we found the most useful approach to our review was to:

- identify any issues that may have compromised SDOT's ability to respond more effectively during the snowstorm event not already outlined in the AAR; and
- determine whether any of the items already outlined in the AAR require further development or refinement.

As a result, the staff findings are intended to surface new issues for additional consideration and do not focus on improvements that have already been widely acknowledged and appear adequately developed as part of the AAR (e.g., coordination with Metro on plow routes, need for improved situational awareness). In no way is this intended to minimize the value of SDOT's identified issues, but rather, to focus and narrow the scope of Council staff's review. The following are the key issues we have identified:

1. **Inadequate systems for tracking progress and making decisions may have compromised strategic deployment of resources by senior staff and management.**

   A. Operations Management

   SDOT does not have a modern work order tracking system to allow for clear documentation of field assignments. During the snow event, tracking of deployment decisions, route assignments, staffing levels, road conditions and overall operations were conducted on dry-erase boards at the Charles Street and Haller Lake maintenance facilities. The only place where documentation of snow plow deployment decisions can be found is in the hundreds of hand written crew reports filed at the end of each shift. The reporting found on these forms is inconsistent and unclear.

   Crew chiefs and supervisors were managing operations according to SDOT's Winter Storm Response Plan (WSRP) and relying on personal experience and expertise. Senior management (Maintenance Operations Manager, Director of Street Maintenance and SDOT Director's Office) is ultimately responsible for making "big picture" strategic and policy decisions to modify the plan as conditions require. But the reliance on the memory of individual staffers, archaic systems, and undocumented verbal reports and communication for real-time decision making appeared to present many challenges for orchestrating an organized, cohesive and coordinated snow response effort. As a result, prioritization of plowing efforts were largely left to the discretion of crew chiefs and supervisors. The lack of a more sophisticated tracking system also presents obstacles for achieving accountability during and after the event. Lastly, without a more robust system for tracking information, it was difficult for SDOT to attain complete situational awareness on road conditions and monitor feedback from drivers and crews out in the field.

   This issue is not directly addressed in the AAR, but SDOT recognizes that work order tracking improvements are necessary and implementation of a new system is under development but not expected to be available until some time in 2010. SDOT has also begun an analysis of GPS technology as a way to better monitor field operations.

Furthermore, beyond the work order system itself, standard operating procedures should be updated and modified to allow for a more effective and accountable reporting structure to achieve better flow of information from crew supervisors all the way up to senior management. For example, crews in the field have the most direct evidence about road conditions and the situation "on the ground." A more effective reporting and communications system and protocols could ensure that this critical information is shared up the chain of command.

Given that technology upgrades for work order tracking are not anticipated until 2010 and a decision on investing in the use of GPS has yet to be made, there may be short term or interim operating procedures that could be implemented sooner to improve the flow and tracking of information during a snowstorm or emergency. In addition, a more thorough "lessons learned" review by SDOT could help inform how the proposed technology upgrades are designed and implemented.

B. Dispatch and Deployment Priorities

SDOT does not have any formal procedures or policies in place for dispatchers to prioritize calls requesting snow plowing. Records also appear to be incomplete as far as documenting the full range of calls and the origins of the requests received by SDOT. The dispatch logs are hand written on forms that do not have a field to write in the origin of the call. Furthermore, in interviews with SDOT staff, requests for assistance were not necessarily all being funneled through the dispatch center (e.g. emails or calls to the Customer Service Bureau and other SDOT phone numbers from the public). Dispatch operations appear to suffer from some of the same technological deficiencies and information flow issues that faced overall operations management during the snowstorm.

The AAR identifies maintaining a list of priority plowing locations and clarifying procedures for requests as a corrective action item for the Office of Emergency Management. But this does not seem to capture the internal issues that confronted SDOT's ability to manage, track and coordinate their responsiveness to these requests. SDOT may want to review its dispatch operations and develop formal procedures for both dispatchers and crew chiefs and supervisors for prioritizing plowing requests rather than leaving these as entirely discretionary decisions. In addition, SDOT may want to examine whether all requests, including emails and calls to other departments and SDOT staff should be directed to the dispatch center.

The following are some questions that may be an appropriate starting point for further examination of operations management and dispatch:

- What are some simple tracking procedures and data collections systems that SDOT can put in place before the work management system is implemented?
- Will the systems requirements that SDOT has identified for the work management system adequately address their operational and decision making needs?
- Are the systems for tracking progress and making decisions adequate for other operational areas in street maintenance (e.g., paving, potholes, encampments)?
- SDOT identifies improving situational awareness in their AAR, but beyond strategies and technology upgrades, what are the internal policies and communications protocols necessary to ensure this information is utilized and shared up the chain of command?

- How can SDOT ensure that communication from the public comes through the most efficient channels and is addressed in a timely fashion? How will dispatch prioritize these calls?
- Do internal communications protocols and procedures need to be put in place to achieve greater accountability and documentation of decision making within SDOT's management structure?

2. SDOT's limited experience and exposure to utilizing the Incident Command System (ICS) may have factored into the overall response effort.

A. Incident Management Team

The ICS is a standardized incident management approach recommended by the Federal Government and formally embraced by the City of Seattle through Mayor Nickels' Executive Order 02-05 issued in June of 2005. Within the ICS is a concept for Incident Management Teams (IMT) to coordinate and augment emergency response efforts. SDOT activated its IMT on December 22 and this essentially brought more members of the department's senior management team to the table to coordinate the response effort. It is universally acknowledged by SDOT that the IMT should probably have been assembled and the principles of ICS initiated earlier during the snowstorm event. Freezing rain and icy roads began to develop as early as December 12 and the first snow fell on December 14. However, the IMT and ICS structure was not formally initiated until 11 days into the snowstorm event and over 9 inches of snow had fallen in the greater Seattle area.

In interviews, we learned that SDOT had never previously assembled the IMT in part because the IMT did not formally exist. SDOT staff had not been designated to fill various roles in the IMT structure and were not trained to carry out the specific responsibilities for those positions. During the snowstorm, senior staff communicated with each other on a regular basis, but for the first week and half of the event, SDOT's Street Maintenance Director was managing the response effort largely on his own.

B. Interaction with the Emergency Operations Center (EOC) and Adaptive Management

In our interviews, there was also evidence to suggest some of SDOT's senior staff may not have been fully aware that SDOT could request activation of the EOC. Furthermore, as late as December 22, SDOT email correspondence to the EOC in response to a request for a status update on government services stated:

> "SDOT is functioning fully. Bridges are operational. Signals are fully functioning. Snow removal is underway in keeping with SDOT Winter Storm plans..." (Email from SDOT to OEM on 12/22/2008 at 10:15 a.m.)

Though technically accurate, this communication did not seem to reflect the urgency or the actual state of SDOT's field operations. The information the EOC was receiving from SDOT may not have fully captured the road conditions and challenges the department was facing at that time. This could be attributed to a lack of good situational awareness on the part of SDOT, but potentially also because ICS principles were not initiated. ICS is intended to provide the necessary framework for adaptive management and decision making. Repeatedly, we heard SDOT staff say that a major lesson learned was that the department focused on executing its Winter Storm Response Plan without recognizing early enough that the plan was not working. SDOT has determined that it needs to modify its plan to include procedures and policies for dealing with a severe snowstorm,

but equally if not more important may be the ability to recognize when the plan is failing and to adapt to changing conditions.

In conversations with staff from the Office of Emergency Management, we learned that effective execution of ICS requires use of this command structure for everyday events. The snowstorm, more than anything, will likely help SDOT embrace this concept of emergency management. But SDOT's only reference to ICS in the AAR is that the department needs to activate the IMT sooner for future snowstorms. Given the brief attention given to ICS by SDOT in the AAR, the fact that the IMT did not exist prior to the snowstorm, and the department's relatively slow strategic response to deteriorating conditions raises questions about SDOT's overall level of emergency preparedness. This is an area that could require more attention from SDOT, and the following questions may be useful for further examination:

- Has SDOT identified the optimal training courses and staff to be trained in ICS and emergency response? How well is SDOT doing on fulfilling their training plan? Is the training plan adequate and does it include all of SDOT's employees that should be trained?
- Are there additional trainings or table-top exercise that could be helpful for fully embracing ICS?
- Has SDOT fully explored the opportunities for help and support from the EOC and other City agencies for incident response?
- Has SDOT identified other triggers (besides snowfall) for the activation of its IMT?
- How will SDOT develop the capacity for effective strategic adaptation of their Winter Storm Response Plan and their other emergency response plans? Is it possible for SDOT to incorporate ICS structure to everyday operations?

3. Several SDOT snow response related policies are unclear and may leave too much discretion to staff.

A. Residential Plowing

Interviews with SDOT staff provided us with vastly different perspectives on the department's policies with regard to plowing residential streets. Some in the department believe after primary and secondary routes have been completed, SDOT may plow accessible residential streets. Others said definitively that SDOT never plows residential streets. The Winter Storm Response Plan states that no streets will be plowed that are not prescribed in the plan itself. While SDOT's website indicates that the department may plow residential streets on a request basis. The inconsistency creates confusion internally and for the public. As noted earlier, record keeping for plowing activity is extremely unclear and limited. How many miles of residential streets and why they were plowed during the snowstorm cannot be confirmed or explained. We are not prepared to recommend what that policy should be, but SDOT should review and clarify its policy rather than risk the appearance of preferential treatment or disproportionate service allocation to different parts of the city.

B. Handwork

In addition to snow plow trucks, SDOT deployed approximately 2300 employee hours to clear stairwells, landings, and sidewalks in front of business districts, schools and bus shelters (as many as 41 FTE on any given day). This operation suffers from some of the same tracking and information flow issues that we discovered with the overall snow removal operations. Beyond the initial deployment to a stairwell location in the city, the shoveling and sanding activities are largely determined at the discretion of the crews

themselves. Our review revealed no clear management level oversight or coordination of handwork across the city. That lack of coordination and a clearly stated policy led to this service being provided to some business districts and neighborhoods and not others without explanation.

A cursory review of handwork crew reports also raises questions about the effectiveness and efficiency of this body of work in general. Hand shoveling and sanding is labor intensive and in some instances as many as half a dozen employees were each working four hour shifts to clear only a few blocks of sidewalks. Given this reality, prioritization of pedestrian needs and coordination is necessary to achieve an effective outcome.

C. Use of Salt

Reviews of SDOT's internal emails suggest that the new policy for application of salt may have been developed over the course of just two days. SDOT requested Seattle Public Utilities (SPU) assistance to research and compare geomelt and other anti and de-icer products on December 29. A draft policy was sent via memo to the Mayor's office on December 30. A press release was issued announcing the new policy on December 31.

SDOT relied heavily on the opinion of its Street Maintenance Director to arrive at the conclusion that if salt had been available during the snowstorm, many of the difficulties experienced would have been avoided. This may very well be the case, however, the absence of meaningful, documented analysis, consultation with any external scientific or environmental experts or a review of other city's best practices raises some questions about the adequacy of the new salt policy.

There are numerous chemical products that are used to melt ice and each have varying degrees of effectiveness and consequences. Conversations with SDOT staff also yielded a range of opinions about salt and its perceived effectiveness. SDOT apparently used road salt in conjunction with sand and geomelt during this past snowstorm with limited effectiveness. But SDOT staff explains that the new policy refers to the use of "rock salt" and not "road salt". With that said, this appears to be a complicated and technical issue that may require more thoughtful review and analysis.

D. Use of Carbide Blades

SDOT has purchased carbide blades to supplement the rubber edged steel blades already on hand for snow removal. During the snowstorm, SDOT's rubber edged blades were unable to remove the thick layer of ice that formed over the city's roadways. The carbide blades are more effective for ice removal, however, they also remove roadway reflectors, other markings and may create additional street maintenance work. At present, SDOT does not appear to have a written or stated policy for when carbide blades should be used. There may be value in determine the criteria and the policy for switching blades now rather than leaving this to the discretion of crews and supervisors during an event.

E. Terminology for Road Conditions

Throughout the period of the snowstorm, SDOT staff would use a range of terminology to describe plowing status and road conditions internally and to the public. Words and phrases such as "clear", "passable", "plowed", and "primaries are done" mean different things to different people and may have unnecessarily created confusion. Winter road

conditions have common terminology used by transportation departments all across the country. It may be useful for this terminology to be included in the Winter Storm Response Plan and utilized by all staff, including Public Information Officers (PIOs). For example, if roadways have "compact snow and ice", that is probably how the City should describe conditions rather than indicating the roads are "passable". The inclusion of a definitions and terminology section in the plan may be appropriate. Standardized definitions would also increase the value of the critical field-level observations that the crews can share with supervisors and ultimately to inform SDOT's senior management.

None of these items are identified in SDOT's AAR. More thorough review and discussions are recommended as well as a review of other jurisdictions and best practices related to these five policy areas. Below are some questions that may be useful as part of a continuing examination of these polices:

- How will SDOT clarify its policy on plowing residential streets within the layers of its organization?
- How will SDOT clarify its policy on sites for handwork within the layers of its organization?
- Has SDOT adequately studied the science and effectiveness of salt? Has SDOT adequately studied the environmental implications and the effects on public infrastructure and personal property? Has the policy on the use of salt been sufficiently developed?
- Has SDOT adequately studied the potential effects and costs of using carbide blades including potential damage to street surfaces? Has the policy for use of carbide blades been sufficiently developed?
- Does SDOT agree with the need for common terminology to describe snow related efforts? If so, what are conditions and terms that need clarifying?
- How will SDOT clearly communicate any and all of these policies to stakeholders and the public?

4. Organizational structure and personnel related issues may have contributed to some of the operational challenges.

A. Management Structure

SDOT's Street Maintenance division is divided into two sections: 1) street cleaning and 2) surface repair. Snow removal operations are managed by the street cleaning section. This means the manager, crew chiefs and supervisors in this section are responsible for executing the Winter Storm Response Plan. The plow truck drivers all work in the surface repair section and normally report to an entirely different set of supervisors and crew chiefs. In our interviews with staff, we found that the supervisors and crew chiefs responsible for executing snow removal efforts were unfamiliar each other and did not normally work with the drivers in the field. A similar scenario was found with regard to handwork, although with this body of work, there may have also been internal confusion as to which section was ultimately responsible for supervising this work at all.

There may be many reasons why SDOT's snow response efforts are organized in this manner. But at minimum, this raises questions about whether the fact that drivers and supervisors during a snowstorm event do not work together normally and are unfamiliar with each others' management and working style may inadvertently create some communications and operational issues.

B. Training

Our interviews and research confirmed what we have heard consistently during and after the snowstorm event about the hard work of SDOT's crew chiefs, supervisors and drivers. Crews were working around the clock, but recognized the road conditions were not up to the standards that they set for themselves. Our impression from discussions is that there was a genuine commitment to doing their best under very challenging circumstances.

But these discussions and our review of documents also anecdotally revealed some possible issues with field operations during the snowstorm event. As mentioned earlier in this memo, there is rather significant inconsistency in the language, format and terminology used in the hand written crew reports. This makes it very challenging to understand what routes were plowed, how often and whether drivers made any discretionary decisions on streets to plow. We also learned that there may have been some issues and confusion with the application of geomelt, sand and salt on roadways. Some drivers may not have been applying the materials correctly, and possibly limited the effectiveness of the products to melt ice. Training may also be necessary related to handwork given some of the policy and efficiency issues that this review has surfaced.

It is entirely understandable that these issues would come up given the infrequency of snowstorms such as this one in Seattle. But there may be value in reviewing training requirements and opportunities to give drivers and crew chiefs and supervisors additional expertise for handling these rare snowstorm events. As with management, issues related to common use of terminology and recording and reporting of information may also need to be address with field staff.

Below are some possible questions for further examination of these issues:

- What is the optimal organizational structure for plow drivers, crew chiefs, and supervisors? What steps can be taken to mitigate operational or reporting issues that might arise from "borrowing" staff from another division for plowing assignments?
- What is the optimal organizational structure for handwork crews and supervisors? How can SDOT ensure that they are deployed as efficiently as possible? What steps can be taken to mitigate operational or reporting issues that might arise from "borrowing" staff from another division for handwork assignments?
- What kind of training would be most beneficial for plowing and handwork crews (first responder training, equipment training, etc.)?
- Should SDOT do a more thorough evaluation of how de-icing materials were applied and whether there could have been a more effective use of existing resources?

POSSIBLE NEXT STEPS FOR COUNCIL

The third question Council asked as part of this effort was whether additional external review should be recommended for SDOT's snow response. Given the number of issues raised in this report, there is value in continuing to examine these areas more closely in advance of the next winter season. SDOT's updated Winter Storm Response Plan needs to be reviewed in comparison to plans from other jurisdictions. Such a review should not be limited to an examination of the issues identified in this report, but also include industry best practices related to snow removal policies, routes (length and geographic distribution), procedures and protocols. Furthermore, given the difficulties faced by Seattle residents and businesses during last December's severe snowstorm and the issues identified in this report over the past three weeks, the City and SDOT would

benefit from a more fully developed corrective action workplan. The participation of independent, external expertise to assist SDOT in this examination is recommended for achieving the best possible outcome. Ultimately, at issue is SDOT's preparedness for future emergencies and disasters, not just snowstorms. The following are some options Council may consider:

Option 1
Have SDOT retain a consultant to develop a new After Action Workplan that includes attention to the issues raised in this report, the department's original AAR and any new items identified and review the adequacy of the department's Winter Storm Response Plan. This effort should also include an examination of SDOT's overall emergency preparedness and readiness to implement an Incident Command System (ICS) when necessary.

This option could be modeled after the Council 2006 effort with City Light where Davies Consulting Inc. was hired to conduct an in-depth review and offer recommendations that were ultimately embraced by both Council and the utility. Full cooperation by City Light enabled this exercise to yield practical and achievable solutions to better preparing the utility for a future severe windstorm. Furthermore, the expertise of Davies in the utility field and understanding of best practices proved invaluable to the process.

Option 2
A less costly alternative may be to request the City Auditor to develop a full scope of work related to the findings from this report and ultimately make specific recommendations for improvements.

Many of the items in this report could be examined in greater detail by the City Auditor's office. Review of other jurisdictions and best practices as well as identifying and recommending systems, procedural and policy changes are well within the purview of the City Auditor. This could be similar to the approach the Council and the Auditor's office took with regard to examining pedestrian and cyclist mobility around construction sites last year.

Both options reflect the value of having an external perspective in helping SDOT move forward with the necessary improvements to better respond to future snowstorms and emergencies.

APPENDIX A: SDOT Snow Response Highlights - December 11 - 27, 2008

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Note: Temperatures listed are the daily average.				11 **.73" rain; 41°** EOC hosted pre-storm meeting. SDOT began de-icing pre-treatment with Geomelt C. Metro at full service.	12 **39.5°** SPU Incident Command activated. De-icing treatment with Geomelt C abandoned due to rain.	13 **.8" snow; .34" rain; 36°** SDOT Street Maintenance began managing storm response. Winter Storm Plan invoked. **SDOT 24-hour operations began (Two 12 hour shifts).** SDOT began to use Geomelt C and Ice Slicer to attempt to melt ice in conjunction with sanding. SDOT PIOs moved to Charles St
14 **.7" snow; 27°** SDOT continued to work Winter Storm Plan. Metro e-mailed SDOT list of problem routes. SDOT staff noted locations.	15 **24.5 °** SDOT continued to work Winter Storm Plan. **Hand shoveling crews began clearing stairs and other sites.**	16 **25.5 °** SDOT continued to work Winter Storm Plan. **Extra plows sent to West Seattle to deal with ice; other areas clear at this time.** SDOT Press Release: Crews able to fill public requests for treating non-arterial streets on a case by case basis and have been doing so with emphasis on West Seattle.	17 **32.5 °** SDOT continued to work Winter Storm Plan. EOC activated at low-level. SDOT Press Release: Crews may start to clear residential streets; residents invited to call with their plowing requests.	18 **2.7" snow; 30 °** SDOT continued to work Winter Storm Plan. **SDOT supervisors reported plow drivers showing signs of fatigue from sustained 24 hour operations.** Metro down to 50% of buses.	19 **24.5 °** SDOT continued to work Winter Storm Plan. **SDOT website: Crews are clearing sidewalks and stairways near critical pedestrian locations, such as hospitals and food banks.**	20 **3" snow; 20 °** SDOT continued to work Winter Storm Plan. **Packed snow and ice became challenging for plows.** EOC in full activation. City Light activated its Operations Center. Metro requested that SDOT plow in front of buses as they travel; SDOT replied that they could not meet this request.
21 **3" snow; 27.5 °** SDOT continued to work Winter Storm Plan. **Plow drivers diverted to plow around Qwest Field.**	22 **.6" snow; 27.5 °** SDOT formed Incident Management Team (IMT). **Drivers only able to plow primary arterials.** SDOT began to use Road Salt in conjunction with Geomelt C and sanding.	23 **32 °** SDOT IMT deployed contract plows. SDOT Press Release: Incorrectly reported that plows are moving to secondary arterials.	24 **2.6" snow; .44" rain; 34 °** Drivers still only able to plow primary arterials.	25 **.4" snow; 34.5 °** Drivers able to plow secondary arterials.	26 **.1" snow; 35 °** SDOT reported that arterials are clear. SDOT and Metro held coordination meeting (Metro did not return to regular schedule until January 4.)	27 **.29" rain; 40.5 °** SDOT ended 24-hour Winter Storm Plan operations.

City of Seattle
December 2008 Winter Storm

After Action Report
and
Corrective Action Plan

Exhibit B

PURPOSE

This After Action Report and Corrective Action Plan is intended to document the major impacts resulting from the December 2008 winter storm, the response actions taken by the City and lessons learned.

OVERVIEW

During the month of December 2008 an extended period of severe winter weather struck the Puget Sound region. This resulted in road closures, difficult driving, limited Metro bus service, school closures, business closures, and other impacts.

This was one of the most significant winter storms to strike Seattle.

LIMITATIONS

In order to quickly capture and implement lessons learned, collection of information for this report started soon after major response operations began to wind down and well before the recovery phase had begun. The final tally of property damage, detailed analysis of the exact weather patterns that occurred and complete assessment of the economic impact will not be known for several months. However, with several weeks of winter weather remaining it is prudent to identify, and where possible implement, improvements to City response plans.

Executive Summary

In December 2008, Western Washington experienced one of its most severe winter storms – high wind warnings, snow, ice, and sustained freezing temperatures lasting more than two weeks. The non-stop accumulation of several inches of snow every few days coupled with temperatures that turned compacted snow into ice made for treacherous conditions throughout the region.

The Mayor called for a formal review of departmental operations and as is the City's practice, the Office of Emergency Management compiled the attached after action report and corrective action plan. While there were valiant efforts from many dedicated staff working round the clock to respond to the weather and its impacts on our customers, this event presents us with a test of the City's winter weather response and an opportunity to strengthen our capabilities and improve the outcomes in future events.

The Seattle Department of Transportation used its Winter Storm Response Plan and maintained 24-hour plowing operations with crews working 12 hour shifts including holidays and weekends. Over 1,530 lane miles were plowed and sanded multiple times, however the onslaught of snow on top of rapidly freezing compacted snow and ice inundated the capacity to keep streets passable.

The concurrent impacts throughout the region included severely limited Metro bus service, garbage and recycling collection, and other delivery services. Travelers were stranded at the airport and at bus and train stations; many more were simply forced to stay home.

Based on the experiences of this unusually severe winter weather, the City has committed to increasing the capacity for snow removal and improving a number of other operations.

Since keeping the roads passable mitigates a host of other potential problems, Seattle Department of Transportation has assembled a multi-pronged strategy to fortify their snow removal operations. The City's snow plow fleet will be augmented with two additional plows and contracts initiated for thirteen additional plows. The City's policy on the use of salt has already been revised to allow for its use in strategically prescribed conditions. Metro has committed to assigning a liaison with Seattle Department of Transportation to coordinate traffic operations on critical routes. The additional plowing capability on strategically planned routes coupled with the targeted use of de-icer, anti-icer and salt would be sufficient to keep pace with the conditions experienced in this storm.

The City was fortunate to escape any major traumatic incidents – Fire and Police Departments were capable of handling emergency responses with only minor delays for limited periods during the two weeks. Public Health worked side by side with hospitals and the Emergency Operations Center to keep medical operations on line. The forecasted high winds did not materialize into massive power outages for Seattle City Light customers and the relatively few customers who did experience outages had service restored the same day or soon thereafter. Human Services operated cold weather shelters for the homeless throughout the entire event and were prepared to expand shelter operations at a moment's notice.

The Office of Emergency Management had re-directed a $50,000 State Farm funded public education campaign from a focus on residential seismic retrofit to winter storm preparedness earlier in the year. Local TV, radio and newspapers joined with us in this effort. Though there is no easy way to quantify how many people were better prepared for severe winter weather as a result, certainly the decision to focus on weather preparedness was beneficial.

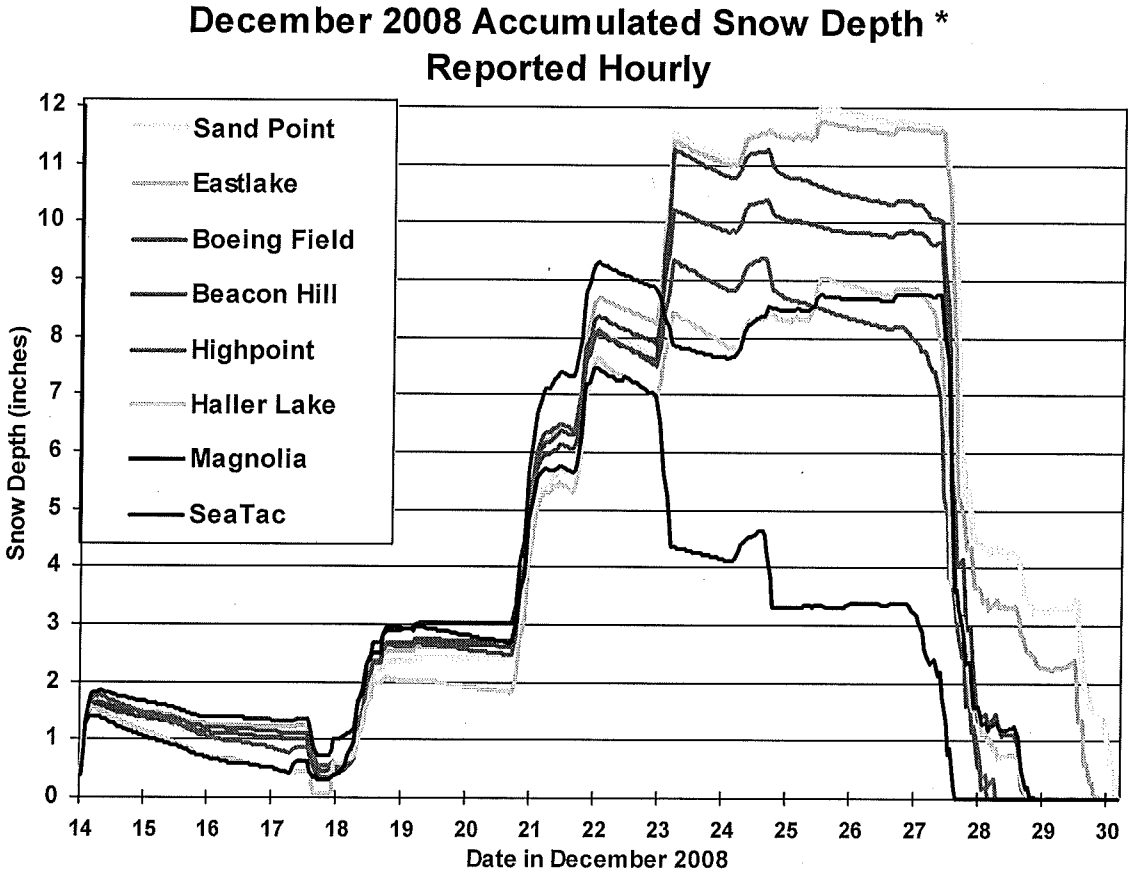
The need, however, persists for more community and neighborhood organizing to knit together human networks of care and compassion. This storm exposed the fragility in many people's lives caused by isolation or interruption to independence provided through case management services. City agencies must continue to partner with other government entities, the private sector, and community-based organizations to build networks of interdependence to increase our overall resiliency.

WEATHER

The Puget Sound region experienced several storms for 14 days starting on December 13th. Freezing temperatures, snow, sleet, freezing rain, heavy rain and high winds presented a significant challenge to responders throughout the region as well as in the City of Seattle.

Seattle ultimately received 11.3 inches of snow between the period of December 13th and the 27th. Typical December snow accumulations average 2.2 inches.

Total number of consecutive hours with snow on the ground was 357 – more than 2 ½ times longer than the most severe storms in the last 20 years.



"The December 2008 snow storm resulted in more consecutive hours of snow on the ground than any other storm in the last 20 years. Only the storm in December 1996 produced a greater amount of accumulated snow. However, the snow from that storm stayed on the ground less than half as long as the snow from the December 2008 storm."
(City of Seattle Office of Policy and Management).

IMPACTS

Deep snow and ice on residential streets and packed snow and ice on primary and secondary snow routes significantly impeded vehicle travel which caused a number of problems:

- Many City streets covered in snow and ice
- Closure of portions of major City streets
- Closed schools
- Closed businesses
- Spot shortages of gasoline supplies and food
- Reduced or canceled public and private events
- Reduced or canceled health care services
- Canceled or significantly reduced public transportation
- Difficulty in obtaining prescription refills or food supplies
- Vehicle accidents
- Delayed garbage pick up
- Heightened risk of ruptured water mains and urban flooding

The Preliminary Damage Assessment for Seattle estimates storm costs at $3,400,056. It includes snow removal, other response costs, power restoration, damaged equipment as well as some property damage. The Small Business Administration has already declared its intent to offer low-interest loans to businesses who incurred revenue or capital loss during the storm.

Fifteen counties, including King, have been declared eligible to receive federal disaster assistance. Additional counties will likely be added bring the total to thirty three.

In short, this was a major storm that significantly impacted the City for two weeks.

DETAILED IMPACTS

Health Care

Local hospitals and other healthcare organizations experienced difficulty in getting staff to and from work and had to implement emergency plans to provide transport with varying degrees of success. Also, some hospitals lack the ability to plow their extensive driveway and parking areas which hindered their operations.

Patients had difficulty getting to and from their scheduled medical appointments. Some dialysis patients, for example, could not get to their dialysis treatments and requested transportation assistance from the Health and Medical Area Command.

Puget Sound Blood Center experienced continual problems with maintaining access to their facility.

Human Services

1. **Food Banks**
   Due to road conditions local food banks had to either shut down or reduce service due to staff inability to get to work and the difficulty delivery trucks had picking up and delivering food.

2. **Vulnerable Populations**
   Many individuals depend on public transportation for accessing food and to obtain prescription refills. Many of the transportation services these individuals depend upon, taxis, Access, bus were either not running or were at a significantly reduced level of operation. Additionally, throughout the City most sidewalks were not shoveled clear which further reduced options for these individuals.

Transportation

1. **Metro**
   On the 18th of December Metro Transit attempted to provide full service during the morning commute. As the snow and ice accumulated the condition of the roadways deteriorated with at least 200 buses getting stuck or delayed on their routes. Half of Metro's fleet is comprised of articulated buses and trolleys that do not perform well in these conditions.

   It should be noted that this impact was countywide covering 39 different jurisdictions which further complicated Metro's problems.

   Bus routes and plowing routes were not well coordinated. Some portions of bus routes are in areas that are not plowed. This impacted the electric trolleys particularly hard because they are dependent on a route determined by overhead wires.

   With so many buses out of service and roads in poor condition Metro was forced to modify its routes to provide service at less than 50% of normal for which it did not have an existing contingency plan. Such planning required effective communication with the buses in the system to determine current conditions and available resources. The Metro radio system has only four channels available which hindered Metro leadership in gaining situational awareness. Metro had already started the process to upgrade their communication system but it is not scheduled to be in place until 2010.

   The result was more passengers than available buses; no tracking of where buses were at any given moment; no coordination of snow plowing with improvised routes; all at a time when more customers were attempting to ride the bus. Many passengers waited in cold and wet conditions for long periods of time for buses that never came. It should also be noted that Metro drivers and

mechanics and other support staff consistently went above and beyond in their efforts to deliver and maintain service during the storm.

2. **Greyhound Bus**
   Greyhound was unable to sustain service due to the conditions of the roads and freeways throughout the region. Approximately 40 passengers were stranded at the Greyhound bus station in downtown Seattle. This created a need for sheltering these passengers. With the assistance of the Seattle Police Department, shelter was provided. Later, when the floods closed Interstate 5, Greyhound again requested shelter for its stranded passengers. Seattle Emergency Operations Center and the King County Emergency Coordination Center arranged for the Greyhound passengers to use the regional shelter operated by the American Red Cross in Renton which had been established for flood victims.

3. **Seattle Tacoma International Airport**
   The airport experienced numerous cancellations of flights that stranded thousands of passengers over several days. While local passengers could return home others sought shelter in hotels and others elected to stay at the airport. The airport emergency operations center consulted with other centers around the region on how to best shelter their passengers. The airport was able to continue sheltering its passengers on site.

4. **Bus Accident**
   On Friday, December 19th, two chartered buses carrying a total of approximately 75 young adults lost control and slid downhill on Thomas Street before crashing through a guardrail at the bottom. The front sections of the two buses were suspended over Interstate 5. Had the buses plunged to the freeway below there could have been many injuries or fatalities. According to initial reports, the bus drivers were attempting to find their way around other streets that were closed due to the icy conditions when they turned on to Thomas Street and immediately lost control.

5. **Roads**
   All roads in the City were impacted. Seattle Department of Transportation was unable to clear primary and secondary snow routes of accumulated ice and snow (down to bare pavement) for several days. This severely impacted Metro's ability to maintain service as well as other public or private vehicle movement throughout the City.

   In addition, as specified in the Winter Storm Response Plan, Seattle Department of Transportation does not plow side streets or residential streets. Many drivers had difficulty accessing the primary or secondary snow routes from their neighborhoods due to the depth of snow and ice.

Unique to this storm was the duration of the closures; many storms in this region are of short duration or are followed by warming temperatures or rain that contributes to rapid melting. That was not the case in this storm.

Utilities

Seattle Public Utilities was hard pressed to maintain the schedule for collecting solid waste. The poor condition of the roads hindered access to neighborhoods by crews. All collection days were missed at least once and about 42% of the total City service area was missed two weeks in a row. Seattle Public Utilities was only partially successful in notifying customers when their solid waste would be picked up. In some areas only a portion of the customers had their waste picked up which made it difficult to determine who still needed service.

RESPONSE SUMMARY

The Seattle Department of Transportation Winter Storm Response Plan is used to coordinate the City response in a winter storm. Seattle Department of Transportation is the lead department for implementing the plan with the support from other City departments and the City Emergency Operations Center.

National Weather Service (NWS) notified all response agencies of the impending storm on December 11th. NWS provides an online briefing for responders throughout the western Washington area. During the month of December the NWS provided numerous briefings on the storm. The initial briefing called for falling temperatures, high winds and snow.

The City Emergency Operations Center hosted a planning meeting for all departments expected to be involved in the response. The weather forecast was reviewed, each department outlined its preparations for the storm and communication procedures were updated.

Seattle Department of Transportation implemented its Winter Storm Response Plan and transitioned to 24 hour plowing operations with all crews working 12 hour shifts. The plan focuses plowing and sanding efforts on 1,531 lane miles of primary and secondary arterials. This is only a fraction of the total lane miles in the City. The number of lane miles that theoretically can be maintained during a storm is a function of the number of plows and sanders and crews and evolving weather patterns.

Residential and side streets are not plowed or sanded due to the limitation of existing plowing and sanding resources. Also, many streets are too hilly or narrow to be plowed.

Seattle Department of Transportation generally plows to the center of the street to avoid blocking driveways and vehicles parked on the street. This created an additional limitation to drivers attempting to make left turns. Plow drivers have the discretion to plow to the side of the street when advisable.

Seattle Department of Transportation and the Seattle Police Department close streets as needed. Generally, these are hilly portions of arterial streets. At the start of the winter season the "Street Closed" signs are placed in known problem areas. During storms transportation and police personnel close these streets for the safety of the public. In a severe, protracted, widespread storm there may not be enough "Street Closed" signs for the number of streets that might need it.

Seattle Public Utilities activated its Incident Management Team and closely monitored the weather and the water system. Seattle Public Utilities focused on preparing for three contingencies; rupture of water pipes (public water mains or in private homes), urban flooding and solid waste collection. Crews were put on alert to ensure that if those contingencies came to pass the response would be rapid.

Urban flooding did not occur, there were no significant water main breaks and Seattle Public Utilities staff was able to handle calls for service. The primary disruption to service for Seattle Public Utilities was the inability to maintain solid waste collection services due to the road conditions.

Emergency Support Function-6 (Human Services, Mass Care and Shelter) activated its cold weather plan which consisted of opening overnight cold weather shelters, keeping daytime warming areas open (community centers and libraries) and cold weather patrols by Seattle Police Department teams who conduct outreach for the homeless each night checking for hypothermia and offering transportation to the shelters.

Seattle City Light prepared for power outages due to high winds that were predicted in the initial forecast. While the winds did not materialize, City Light maintained increased readiness by monitoring the weather and keeping staff on call. Some outages did occur (largest outage affected 26,489 customers) but they were limited in number and were quickly resolved.

The Joint Information Center, Seattle Department of Transportation, Seattle Public Utilities and Public Health all issued numerous public messages before and during the storm.

Fleets and Facilities transitioned its Fleet Services Department to 24 hour operations, with staff working 12 hour shifts to provide rapid repair and maintenance of responder vehicles with priority provided to plow and sanding vehicles.

The Seattle Fire Department implemented its Cold Weather Procedures to maintain its response capability. Additional EMS vehicles were added. Response times did not degrade significantly; an additional minute was added to the average response time on only one day during the storm.

The Police Department organized its response through a department wide operational plan. This included chaining a percentage of their patrol vehicles ahead of the storm to

ensure service could be maintained when the storm hit. All calls for service were answered however some delays were encountered due to the condition of the roads.

The Emergency Executive Board was convened to review the response to the storm, review the proclamations by the governor and county executive, determine whether there was a need for any emergency executive orders, and to coordinate the response.

The City Emergency Operations Center activated to support and coordinate response operations and recovery in the City. Starting December 11th the EOC maintained a higher state of readiness throughout the storm period using a combination of its assigned Staff Duty Officers (SDO) and/or selected representatives from key departments. Some missions addressed by the City Emergency Operations Center:

- Coordinating assistance for stranded commuters and the homeless
- Arranging for transportation of dialysis patients and critical health care workers
- Coordinating solutions for potential shortages of tire chains and deicer for response vehicles
- Maintaining service at maintenance shops
- Coordinating public information
- Conducting conference calls to address specific issues or coordinate operations
- Arranging for priority plowing at critical facilities
- Providing regular situational updates and weather reports to all departments and other stakeholders
- Arranging transportation for Aging and Disability Services to maintain service
- Coordinating response and recovery operations with King County ECC and State EOC
- Developing and initiating the recovery plan

WHAT WORKED

1. The concerns regarding the time needed to clear the streets of extraordinary volumes of snow and ice should not prevent acknowledging the dedication of the Seattle Department of Transportation crews who worked long hours every day, many over the holidays, for more than 14 consecutive days.
2. National Weather Service provided daily detailed forecasts essential to conducting response planning and operations. The National Weather Service was also available 24 hours a day to answer any weather related questions.
3. Essential public services such as fire, law enforcement and electrical power, were maintained without significant interruption or delay despite the difficult road conditions and low temperatures.
4. Fleet Services providing vehicle maintenance and repair 24 hours per day ensured essential services were maintained during the storm. It is important to note that no Department of Transportation vehicle was unavailable during the storm due to maintenance problems.
5. Auxiliary Communication Service personnel, a volunteer organization associated with the City Emergency Operations Center, volunteered to transport dialysis patients and medical staff. A total of 24 transports were made during the storm.

6. Fleets and Facilities rapidly addressed a growing shortage of tire chains and deicer ensuring response vehicles could continue their missions.
7. The Seattle Police Department's outreach to homeless during cold weather, in conjunction with ESF-6, provides a valuable service that prevents death or injury in cold weather due to hypothermia. Also, the police addressed the shelter issue that had arisen with Greyhound.
8. Metro Transit provided heavy duty tow trucks to assist fire trucks that had become stuck in the snow. This ensured the fire department could maintain services.
9. The City's Emergency Operations Center worked with Public Health Seattle King County through their Health and Medical Area Command to support the needs of the medical community.
10. The City had re-directed a public information campaign grant to focus this year on winter storm preparedness. Called, "Take Winter by Storm," winter preparedness material was made available through local media beginning in October. Though impossible to quantify, certainly more community members were better prepared for this storm as a result.
11. Post storm the City provided an opportunity for feedback from citizens regarding the snow response;
    - A City Council public comment hearing
    - Three community meetings hosted by the Mayor, which attracted a total of fifty five citizens, were held in three different locations attended by the department heads or their designee from each department that had a response role during the storm
    - Hosted a website for online comments

CORRECTIVE ACTION PLAN

Each department with a significant role in the response submitted a Corrective Action Plan. One goal of this report was to as rapidly as possible identify and act on improvements. Some overlap between individual department's efforts is inevitable due to the pace of this process. The Strategic Workgroup will ensure the implementation of the Corrective Action Plan is coordinated, efficient and meets deadlines.

Many of the proposed corrective actions such as research, training, and writing contracts require time to fully implement. Some projects may not be complete until September of this year. However, should another storm strike before all corrective actions are in place, the City is committed to a strategy of implementing as many corrective actions as possible, even on a partial basis. For example, emergency executive authority can be invoked to speed the hiring of plowing contractors on a short term basis.

Until the Corrective Action Plan is completed it will be referenced during the planning and response phases of any winter storm emergency to make use of as many lessons learned as possible.

Seattle Office of Emergency Management

Area for Improvement	Due Date and Solution	Responsibility
Many departments use privately owned four wheel drive vehicles for transporting employees to and from work.	Develop policy to guide departments in how to use this resource which addresses liability and compensation. Due: June 2009	Department of Executive Administration Risk Management Legal Department Strategic Workgroup
The process for keeping City employees updated during a disaster should be reviewed to ensure it provides the information needed in an efficient manner.	Allow City Emergency Operations Center Director to authorize citywide email announcements and provide permission for all Emergency Management Duty Officers to transmit these messages over GroupWise. Due: As soon as possible	Seattle Office of Emergency Management Customer Service Bureau
Health, Hospitals and Emergency Management have varying expectations as to how to organize the transport of healthcare employees and patients.	Develop plan for organizing the transport of employees and patients. Due: June 2009	Seattle Office of Emergency Management Public Health Seattle King County
Department of Transportation received multiple requests for priority plowing to maintain access to critical facilities such as the jail, blood bank, precincts, public transit areas, and hospitals. The list of what should be given priority needs better definition to avoid unrealistic expectations and negative impacts to the implementation of the winter storm response plan.	For the remainder of the winter season maintain list of areas that needed priority plowing in the last storm within the Emergency Operations Center Planning Section and incorporate in the response strategy. Due: Completed Develop list of potential sites, procedures for requesting priority plow services, prioritization methods and a tracking system for ensuring those requests are fulfilled. Due: September 2009	Seattle Office of Emergency Management Strategic Workgroup
Based on lessons learned update essential response information and information required by the Joint Information Center to support the response.	Seattle Office of Emergency Management will develop draft list of information essential for supporting the response and for public messaging. The Strategic Workgroup will review, edit and approve this list. Approved list will be incorporated into response plans. Due: February 2009	Seattle Office of Emergency Management Strategic Workgroup

Identify and document all changes to the Winter Storm Response Plan based on After Action Report and Corrective Action	Update City Plan and Winter Storm Response Plan Due: April 2009	Seattle Office of Emergency Management Seattle Department of Transportation Strategic Workgroup
The EOC did not have sufficient information to maintain situational awareness in a severe snow storm.	Increase the number of information sources . Also, amend EOC standard operating procedure to include discussing human impacts with Customer Service Bureau and 2-1-1 Due: February 2009	Seattle Office of Emergency Management Seattle Department of Transportation Human Services

Seattle Department of Transportation

Area for Improvement	Due Date and Solution	Responsibility
Improve snow related coordination with Metro Transit.	Memorandum of Agreement Identify additional key plow routes. Metro to provide a snowplow and a liaison to Seattle Department of Transportation when necessary. Due: March 2009	Traffic Management Division Policy & Planning Seattle Department of Transportation Emergency Preparedness
Revise road salt policy.	Road salt will be used when at least 4" of snow is predicted, when ice is predicted, when snow is predicted to last more than 3 days, or at the discretion of the director. Due: Done	Director's Office Street Maintenance Division
Institutionalize the early mobilization of the Seattle Department of Transportation Incident Management Team	Revise Winter Storm Response Plan. Due: Done	Seattle Department of Transportation Emergency Preparedness
Develop Winter Weather Response Plans for extreme weather conditions and sustained operations.	Revise Seattle Department of Transportation Winter Storm Plan. Due: April 2009	Street Maintenance Division Traffic Management Division Seattle Department of Transportation Emergency Preparedness
Acquire emergency snow and ice	Identify 13 contractors	Street Maintenance

clearing assistance from private contractors	Due: Done	Division
Upgrade plow fleet to 29 vehicles	Upgrade two new vehicles (already on order prior to storm) to plows. Due: Done	Street Maintenance
Increase Public Information Officer (PIO) capacity during prolonged events.	Augment communications staff with existing resources. Develop a plan to address staffing needs for extended periods of 24-hour operations Due: July 2009	Communications Office Director's Office
Improve situational awareness; Utilize Traffic Management Center (TMC) resources.	Provide for monitoring of traffic cameras at the Charles Street Operations Center. Increase TMC staffing during weather events and deploy inspectors to the field to gauge road conditions. Due: September 2009	Traffic Management Division Street Use Division Street Maintenance Division
Reduce crew fatigue during prolonged events.	After four days of 12 hour shifts, assign crews to 8 hour shifts while maintaining 24-hour operations. Train additional personnel to operate snowplow equipment. Due: Done	Street Maintenance Division
Increase public awareness about the need to clear snow from public, business and government owned sidewalks.	Coordinate messaging with the Office of Emergency Management. Incorporate into communications materials. Due: September 2009	Communications Office Seattle Department of Transportation Emergency Preparedness Seattle Office of Emergency Management
Utilize technology to improve the efficiency of snowplow operations.	Study the cost and feasibility of a GPS tracking system for the winter storm fleet. Utilize this information to adjust resources in real time Due: March 2009	Street Maintenance Division
Pursue an agreement with Washington State Department of Transportation for emergency access to snow and ice clearing supplies when necessary.	Memorandum of Agreement Due: July 2009	Street Maintenance Division

Fleets and Facilities Department

Area for Improvement	Due Date and Solution	Responsibility
Improve city departments' access to 4x4 vehicles to better support their mission during winter storm events.	Identify 4x4 vehicles currently in the City fleet available for loan to other departments in an emergency. Due: March 2009 Explore vehicle options with departments following existing Fleet policies that would meet departments' operational objectives during winter storms. Due: April 2009	Fleet Services Strategic Workgroup
Clarify existing department policy/procedure for lodging critical staff.	Research and develop a departmental policy for identifying essential staff, conditions required for providing lodging, etc. Due: June 2009	Human Resources Fleets Services and Facility Ops
Improve communication with departmental staff and EOC regarding fuel supply status on fueling sites and emergency generators.	Develop Fuel Status Report for fueling sites that can be uploaded onto internet site. Due: March 2009	Fleet Services and Facility Ops
Address cold weather impacts on biodiesel and Seattle Public Utilities generator fueling needs.	Evaluate timing of introduction of seasonal additives to biodiesel fueling stations. Due: March 2009 Work with Seattle Public Utilities to revise, as necessary, protocols for maintenance of pony tanks and refueling generator tanks. Due: June 2009	Fleet Services Seattle Public Utilities
Ensure adequate supply of parts for sanders and snow plows in periods of extended use of equipment.	Reassess parts inventory and restock critical parts for the remainder of this winter. Due: March 2009 Develop SOP/checklist for assessment of parts inventory prior to each winter season. Due: March 2009	Fleet Services

Develop alternatives for chain up of police department vehicles, in the event vendor unable to perform effectively.	Develop internal fleet alternatives to be incorporated into SOP/Checklist. Due: March 2009	Fleets Division Seattle Police Department
Improve knowledge and skills of vehicle operators for driving and operating vehicles in snow and ice.	Provide annual pre-winter reminder to departments regarding installation of chains and winter driving technique. Due: March 09 Provide additional training to other city department staff as needed for chain-up Due: On-going	Fleet Services, other City depts.
Improve methods for facility assessments during emergency conditions.	Establish process to secure necessary professional and engineering expertise to supplement skilled trades, as needed, to assess condition of buildings. Due: September 2009	Facility Operations
Evaluate appropriate amount of equipment and supplies to keep on hand for efficient removal of large quantity of snow around facilities.	Acquire better quality snow shovels for staff to use. Due: September 2009 Identify alternative measures for snow removal at facilities if vendor is unable to perform contractual obligations. Due: March 2009	Facility Operations
Improve methods for allocating and securing critical supplies, which may become difficult to obtain locally during a snowstorm.	Develop plan/checklist to inventory and secure relevant supplies each fall. Due: September 09 Develop plan to review facilities and pre-position critical supplies each fall. Due: September 2009	Fleet Services and Facility Operations, other departments
Clarify policy/procedures for activating emergency shelter caches.	Develop threshold for activating emergency shelter caches. Due: March 2009 Organize tabletop exercise to test the activation of caches. Due: September 2009	Fleets and Facilities, Department of Parks and Recreation Humans Services Department

Human Services Department

Area for Improvement	Due Date and Solution	Responsibility
The Human Services Department provides in-home case management services for thousands of vulnerable clients; however, by the third day of the snow and ice some case management workers were unable to access clients. A solution was offered by Fleets and Facilities finding two 4x4 vehicles to loan to case workers until the roadways were again passable with ordinary vehicles.	Secure chained or all wheel drive vehicles for use by key case management workers to reach critical clients through an agreement with Fleets and Facilities Department or outside resource. Due: August 2009	Human Services Department ADS Case Management Manager Fleets and Facilities Department Strategic Workgroup
People who became homebound by the weather conditions and were not receiving case management services were not able to procure food and medicines as the snow event continued to limit the mobility of independent but more vulnerable populations.	Work with Public Health, ADS, 2-1-1 and other partners to develop a plan of response so that people who become homebound in a disaster are able to have critical basic needs met. Continue to develop and provide public education to raise awareness of the issue and increase personal and community preparedness. Due Date: On-going Develop a proposal for a volunteer coordinator to launch and manage a volunteer Citizen Corps Council. Due Date: August 2009	Human Services Emergency Management Planner and ESF-6 Coordinator
Had the EOC been activated for a longer period of time, HSD would have needed more trained backup staff in their emergency response team.	Train all Human Services Department staff in what their role is in an emergency and build the depth of the Human Services Department Emergency Response Team. Due Date: December 2009	Human Services Emergency Management Planner and ESF-6 Coordinator
The City Hall and Seattle Center severe weather shelter sites had to close at 5:00 a.m. each morning, due to provider operating requirements. The early closure results in people being moved out into the cold before alternative facilities are open.	Investigate whether arrangements can be made to open other facilities in the early morning. Due Date: August 2009	Human Services HIBGA Division Director
The snow storm and later floods left	Work with Greyhound and Amtrak to	Human Services DVSAP

many stranded travelers in Seattle. Greyhound did not have a plan to care for travelers that were stranded for an extended period.	review their plans to assist stranded travelers. Due Date: August 2009	Division Director Human Services Emergency Management Planner and ESF-6 Coordinator
The Frye shelter for women exceeded normal capacity, particularly when Tanya's Room, a regular women's shelter, could not open due to staff being unable to get to the shelter. This resulted in 25 women's beds not being available. While everyone seeking shelter received it, the increased need put additional pressure on the Frye severe weather shelter.	Investigate whether the capacity for severe weather shelters needs to be expanded, particularly for women, and continue to work with shelter agencies on their ability to remain open. Due Date: August 2009	Human Services HIBGA Division Director

Joint Information Center

Area for Improvement	Due Date and Solution	Responsibility
The Joint Information Center shall explore emerging online communications technologies to ensure City communications are consistent with customer media consumption patterns.	Establish a policy and procedure for communicating with customers through new online technologies. Due: June 2009	Mayor's Communications Director
The Joint Information Center shall establish appropriate vendor relationships to ensure American Sign Language interpretation is available for press conferences held during activations.	Establish vendor relationships to provide American Sign Language interpretation. Due: February 2009	Mayor's Communications Director
Many citizens found it difficult to determine what City offices/services were open or available and their hours of operation; courts, neighborhood service centers, libraries etc.	Include in effort to deliver information through one location on the City web. Due: July 2009	Mayor's Communications Director ESF-15 Coordinator SDOT Communications Officer
The Joint Information Center was activated only during times of most need with departments covering public messaging when it was not activated. This made coordination difficult.	City strategy will now favor Joint Information Center activation to ensure coordinated and effective response messaging. Not activating the Joint Information Center will be considered an exception to that strategy. The Emergency Operations Center Director will issue coordinating instructions for public messaging to all departments in those instances where the Joint	Seattle Office of Emergency Management ESF-15 Coordinator

	Information Center is not activated Due: Completed	
With plowing the main tactic for resolving the challenge posed by the snow, the City should better describe which streets have been plowed and when. Many citizens complained their street had not been plowed when in fact it had been several times.	Participate in the Strategic Workgroup process to define essential information required by the Joint Information Center. Due: February 2009	Mayor's Communications Director ESF-15 Coordinator SDOT Communications Officer
The Joint Information Center shall establish a "one stop" information page/portal at www.seattle.gov that aggregates relevant incident specific information across departments.	Work with the citywide web team to identify appropriate content and create page/portal. Due: July 2009	Mayor's Communications Director ESF-15 Coordinator

Seattle Parks and Recreation

Area for Improvement	Due Date and Solution	Responsibility
Had the EOC been activated for a longer period of time, Parks would have needed more trained EOC responders.	Identify and train additional Parks employees as EOC responders and increase the capacity of the Parks EOC Responder Team. Due: December 2009	Parks Emergency Management Director
Training: prior to winter season, conduct annual winter weather response exercises with staff to communicate clear expectations and clarify severe weather staffing assignments and responsibilities. Provide information to staff on METRO bus snow routing response and contact info.	Assign Division Managers and Parks EMC to conduct annual winter storm response and staffing plan preparedness training. Due: October 2009	Parks Emergency Management Director

Seattle City Light

Area for Improvement	Due Date and Solution	Responsibility
Slightly increase the number of four wheel drive vehicles available within the Department for passenger travel.	Seattle City Light will replace three of these vehicles with four-wheel-drive vehicles during our normal vehicle replacement cycle for 2009. Due: March 2009	Security and Emergency Management Director Fleets and Facilities Department Strategic Workgroup
Seattle City Light and Seattle	Seattle City Light, Department of	Customer Care Director

Public Utilities continue to receive comments about their jointly operated Call Center indicating that some calls have been dropped or routed incorrectly.	Information Technology and Seattle Public Utilities are investigating the complaints about the Outage Hotline to determine the problem and select a corrective action. Due: February 2009	Seattle Public Utilities Call Center Manager

Seattle Public Utilities

Area for Improvement	Due Date and Solution	Responsibility
Solid Waste. Communication between SPU and the solid waste collection contractors was, on occasion, not timely and accurate enough to ensure that field conditions were clearly conveyed to Seattle Public Utilities management staff for assessment and decision support.	Develop and implement a procedure for collecting, verifying, and reporting operational condition information to managers; include a process for explicitly sharing information between Seattle Public Utilities and the solid waste contractors regarding: 1) Seattle Public Utilities objectives and expectations; and 2) contractor capabilities, safety concerns, and performance. Due: March 2009	Solid Waste Director Collection, Processing & Disposal Manager
Solid Waste. There were some inconsistencies in information between the Seattle Public Utilities Solid Waste web page, the Call Center, and ORC regarding pickups.	Route all information through a single Seattle Public Utilities process for vetting by the critical stakeholders, Incident Commander and the Public Information function prior to making it available to the various Seattle Public Utilities customer-contact outlets. Due: March 2009	Solid Waste Director Communications Public Utilities Emergency Management Coordinator
Solid Waste. Messaging to the general public regarding adjusted solid waste pickup schedules was, at times, unclear, inconsistent, or overly-optimistic.	Route all public information through a single Seattle Public Utilities process for vetting by the Incident Commander and the Public Information function prior to releasing to the public. Due: March 2009	Solid Waste Director Communications Public Utilities Emergency Management Coordinator
Solid Waste. Current methods for communicating to the general public did not allow for timely and focused dissemination of information regarding changes in pickups routes/schedules in the face of changing weather, street conditions, and contractor capabilities.	Investigate Seattle Public Utilities capability for accessing alternative, real-time methods for disseminating information to the public, including: out-dialer, community blogs, web sites, media feeds, etc. Develop and implement a procedure to make maximum use of real-time public communication channels.	Solid Waste Director Communications Public Utilities Emergency Management Coordinator

	Due: June 2009	
Drainage and Wastewater. Lack of flexibility in activating the Urban Flooding Plan.	Update Urban Flooding Plan to reflect current technological improvements in work scheduling and tracking. Review and revise criteria (as necessary) for plan activation. Due: March 2009	Drainage & Wastewater Public Utilities Emergency Management Coordinator
Drinking Water. Lack of flexibility in activating the Winter Freeze Plan.	Update Winter Freeze Plan to reflect current technological improvements in work scheduling and tracking. Review and revise criteria (as necessary) for plan activation Due: March 2009	Water Operations. Public Utilities Emergency Management Coordinator
Seattle Public Utilities. Identification of priority facilities for plowing/snow clearing.	Develop list of Seattle Public Utilities facilities that should be priority for plowing or snow clearing for access. Due: June 2009	Public Utilities Emergency Management Coordinator Strategic Workgroup

Seattle Fire Department

Area for Improvement	Due Date and Solution	Responsibility
Many Administrative Staff personnel could not make it in to work or had difficulty because of a lack of 4-wheel drive vehicles.	Secure 4-wheel drive vehicles for use by critical Administrative positions through an agreement with Fleets and Facilities. Due: February 2009	Fleets and Facilities Fleet Manager Strategic Workgroup
Immediately accessible winter supplies.	Establish a greater minimum inventory of winter supplies (chains, deicer, ice melt. Due: July 2009	Support Services Lieutenant
Reduce time and labor required for putting together tire chain caches.	Palletize and shrink wrap tire chains for quick access and transportation to Battalion Headquarters. Support Services to explore with Fleets and Facilities Fire Garage. Due: April 2009	Support Services Captain and Fleet Manager
Ability to safely distribute	Provide the type of support vehicles	Chief of Staff/Resource

equipment and supplies on a 24-hour basis to fire stations and emergency scenes.	necessary to respond to all types of natural and manmade transportation challenges. Due: April 2009	Management

Seattle Police Department

Area for Improvement	Due Date and Solution	Responsibility
Plowing: Precincts encountered minor problems with snow removal specifically ensuring that when parking lots are plowed by contractors that snow is moved away from as opposed to towards the parked patrol vehicles.	Work with Fleets and Facilities to better define expectations for contractor performance Due: September 2009	Homeland Security Bureau Fleets and Facilities Department
Officers encountered problems getting prisoners into King County Jail due to the road conditions around the jail entrance. Officers had to walk prisoners into the jail. The entrance is located on a steep hill and during a significant snow event plows may not be able to maintain access.	Seattle Police Department will meet with the King County Jail staff to develop a plan for access during snow events. Due: March 2009	Homeland Security Bureau Seattle Department of Transportation
Signage: Precincts and Traffic Section both ended up delivering signage to neighborhoods because Seattle Department of Transportation was overwhelmed with other demands.	Review policy for who is responsible for providing signs to neighborhoods and store adequate signage at the precinct and Traffic Unit. Due: September 2009	Homeland Security Bureau Seattle Department of Transportation
Vehicle Needs: Officers encountered problems accessing certain parts of the City in patrol vehicles that did not have All Wheel or 4-Wheel Drive.	Identify vehicles with all-wheel or 4-wheel drive from City Fleet that can be loaned to Precinct for use during snowstorms. Develop policy for deployment of vehicles in the event of major snowstorms. Due: September 2009	Homeland Security Bureau Fleets and Facilities Fleets Manager Strategic Workgroup
Tracking street closures	SPOC has developed an Excel spreadsheet that will enable 911 radio dispatchers to track street closures and	Homeland Security Bureau

	then report those to SPOC. This process has been completed and is now ready to be implemented under circumstances requiring it. The list of routine street closures will be reviewed following every event. Due: Completed	Strategic Workgroup
Preparation before the storm	Ensure that the Precincts have a sufficient supply of rock salt and other snow/ice removal aids prior to snow. Ensure that the Precincts' Winter Storm Response Plan are current and that all Precincts have a copy of the City's Winter Storm Response Plan. Due: February 2009	Homeland Security Bureau

Public Health Seattle and King County

Area for Improvement	Due Date and Solution	Responsibility
The Department lacked sufficient plans to enable essential staff to get to and from work and to field operation sites.	Develop emergency transportation plans to enable essential staff and volunteers to get to and from work and field operation sites. Due: September 2009	Public Health Preparedness/CPRE
Some essential staff were unable to get home from the downtown Seattle area after their shifts and had to remain overnight at the Chinook Building to enable sufficient staffing for Area Command and critical department functions.	Develop housing plans to temporarily lodge critical department staff in Seattle downtown core. Due: September 2009	Public Health Preparedness/CPRE
Healthcare Workers and patients had difficulty getting to and from work/points of care.	Work with local emergency management, healthcare organizations and the private sector to develop critical personnel/patient transport strategy and identify necessary resources. Due: June 2009	Public Health Preparedness, King County Healthcare Coalition, Seattle Office of Emergency Management

Situation status updates from healthcare organizations varied in frequency and content.	Develop standardized healthcare organization status reporting template and institute routine reporting timeframes. Due: September 2009	Public Health Preparedness and King County Healthcare Coalition

Customer Service Bureau

Area for Improvement	Due date and solution	Responsibility
CSB's emergency response plan calls for CSB to provide a regular call summary to the EOC. CSB staff did not provide a summary during the snow storm.	Review emergency response plan with staff at monthly staff meeting. Due: Completed	Customer Service Bureau

SUMMARY

The December 2008 Winter storm presented significant challenges to the City of Seattle and the region. The central strategy in any Winter Storm Response plan involves clearing the roads of snow and ice. How long that takes depends on the following factors:

- The number of plows and sanding trucks
- The use of chemicals, including salt
- Sufficient staff to operate snow removal equipment 24 hours per day
- A plan that identifies which streets will be plowed and those that won't
- The weather

In the December storm the region experienced a rare snow event that delivered a significant amount of snow accompanied with an extended period of below freezing temperatures which ensured the snow and ice were not going to melt quickly.

In the battle to clear the streets the Seattle Department of Transportation attacked the snow with all of the resources it had under its control. At no point in this analysis has information been revealed that Seattle Department of Transportation failed to put all of its vehicles on the road. It was also able to gather sufficient staff to operate those vehicles continuously for 14 days. Seattle Department of Transportation followed its plan which calls for plowing and sanding efforts at identified primary and secondary arterials only.

The Winter Storm Response plan and equipment are capable of handling most Seattle winter storms; typically not a lot of snow, followed by increasing temperatures and rain which results in short duration events. The severity of this series of storms simply exceeded the ability of the Seattle Department of Transportation plan and resources to address it.

Complaints regarding the performance of the Seattle Department of Transportation during the storm consist of three issues:

- Use of Salt
- Types of plow blades
- The result of all snow and ice removal techniques should have created roads conditions passable to vehicles equipped for winter driving (4x4's, snow tires, chains, and responsible driving)

Salt was abandoned as a de-icer in the 1990's. Seattle Department of Transportation follows best practices regarding salt as outlined in the Regional Road Maintenance Program. It has already amended its policy of use salt in certain conditions, i.e. when 4 inches of snow are forecast, when ice is forecast, or when the duration of the snow or ice is predicted to last more than 3 days. The Seattle Department of Transportation Director also can authorize the use of salt at their own discretion on arterials, hills or hospital access.

The use of steel or carbide plow blades carry the significant risk of causing substantial damage especially to asphalt covered streets, which is on most streets. It should also be noted that many other cities in the region do not use steel or carbide plow blades for the very same reason. The rubber cutting edges deployed in the plow fleet are both effective in clearing snow and protecting asphalt road surfaces. But Seattle Department of Transportation does use steel blades where it makes sense to do so, i.e. on concrete structures. The future use of salt in combination with increased plowing capability should be more effective under extreme weather conditions.

The bottom line lesson is that regardless of the round-the-clock dedication of the full fleet of resources and regardless of the number of times roads were plowed over two weeks, many streets in the City and region remained impassable to vehicles other than 4x4's. This had cascading impacts. Seattle and neighboring cities could not cumulatively maintain passable routes for Metro buses and this too cascaded into problems for passengers who were trying to buy groceries, fill prescriptions, get to work and shop for the holidays, etc.

The primary strategy to address streets covered with ice and snow consisting of a combination of plowing, sanding, and the application of chemicals to counter ice has been revised to include the use of salt and the hiring of contractors. Also essential to the response is adequate preparation on the part of the public to mitigate the impacts.

This plan provides for a number of enhancements to the existing capability to clear the streets. Expanding the number of plows to 29, having agreements in place to hire contractors, a clear policy on salt application and close coordination with Metro Transit increases confidence in the ability of the City to, at minimum, keep primary routes open during a storm similar to the one experienced in December of 2008. It will permit the movement of vehicles, and especially buses, with greater efficiency provided those vehicles are prepared for winter driving.

Every winter storm is different. The solution is to adjust to the conditions sooner in anticipation of these conditions and apply strategies adaptable to the conditions. Seattle Department of Transportation has committed to doing exactly that in their operations. The salt use policy has already been amended, the use of private contractors has set a good example, and the purchase of equipment in the future that can be pressed into storm response service is being incorporated into department plans. The EOC will learn from this event to focus on the bigger picture and try to help solve the problems that cause cascading problems through its advanced planning function. The Mayor's Emergency Executive Board will be assembled earlier during events to assure city-wide executive support and coordination focused on these solutions.

The city-wide ESF-15 (External Affairs and Public Information) team will investigate methods to more effectively get real-time useful information into our customers hands

whether that's estimated date of solid waste collection, transportation detours or any other critical service.

The storm response crews and emergency workers throughout the City demonstrated remarkable dedication in their efforts to combat record-breaking conditions. Their dedication will be further demonstrated by making the improvements to our collective response identified in this report.

Form revised May 5, 2009

FISCAL NOTE FOR NON-CAPITAL PROJECTS

Department:	Contact Person/Phone:	DOF Analyst/Phone:
Legislative	Mike Fong/5-1675	N/A

Legislation Title: A RESOLUTION initiating an external consultant review of the Seattle Department of Transportation's snowstorm response and emergency preparedness, approving recommendations of the Executive's December 2008 Winter Storm After Action Report and Corrective Action Plan and outlining additional Council priorities and recommendations.

- **Summary of the Legislation:**

This resolution approves the recommendations in the Executive's After Action Report (AAR) following the December 2008 winter snowstorm. The Council has identified its priorities from the AAR and highlights additional priorities proposed for the Executive. The resolution outlines reporting requirements to the Council and states the Mayor and Council's intent for SDOT to hire a consultant to further review and develop a work plan for snowstorm response and overall emergency preparedness for the department.

- **Background:** *(Include brief description of the purpose and context of legislation and include record of previous legislation and funding history, if applicable):*

Following the December 2008 winter snowstorm, the Executive released the AAR (attached as Attachment A to the resolution) identifying lessons learned and corrective actions for City departments to improve future response efforts. In addition, Council staff released a report in April documenting additional factors that may have contributed to the challenges faced by SDOT during the severe snowstorm. As a result, the Mayor and Council have agreed to direct SDOT to retain an outside consultant to assist the department in improving future snowstorm response efforts and enhance overall emergency preparedness.

This resolution also highlights some areas of interest and priorities for Council from the AAR and requests the Executive to provide progress reports on implementation by November of 2009.

- *Please check one of the following:*

_X_ **This legislation does not have any financial implications.** (*Stop here and delete the remainder of this document prior to saving and printing.)*

NOTE: This legislation will not impact the adopted 2009 budget. Funding necessary to implement corrective actions in the Executive's After Action Report and SDOT's efforts to hire a consultant to work with the department on snowstorm and overall emergency preparedness will be funding within existing department budgets. Staff is unaware of the need for new funding appropriations to implement any provisions within this resolution.

Michael Fong/MF
2008 Winter Storm Response Resolution
May 5, 2009
Version #4a

RESOLUTION _____

A RESOLUTION initiating an external consultant review of the Seattle Department of Transportation's snowstorm response and emergency preparedness, approving recommendations of the Executive's December 2008 Winter Storm After Action Report and Corrective Action Plan and outlining additional Council priorities and recommendations.

WHEREAS, in December of 2008, Western Washington experienced a series of winter storms that brought high winds, snow, ice and freezing temperatures to the region; and

WHEREAS, the winter storms significantly impacted the residents and businesses in Seattle; and

WHEREAS, many lessons were learned about the City of Seattle's preparedness for and response to extreme winter weather conditions; and

WHEREAS, the City Council held several public meetings to review and discuss the performance of City departments during the winter storms; and

WHEREAS, the City Council is committed to responding to the concerns and issues raised by members of the public during and after the December winter storms; and

WHEREAS, the Executive released the December 2008 Winter Storm After Action Report and Corrective Action Plan (AARCAP) in February identifying specific actions and areas for improvement in order for the City to be better prepared for future extreme weather conditions and other emergencies; and

WHEREAS, the City Council has reviewed the AARCAP and identified additional priorities and areas of emphasis for City departments to become better prepared for future winter storms and other emergencies; and

WHEREAS, Council staff reviewed and released a report on SDOT's snow storm response operations and identified several areas in need of further evaluation and potential corrective action to improve the department's preparedness for future severe snowstorms and emergencies; and

WHEREAS, the Mayor and City Council agree that SDOT should retain a consultant to review operations and assist the department in developing a work plan to improve future response to severe snowstorms and other emergencies; and; and

WHEREAS, the City Council intends to continue its policy and oversight responsibilities with regard to the City's overall emergency preparedness and evaluate the Executive's

fulfillment of the objectives outlined in the AARCAP and additional Council priorities and monitor the consultant work associated with SDOT; NOW THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE MAYOR CONCURRING, THAT:

Section 1. The Mayor and City Council requests that SDOT hire an independent consultant to review the department's winter storm response operations and develop a comprehensive work plan to complement the corrective actions already identified in the After Action Report. This review will be coordinated by SDOT with support from the City Council's Central Staff. SDOT will submit to the City Council a proposed consultant scope of work and the Request for Qualifications (RFQ) for review no later than June 30, 2009. Development of the scope of work and RFQ should include addressing the issues identified in the Council staff report on SDOT's snowstorm response efforts. It is anticipated that funding for this review come from existing appropriation authority in SDOT's 2009 budget.

Section 2. The City Council hereby approves the recommended corrective actions identified in the 2008 Winter Storm After Action Report and Corrective Action Plan (AARCAP), which is attached as Exhibit A.

Section 3. The City Council hereby establishes the following as priorities from the AARCAP for implementing improvements to the City's future winter weather response efforts and overall emergency preparedness and a reporting schedule for Council review:

1. Seattle Department of Transportation (SDOT):

a. update the SDOT Winter Storm Response Plan to include a level 2 plan for responding to extreme weather conditions and review and make any modifications to primary and secondary roadway designations;

b. establish a Memorandum of Agreement with King County Metro Transit related to snow removal coordination and identify new and modified key plow routes to maintain transit service during a range of severity for snow and ice related roadway conditions; and

c. work with Office of Emergency Management to develop strategy for improving public awareness of sidewalk snow clearing responsibilities.

SDOT is requested to provide the Council's Transportation Committee a public briefing on and a copy of the revised plan, coordinated agreements with Metro and a sidewalk snow clearing communications strategy.

2. Office of Emergency Management (OEM): work with Seattle Department of Transportation to develop a master list of critical facilities that require priority plowing status during a severe snowstorm and a process for ensuring that access to these sites is met. OEM is requested to provide the Council's Emergency Management and Utilities Committee a progress report and a copy of the critical facilities list and procedures.

3. Seattle-King County Public Health (SKCPH) and OEM: develop a plan for emergency transport of health care employees and patients during severe weather conditions. SKCPH and OEM are requested to provide the Council's Culture, Civil Rights, Health and Personnel Committee a progress report.

4. Human Services Department (HSD):

    a. Work with Public Health, Aging and Disability Services, 2-1-1 Information Line and other partner agencies to develop strategies designed to address critical basic needs of people who become homebound in a disaster;

    b. Work with Greyhound and Amtrak to develop company plans to meet the needs of stranded travelers in the event of an emergency or disaster;

    c. Evaluate severe weather shelter capacity, particularly for women, and determine if additional capacity is necessary.

    HSD is requested to provide the Council's Public Safety, Human Services and Education Committee with a progress report.

5. Emergency Support Function (ESF) – 15: Communications: develop new policies and procedures to effectively communicate information with the public during an emergency or disaster with new online technologies. The Executive is requested to provide a report on these new policies to the Council's Energy and Technology Committee.

6. Seattle Public Utilities (SPU) and Department of Information Technology (DoIT): review Utilities Call Center operations and identify source and cause of reported dropped calls and incorrect routing of customers during the December snowstorm and take corrective action. SPU and DoIT are requested to update the Council's Energy and Technology Committee.

7. SPU: improve communication and coordination between SPU and solid waste collection contractors by implementing procedures for identifying timely and accurate

information from the field in order to adapt to operational conditions and meet performance expectations. SPU is requested to provide a progress report on this action item to the Council's Emergency Management and Utilities Committee. The Executive is expected to meet the specific requests outlined in Section 3 to the specified City Council committees no later than November 1, 2009.

Section 4. In addition the items outlined in Section 2 of this resolution, Council requests the Executive to implement the following additional actions beyond the AARCAP to improve future City response efforts to a severe snowstorm event or other emergencies:

1. Adaptive Management: identify training opportunities and ways to institutionalize the importance and significance of adapting to emerging and changing conditions during an emergency or disaster.
2. Require formal communications protocol between Emergency Operations Center (EOC) and City Council: clarify, formalize and develop a mechanism for enabling the City Council to communicate public feedback and concerns to the EOC to inform emergency management decision making.
3. Review Community Notification System (CNS): submit a full report to the City Council on the City's use of the CNS for both internal and external communications since January 1, 2007. This report shall include a summary of all annual costs associated with administering the CNS, the purpose for each authorized use of the system, and any policy, operational or technical barriers or challenges that may prevent the effective use of the CNS during an emergency or disaster.

4. Sidewalk and pedestrian access to government facilities: develop clear procedures and responsibilities in City winter storm response plans to include snow clearing responsibilities for critical government facilities including pedestrian access along bridges.

5. Review of post storm clean-up plans and procedures: evaluate SDOT's post storm clean up procedures and identify policy changes and cost implications for accelerating inspections, sand removal, lane re-striping and other roadway safety related work orders in the future.

The Executive is requested to provide a report on the items listed in Section 4 to the Emergency Management, Environment and Utilities Committees no later than November 1, 2009.

Adopted by the City Council the ____ day of _____, 2009, and signed by me in open session in authentication of its adoption this_____ day of _____, 2009.

_____
President _____of the City Council

THE MAYOR CONCURRING:

_____
Gregory J. Nickels, Mayor

Filed by me this ____ day of _____, 2009.

_____
City Clerk

(Seal)

Exhibit A. Action Report and Corrective Action Plan (AARCAP)

City of Seattle
December 2008 Winter Storm

After Action Report
and
Corrective Action Plan

Exhibit A

PURPOSE

This After Action Report and Corrective Action Plan is intended to document the major impacts resulting from the December 2008 winter storm, the response actions taken by the City and lessons learned.

OVERVIEW

During the month of December 2008 an extended period of severe winter weather struck the Puget Sound region. This resulted in road closures, difficult driving, limited Metro bus service, school closures, business closures, and other impacts.

This was one of the most significant winter storms to strike Seattle.

LIMITATIONS

In order to quickly capture and implement lessons learned, collection of information for this report started soon after major response operations began to wind down and well before the recovery phase had begun. The final tally of property damage, detailed analysis of the exact weather patterns that occurred and complete assessment of the economic impact will not be known for several months. However, with several weeks of winter weather remaining it is prudent to identify, and where possible implement, improvements to City response plans.

Executive Summary

In December 2008, Western Washington experienced one of its most severe winter storms – high wind warnings, snow, ice, and sustained freezing temperatures lasting more than two weeks. The non-stop accumulation of several inches of snow every few days coupled with temperatures that turned compacted snow into ice made for treacherous conditions throughout the region.

The Mayor called for a formal review of departmental operations and as is the City's practice, the Office of Emergency Management compiled the attached after action report and corrective action plan. While there were valiant efforts from many dedicated staff working round the clock to respond to the weather and its impacts on our customers, this event presents us with a test of the City's winter weather response and an opportunity to strengthen our capabilities and improve the outcomes in future events.

The Seattle Department of Transportation used its Winter Storm Response Plan and maintained 24-hour plowing operations with crews working 12 hour shifts including holidays and weekends. Over 1,530 lane miles were plowed and sanded multiple times, however the onslaught of snow on top of rapidly freezing compacted snow and ice inundated the capacity to keep streets passable.

The concurrent impacts throughout the region included severely limited Metro bus service, garbage and recycling collection, and other delivery services. Travelers were stranded at the airport and at bus and train stations; many more were simply forced to stay home.

Based on the experiences of this unusually severe winter weather, the City has committed to increasing the capacity for snow removal and improving a number of other operations.

Since keeping the roads passable mitigates a host of other potential problems, Seattle Department of Transportation has assembled a multi-pronged strategy to fortify their snow removal operations. The City's snow plow fleet will be augmented with two additional plows and contracts initiated for thirteen additional plows. The City's policy on the use of salt has already been revised to allow for its use in strategically prescribed conditions. Metro has committed to assigning a liaison with Seattle Department of Transportation to coordinate traffic operations on critical routes. The additional plowing capability on strategically planned routes coupled with the targeted use of de-icer, anti-icer and salt would be sufficient to keep pace with the conditions experienced in this storm.

The City was fortunate to escape any major traumatic incidents – Fire and Police Departments were capable of handling emergency responses with only minor delays for limited periods during the two weeks. Public Health worked side by side with hospitals and the Emergency Operations Center to keep medical operations on line. The forecasted high winds did not materialize into massive power outages for Seattle City Light customers and the relatively few customers who did experience outages had service restored the same day or soon thereafter. Human Services operated cold weather shelters for the homeless throughout the entire event and were prepared to expand shelter operations at a moment's notice.

The Office of Emergency Management had re-directed a $50,000 State Farm funded public education campaign from a focus on residential seismic retrofit to winter storm preparedness earlier in the year. Local TV, radio and newspapers joined with us in this effort. Though there is no easy way to quantify how many people were better prepared for severe winter weather as a result, certainly the decision to focus on weather preparedness was beneficial.

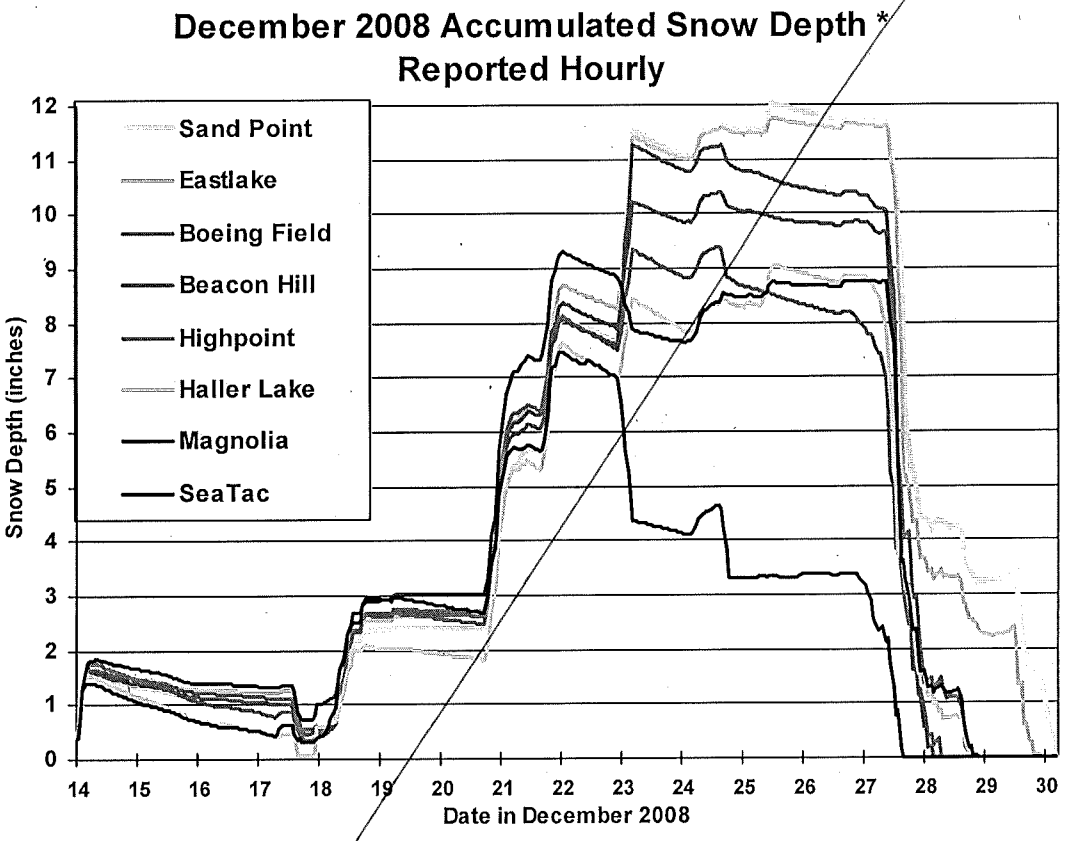
The need, however, persists for more community and neighborhood organizing to knit together human networks of care and compassion. This storm exposed the fragility in many people's lives caused by isolation or interruption to independence provided through case management services. City agencies must continue to partner with other government entities, the private sector, and community-based organizations to build networks of interdependence to increase our overall resiliency.

WEATHER

The Puget Sound region experienced several storms for 14 days starting on December 13th. Freezing temperatures, snow, sleet, freezing rain, heavy rain and high winds presented a significant challenge to responders throughout the region as well as in the City of Seattle.

Seattle ultimately received 11.3 inches of snow between the period of December 13th and the 27th. Typical December snow accumulations average 2.2 inches.

Total number of consecutive hours with snow on the ground was 357 – more than 2 ½ times longer than the most severe storms in the last 20 years.



"The December 2008 snow storm resulted in more consecutive hours of snow on the ground than any other storm in the last 20 years. Only the storm in December 1996 produced a greater amount of accumulated snow. However, the snow from that storm stayed on the ground less than half as long as the snow from the December 2008 storm."
(City of Seattle Office of Policy and Management).

IMPACTS

Deep snow and ice on residential streets and packed snow and ice on primary and secondary snow routes significantly impeded vehicle travel which caused a number of problems:

- Many City streets covered in snow and ice
- Closure of portions of major City streets
- Closed schools
- Closed businesses
- Spot shortages of gasoline supplies and food
- Reduced or canceled public and private events
- Reduced or canceled health care services
- Canceled or significantly reduced public transportation
- Difficulty in obtaining prescription refills or food supplies
- Vehicle accidents
- Delayed garbage pick up
- Heightened risk of ruptured water mains and urban flooding

The Preliminary Damage Assessment for Seattle estimates storm costs at $3,400,056. It includes snow removal, other response costs, power restoration, damaged equipment as well as some property damage. The Small Business Administration has already declared its intent to offer low-interest loans to businesses who incurred revenue or capital loss during the storm.

Fifteen counties, including King, have been declared eligible to receive federal disaster assistance. Additional counties will likely be added bring the total to thirty three.

In short, this was a major storm that significantly impacted the City for two weeks.

DETAILED IMPACTS

Health Care

Local hospitals and other healthcare organizations experienced difficulty in getting staff to and from work and had to implement emergency plans to provide transport with varying degrees of success. Also, some hospitals lack the ability to plow their extensive driveway and parking areas which hindered their operations.

Patients had difficulty getting to and from their scheduled medical appointments. Some dialysis patients, for example, could not get to their dialysis treatments and requested transportation assistance from the Health and Medical Area Command.

Puget Sound Blood Center experienced continual problems with maintaining access to their facility.

Human Services

1. **Food Banks**
   Due to road conditions local food banks had to either shut down or reduce service due to staff inability to get to work and the difficulty delivery trucks had picking up and delivering food.

2. **Vulnerable Populations**
   Many individuals depend on public transportation for accessing food and to obtain prescription refills. Many of the transportation services these individuals depend upon, taxis, Access, bus were either not running or were at a significantly reduced level of operation. Additionally, throughout the City most sidewalks were not shoveled clear which further reduced options for these individuals.

Transportation

1. **Metro**
   On the 18th of December Metro Transit attempted to provide full service during the morning commute. As the snow and ice accumulated the condition of the roadways deteriorated with at least 200 buses getting stuck or delayed on their routes. Half of Metro's fleet is comprised of articulated buses and trolleys that do not perform well in these conditions.

   It should be noted that this impact was countywide covering 39 different jurisdictions which further complicated Metro's problems.

   Bus routes and plowing routes were not well coordinated. Some portions of bus routes are in areas that are not plowed. This impacted the electric trolleys particularly hard because they are dependent on a route determined by overhead wires.

   With so many buses out of service and roads in poor condition Metro was forced to modify its routes to provide service at less than 50% of normal for which it did not have an existing contingency plan. Such planning required effective communication with the buses in the system to determine current conditions and available resources. The Metro radio system has only four channels available which hindered Metro leadership in gaining situational awareness. Metro had already started the process to upgrade their communication system but it is not scheduled to be in place until 2010.

   The result was more passengers than available buses; no tracking of where buses were at any given moment; no coordination of snow plowing with improvised routes; all at a time when more customers were attempting to ride the bus. Many passengers waited in cold and wet conditions for long periods of time for buses that never came. It should also be noted that Metro drivers and

mechanics and other support staff consistently went above and beyond in their efforts to deliver and maintain service during the storm.

2. **Greyhound Bus**
Greyhound was unable to sustain service due to the conditions of the roads and freeways throughout the region. Approximately 40 passengers were stranded at the Greyhound bus station in downtown Seattle. This created a need for sheltering these passengers. With the assistance of the Seattle Police Department, shelter was provided. Later, when the floods closed Interstate 5, Greyhound again requested shelter for its stranded passengers. Seattle Emergency Operations Center and the King County Emergency Coordination Center arranged for the Greyhound passengers to use the regional shelter operated by the American Red Cross in Renton which had been established for flood victims.

3. **Seattle Tacoma International Airport**
The airport experienced numerous cancellations of flights that stranded thousands of passengers over several days. While local passengers could return home others sought shelter in hotels and others elected to stay at the airport. The airport emergency operations center consulted with other centers around the region on how to best shelter their passengers. The airport was able to continue sheltering its passengers on site.

4. **Bus Accident**
On Friday, December 19th, two chartered buses carrying a total of approximately 75 young adults lost control and slid downhill on Thomas Street before crashing through a guardrail at the bottom. The front sections of the two buses were suspended over Interstate 5. Had the buses plunged to the freeway below there could have been many injuries or fatalities. According to initial reports, the bus drivers were attempting to find their way around other streets that were closed due to the icy conditions when they turned on to Thomas Street and immediately lost control.

5. **Roads**
All roads in the City were impacted. Seattle Department of Transportation was unable to clear primary and secondary snow routes of accumulated ice and snow (down to bare pavement) for several days. This severely impacted Metro's ability to maintain service as well as other public or private vehicle movement throughout the City.

In addition, as specified in the Winter Storm Response Plan, Seattle Department of Transportation does not plow side streets or residential streets. Many drivers had difficulty accessing the primary or secondary snow routes from their neighborhoods due to the depth of snow and ice.

Unique to this storm was the duration of the closures; many storms in this region are of short duration or are followed by warming temperatures or rain that contributes to rapid melting. That was not the case in this storm.

Utilities

Seattle Public Utilities was hard pressed to maintain the schedule for collecting solid waste. The poor condition of the roads hindered access to neighborhoods by crews. All collection days were missed at least once and about 42% of the total City service area was missed two weeks in a row. Seattle Public Utilities was only partially successful in notifying customers when their solid waste would be picked up. In some areas only a portion of the customers had their waste picked up which made it difficult to determine who still needed service.

RESPONSE SUMMARY

The Seattle Department of Transportation Winter Storm Response Plan is used to coordinate the City response in a winter storm. Seattle Department of Transportation is the lead department for implementing the plan with the support from other City departments and the City Emergency Operations Center.

National Weather Service (NWS) notified all response agencies of the impending storm on December 11th. NWS provides an online briefing for responders throughout the western Washington area. During the month of December the NWS provided numerous briefings on the storm. The initial briefing called for falling temperatures, high winds and snow.

The City Emergency Operations Center hosted a planning meeting for all departments expected to be involved in the response. The weather forecast was reviewed, each department outlined its preparations for the storm and communication procedures were updated.

Seattle Department of Transportation implemented its Winter Storm Response Plan and transitioned to 24 hour plowing operations with all crews working 12 hour shifts. The plan focuses plowing and sanding efforts on 1,531 lane miles of primary and secondary arterials. This is only a fraction of the total lane miles in the City. The number of lane miles that theoretically can be maintained during a storm is a function of the number of plows and sanders and crews and evolving weather patterns.

Residential and side streets are not plowed or sanded due to the limitation of existing plowing and sanding resources. Also, many streets are too hilly or narrow to be plowed.

Seattle Department of Transportation generally plows to the center of the street to avoid blocking driveways and vehicles parked on the street. This created an additional limitation to drivers attempting to make left turns. Plow drivers have the discretion to plow to the side of the street when advisable.

Seattle Department of Transportation and the Seattle Police Department close streets as needed. Generally, these are hilly portions of arterial streets. At the start of the winter season the "Street Closed" signs are placed in known problem areas. During storms transportation and police personnel close these streets for the safety of the public. In a severe, protracted, widespread storm there may not be enough "Street Closed" signs for the number of streets that might need it.

Seattle Public Utilities activated its Incident Management Team and closely monitored the weather and the water system. Seattle Public Utilities focused on preparing for three contingencies; rupture of water pipes (public water mains or in private homes), urban flooding and solid waste collection. Crews were put on alert to ensure that if those contingencies came to pass the response would be rapid.

Urban flooding did not occur, there were no significant water main breaks and Seattle Public Utilities staff was able to handle calls for service. The primary disruption to service for Seattle Public Utilities was the inability to maintain solid waste collection services due to the road conditions.

Emergency Support Function-6 (Human Services, Mass Care and Shelter) activated its cold weather plan which consisted of opening overnight cold weather shelters, keeping daytime warming areas open (community centers and libraries) and cold weather patrols by Seattle Police Department teams who conduct outreach for the homeless each night checking for hypothermia and offering transportation to the shelters.

Seattle City Light prepared for power outages due to high winds that were predicted in the initial forecast. While the winds did not materialize, City Light maintained increased readiness by monitoring the weather and keeping staff on call. Some outages did occur (largest outage affected 26,489 customers) but they were limited in number and were quickly resolved.

The Joint Information Center, Seattle Department of Transportation, Seattle Public Utilities and Public Health all issued numerous public messages before and during the storm.

Fleets and Facilities transitioned its Fleet Services Department to 24 hour operations, with staff working 12 hour shifts to provide rapid repair and maintenance of responder vehicles with priority provided to plow and sanding vehicles.

The Seattle Fire Department implemented its Cold Weather Procedures to maintain its response capability. Additional EMS vehicles were added. Response times did not degrade significantly; an additional minute was added to the average response time on only one day during the storm.

The Police Department organized its response through a department wide operational plan. This included chaining a percentage of their patrol vehicles ahead of the storm to

ensure service could be maintained when the storm hit. All calls for service were answered however some delays were encountered due to the condition of the roads.

The Emergency Executive Board was convened to review the response to the storm, review the proclamations by the governor and county executive, determine whether there was a need for any emergency executive orders, and to coordinate the response.

The City Emergency Operations Center activated to support and coordinate response operations and recovery in the City. Starting December 11th the EOC maintained a higher state of readiness throughout the storm period using a combination of its assigned Staff Duty Officers (SDO) and/or selected representatives from key departments. Some missions addressed by the City Emergency Operations Center:

- Coordinating assistance for stranded commuters and the homeless
- Arranging for transportation of dialysis patients and critical health care workers
- Coordinating solutions for potential shortages of tire chains and deicer for response vehicles
- Maintaining service at maintenance shops
- Coordinating public information
- Conducting conference calls to address specific issues or coordinate operations
- Arranging for priority plowing at critical facilities
- Providing regular situational updates and weather reports to all departments and other stakeholders
- Arranging transportation for Aging and Disability Services to maintain service
- Coordinating response and recovery operations with King County ECC and State EOC
- Developing and initiating the recovery plan

WHAT WORKED

1. The concerns regarding the time needed to clear the streets of extraordinary volumes of snow and ice should not prevent acknowledging the dedication of the Seattle Department of Transportation crews who worked long hours every day, many over the holidays, for more than 14 consecutive days.
2. National Weather Service provided daily detailed forecasts essential to conducting response planning and operations. The National Weather Service was also available 24 hours a day to answer any weather related questions.
3. Essential public services such as fire, law enforcement and electrical power, were maintained without significant interruption or delay despite the difficult road conditions and low temperatures.
4. Fleet Services providing vehicle maintenance and repair 24 hours per day ensured essential services were maintained during the storm. It is important to note that no Department of Transportation vehicle was unavailable during the storm due to maintenance problems.
5. Auxiliary Communication Service personnel, a volunteer organization associated with the City Emergency Operations Center, volunteered to transport dialysis patients and medical staff. A total of 24 transports were made during the storm.

6. Fleets and Facilities rapidly addressed a growing shortage of tire chains and deicer ensuring response vehicles could continue their missions.
7. The Seattle Police Department's outreach to homeless during cold weather, in conjunction with ESF-6, provides a valuable service that prevents death or injury in cold weather due to hypothermia. Also, the police addressed the shelter issue that had arisen with Greyhound.
8. Metro Transit provided heavy duty tow trucks to assist fire trucks that had become stuck in the snow. This ensured the fire department could maintain services.
9. The City's Emergency Operations Center worked with Public Health Seattle King County through their Health and Medical Area Command to support the needs of the medical community.
10. The City had re-directed a public information campaign grant to focus this year on winter storm preparedness. Called, "Take Winter by Storm," winter preparedness material was made available through local media beginning in October. Though impossible to quantify, certainly more community members were better prepared for this storm as a result.
11. Post storm the City provided an opportunity for feedback from citizens regarding the snow response;
    - A City Council public comment hearing
    - Three community meetings hosted by the Mayor, which attracted a total of fifty five citizens, were held in three different locations attended by the department heads or their designee from each department that had a response role during the storm
    - Hosted a website for online comments

CORRECTIVE ACTION PLAN

Each department with a significant role in the response submitted a Corrective Action Plan. One goal of this report was to as rapidly as possible identify and act on improvements. Some overlap between individual department's efforts is inevitable due to the pace of this process. The Strategic Workgroup will ensure the implementation of the Corrective Action Plan is coordinated, efficient and meets deadlines.

Many of the proposed corrective actions such as research, training, and writing contracts require time to fully implement. Some projects may not be complete until September of this year. However, should another storm strike before all corrective actions are in place, the City is committed to a strategy of implementing as many corrective actions as possible, even on a partial basis. For example, emergency executive authority can be invoked to speed the hiring of plowing contractors on a short term basis.

Until the Corrective Action Plan is completed it will be referenced during the planning and response phases of any winter storm emergency to make use of as many lessons learned as possible.

Seattle Office of Emergency Management

Area for Improvement	Due Date and Solution	Responsibility
Many departments use privately owned four wheel drive vehicles for transporting employees to and from work.	Develop policy to guide departments in how to use this resource which addresses liability and compensation. Due: June 2009	Department of Executive Administration Risk Management Legal Department Strategic Workgroup
The process for keeping City employees updated during a disaster should be reviewed to ensure it provides the information needed in an efficient manner.	Allow City Emergency Operations Center Director to authorize citywide email announcements and provide permission for all Emergency Management Duty Officers to transmit these messages over GroupWise. Due: As soon as possible	Seattle Office of Emergency Management Customer Service Bureau
Health, Hospitals and Emergency Management have varying expectations as to how to organize the transport of healthcare employees and patients.	Develop plan for organizing the transport of employees and patients. Due: June 2009	Seattle Office of Emergency Management Public Health Seattle King County
Department of Transportation received multiple requests for priority plowing to maintain access to critical facilities such as the jail, blood bank, precincts, public transit areas, and hospitals. The list of what should be given priority needs better definition to avoid unrealistic expectations and negative impacts to the implementation of the winter storm response plan.	For the remainder of the winter season maintain list of areas that needed priority plowing in the last storm within the Emergency Operations Center Planning Section and incorporate in the response strategy. Due: Completed Develop list of potential sites, procedures for requesting priority plow services, prioritization methods and a tracking system for ensuring those requests are fulfilled. Due: September 2009	Seattle Office of Emergency Management Strategic Workgroup
Based on lessons learned update essential response information and information required by the Joint Information Center to support the response.	Seattle Office of Emergency Management will develop draft list of information essential for supporting the response and for public messaging. The Strategic Workgroup will review, edit and approve this list. Approved list will be incorporated into response plans. Due: February 2009	Seattle Office of Emergency Management Strategic Workgroup

Identify and document all changes to the Winter Storm Response Plan based on After Action Report and Corrective Action	Update City Plan and Winter Storm Response Plan Due: April 2009	Seattle Office of Emergency Management Seattle Department of Transportation Strategic Workgroup
The EOC did not have sufficient information to maintain situational awareness in a severe snow storm.	Increase the number of information sources . Also, amend EOC standard operating procedure to include discussing human impacts with Customer Service Bureau and 2-1-1 Due: February 2009	Seattle Office of Emergency Management Seattle Department of Transportation Human Services

Seattle Department of Transportation

Area for Improvement	Due Date and Solution	Responsibility
Improve snow related coordination with Metro Transit.	Memorandum of Agreement Identify additional key plow routes. Metro to provide a snowplow and a liaison to Seattle Department of Transportation when necessary. Due: March 2009	Traffic Management Division Policy & Planning Seattle Department of Transportation Emergency Preparedness
Revise road salt policy.	Road salt will be used when at least 4" of snow is predicted, when ice is predicted, when snow is predicted to last more than 3 days, or at the discretion of the director. Due: Done	Director's Office Street Maintenance Division
Institutionalize the early mobilization of the Seattle Department of Transportation Incident Management Team	Revise Winter Storm Response Plan. Due: Done	Seattle Department of Transportation Emergency Preparedness
Develop Winter Weather Response Plans for extreme weather conditions and sustained operations.	Revise Seattle Department of Transportation Winter Storm Plan. Due: April 2009	Street Maintenance Division Traffic Management Division Seattle Department of Transportation Emergency Preparedness
Acquire emergency snow and ice	Identify 13 contractors	Street Maintenance

clearing assistance from private contractors	Due: Done	Division
Upgrade plow fleet to 29 vehicles	Upgrade two new vehicles (already on order prior to storm) to plows. Due: Done	Street Maintenance
Increase Public Information Officer (PIO) capacity during prolonged events.	Augment communications staff with existing resources. Develop a plan to address staffing needs for extended periods of 24-hour operations Due: July 2009	Communications Office Director's Office
Improve situational awareness; Utilize Traffic Management Center (TMC) resources.	Provide for monitoring of traffic cameras at the Charles Street Operations Center. Increase TMC staffing during weather events and deploy inspectors to the field to gauge road conditions. Due: September 2009	Traffic Management Division Street Use Division Street Maintenance Division
Reduce crew fatigue during prolonged events.	After four days of 12 hour shifts, assign crews to 8 hour shifts while maintaining 24-hour operations. Train additional personnel to operate snowplow equipment. Due: Done	Street Maintenance Division
Increase public awareness about the need to clear snow from public, business and government owned sidewalks.	Coordinate messaging with the Office of Emergency Management. Incorporate into communications materials. Due: September 2009	Communications Office Seattle Department of Transportation Emergency Preparedness Seattle Office of Emergency Management
Utilize technology to improve the efficiency of snowplow operations.	Study the cost and feasibility of a GPS tracking system for the winter storm fleet. Utilize this information to adjust resources in real time Due: March 2009	Street Maintenance Division
Pursue an agreement with Washington State Department of Transportation for emergency access to snow and ice clearing supplies when necessary.	Memorandum of Agreement Due: July 2009	Street Maintenance Division

Fleets and Facilities Department

Area for Improvement	Due Date and Solution	Responsibility
Improve city departments' access to 4x4 vehicles to better support their mission during winter storm events.	Identify 4x4 vehicles currently in the City fleet available for loan to other departments in an emergency. Due: March 2009 Explore vehicle options with departments following existing Fleet policies that would meet departments' operational objectives during winter storms. Due: April 2009	Fleet Services Strategic Workgroup
Clarify existing department policy/procedure for lodging critical staff.	Research and develop a departmental policy for identifying essential staff, conditions required for providing lodging, etc. Due: June 2009	Human Resources Fleets Services and Facility Ops
Improve communication with departmental staff and EOC regarding fuel supply status on fueling sites and emergency generators.	Develop Fuel Status Report for fueling sites that can be uploaded onto internet site. Due: March 2009	Fleet Services and Facility Ops
Address cold weather impacts on biodiesel and Seattle Public Utilities generator fueling needs.	Evaluate timing of introduction of seasonal additives to biodiesel fueling stations. Due: March 2009 Work with Seattle Public Utilities to revise, as necessary, protocols for maintenance of pony tanks and refueling generator tanks. Due: June 2009	Fleet Services Seattle Public Utilities
Ensure adequate supply of parts for sanders and snow plows in periods of extended use of equipment.	Reassess parts inventory and restock critical parts for the remainder of this winter. Due: March 2009 Develop SOP/checklist for assessment of parts inventory prior to each winter season. Due: March 2009	Fleet Services

Develop alternatives for chain up of police department vehicles, in the event vendor unable to perform effectively.	Develop internal fleet alternatives to be incorporated into SOP/Checklist. Due: March 2009	Fleets Division Seattle Police Department
Improve knowledge and skills of vehicle operators for driving and operating vehicles in snow and ice.	Provide annual pre-winter reminder to departments regarding installation of chains and winter driving technique. Due: March 09 Provide additional training to other city department staff as needed for chain-up Due: On-going	Fleet Services, other City depts.
Improve methods for facility assessments during emergency conditions.	Establish process to secure necessary professional and engineering expertise to supplement skilled trades, as needed, to assess condition of buildings. Due: September 2009	Facility Operations
Evaluate appropriate amount of equipment and supplies to keep on hand for efficient removal of large quantity of snow around facilities.	Acquire better quality snow shovels for staff to use. Due: September 2009 Identify alternative measures for snow removal at facilities if vendor is unable to perform contractual obligations. Due: March 2009	Facility Operations
Improve methods for allocating and securing critical supplies, which may become difficult to obtain locally during a snowstorm.	Develop plan/checklist to inventory and secure relevant supplies each fall. Due: September 09 Develop plan to review facilities and pre-position critical supplies each fall. Due: September 2009	Fleet Services and Facility Operations, other departments
Clarify policy/procedures for activating emergency shelter caches.	Develop threshold for activating emergency shelter caches. Due: March 2009 Organize tabletop exercise to test the activation of caches. Due: September 2009	Fleets and Facilities, Department of Parks and Recreation Humans Services Department

Human Services Department

Area for Improvement	Due Date and Solution	Responsibility
The Human Services Department provides in-home case management services for thousands of vulnerable clients; however, by the third day of the snow and ice some case management workers were unable to access clients. A solution was offered by Fleets and Facilities finding two 4x4 vehicles to loan to case workers until the roadways were again passable with ordinary vehicles.	Secure chained or all wheel drive vehicles for use by key case management workers to reach critical clients through an agreement with Fleets and Facilities Department or outside resource. Due: August 2009	Human Services Department ADS Case Management Manager Fleets and Facilities Department Strategic Workgroup
People who became homebound by the weather conditions and were not receiving case management services were not able to procure food and medicines as the snow event continued to limit the mobility of independent but more vulnerable populations.	Work with Public Health, ADS, 2-1-1 and other partners to develop a plan of response so that people who become homebound in a disaster are able to have critical basic needs met. Continue to develop and provide public education to raise awareness of the issue and increase personal and community preparedness. Due Date: On-going Develop a proposal for a volunteer coordinator to launch and manage a volunteer Citizen Corps Council. Due Date: August 2009	Human Services Emergency Management Planner and ESF-6 Coordinator
Had the EOC been activated for a longer period of time, HSD would have needed more trained backup staff in their emergency response team.	Train all Human Services Department staff in what their role is in an emergency and build the depth of the Human Services Department Emergency Response Team. Due Date: December 2009	Human Services Emergency Management Planner and ESF-6 Coordinator
The City Hall and Seattle Center severe weather shelter sites had to close at 5:00 a.m. each morning, due to provider operating requirements. The early closure results in people being moved out into the cold before alternative facilities are open.	Investigate whether arrangements can be made to open other facilities in the early morning. Due Date: August 2009	Human Services HIBGA Division Director
The snow storm and later floods left	Work with Greyhound and Amtrak to	Human Services DVSAP

many stranded travelers in Seattle. Greyhound did not have a plan to care for travelers that were stranded for an extended period.	review their plans to assist stranded travelers. Due Date: August 2009	Division Director Human Services Emergency Management Planner and ESF-6 Coordinator
The Frye shelter for women exceeded normal capacity, particularly when Tanya's Room, a regular women's shelter, could not open due to staff being unable to get to the shelter. This resulted in 25 women's beds not being available. While everyone seeking shelter received it, the increased need put additional pressure on the Frye severe weather shelter.	Investigate whether the capacity for severe weather shelters needs to be expanded, particularly for women, and continue to work with shelter agencies on their ability to remain open. Due Date: August 2009	Human Services HIBGA Division Director

Joint Information Center

Area for Improvement	Due Date and Solution	Responsibility
The Joint Information Center shall explore emerging online communications technologies to ensure City communications are consistent with customer media consumption patterns.	Establish a policy and procedure for communicating with customers through new online technologies. Due: June 2009	Mayor's Communications Director
The Joint Information Center shall establish appropriate vendor relationships to ensure American Sign Language interpretation is available for press conferences held during activations.	Establish vendor relationships to provide American Sign Language interpretation. Due: February 2009	Mayor's Communications Director
Many citizens found it difficult to determine what City offices/services were open or available and their hours of operation; courts, neighborhood service centers, libraries etc.	Include in effort to deliver information through one location on the City web. Due: July 2009	Mayor's Communications Director ESF-15 Coordinator SDOT Communications Officer
The Joint Information Center was activated only during times of most need with departments covering public messaging when it was not activated. This made coordination difficult.	City strategy will now favor Joint Information Center activation to ensure coordinated and effective response messaging. Not activating the Joint Information Center will be considered an exception to that strategy. The Emergency Operations Center Director will issue coordinating instructions for public messaging to all departments in those instances where the Joint	Seattle Office of Emergency Management ESF-15 Coordinator

	Information Center is not activated Due: Completed	
With plowing the main tactic for resolving the challenge posed by the snow, the City should better describe which streets have been plowed and when. Many citizens complained their street had not been plowed when in fact it had been several times.	Participate in the Strategic Workgroup process to define essential information required by the Joint Information Center. Due: February 2009	Mayor's Communications Director ESF-15 Coordinator SDOT Communications Officer
The Joint Information Center shall establish a "one stop" information page/portal at www.seattle.gov that aggregates relevant incident specific information across departments.	Work with the citywide web team to identify appropriate content and create page/portal. Due: July 2009	Mayor's Communications Director ESF-15 Coordinator

Seattle Parks and Recreation

Area for Improvement	Due Date and Solution	Responsibility
Had the EOC been activated for a longer period of time, Parks would have needed more trained EOC responders.	Identify and train additional Parks employees as EOC responders and increase the capacity of the Parks EOC Responder Team. Due: December 2009	Parks Emergency Management Director
Training: prior to winter season, conduct annual winter weather response exercises with staff to communicate clear expectations and clarify severe weather staffing assignments and responsibilities. Provide information to staff on METRO bus snow routing response and contact info.	Assign Division Managers and Parks EMC to conduct annual winter storm response and staffing plan preparedness training. Due: October 2009	Parks Emergency Management Director

Seattle City Light

Area for Improvement	Due Date and Solution	Responsibility
Slightly increase the number of four wheel drive vehicles available within the Department for passenger travel.	Seattle City Light will replace three of these vehicles with four-wheel-drive vehicles during our normal vehicle replacement cycle for 2009. Due: March 2009	Security and Emergency Management Director Fleets and Facilities Department Strategic Workgroup
Seattle City Light and Seattle	Seattle City Light, Department of	Customer Care Director

Public Utilities continue to receive comments about their jointly operated Call Center indicating that some calls have been dropped or routed incorrectly.	Information Technology and Seattle Public Utilities are investigating the complaints about the Outage Hotline to determine the problem and select a corrective action. Due: February 2009	Seattle Public Utilities Call Center Manager

Seattle Public Utilities

Area for Improvement	Due Date and Solution	Responsibility
Solid Waste. Communication between SPU and the solid waste collection contractors was, on occasion, not timely and accurate enough to ensure that field conditions were clearly conveyed to Seattle Public Utilities management staff for assessment and decision support.	Develop and implement a procedure for collecting, verifying, and reporting operational condition information to managers; include a process for explicitly sharing information between Seattle Public Utilities and the solid waste contractors regarding: 1) Seattle Public Utilities objectives and expectations; and 2) contractor capabilities, safety concerns, and performance. Due: March 2009	Solid Waste Director Collection, Processing & Disposal Manager
Solid Waste. There were some inconsistencies in information between the Seattle Public Utilities Solid Waste web page, the Call Center, and ORC regarding pickups.	Route all information through a single Seattle Public Utilities process for vetting by the critical stakeholders, Incident Commander and the Public Information function prior to making it available to the various Seattle Public Utilities customer-contact outlets. Due: March 2009	Solid Waste Director Communications Public Utilities Emergency Management Coordinator
Solid Waste. Messaging to the general public regarding adjusted solid waste pickup schedules was, at times, unclear, inconsistent, or overly-optimistic.	Route all public information through a single Seattle Public Utilities process for vetting by the Incident Commander and the Public Information function prior to releasing to the public. Due: March 2009	Solid Waste Director Communications Public Utilities Emergency Management Coordinator
Solid Waste. Current methods for communicating to the general public did not allow for timely and focused dissemination of information regarding changes in pickups routes/schedules in the face of changing weather, street conditions, and contractor capabilities.	Investigate Seattle Public Utilities capability for accessing alternative, real-time methods for disseminating information to the public, including: out-dialer, community blogs, web sites, media feeds, etc. Develop and implement a procedure to make maximum use of real-time public communication channels.	Solid Waste Director Communications Public Utilities Emergency Management Coordinator

	Due: June 2009	
Drainage and Wastewater. Lack of flexibility in activating the Urban Flooding Plan.	Update Urban Flooding Plan to reflect current technological improvements in work scheduling and tracking. Review and revise criteria (as necessary) for plan activation. Due: March 2009	Drainage & Wastewater Public Utilities Emergency Management Coordinator
Drinking Water. Lack of flexibility in activating the Winter Freeze Plan.	Update Winter Freeze Plan to reflect current technological improvements in work scheduling and tracking. Review and revise criteria (as necessary) for plan activation Due: March 2009	Water Operations. Public Utilities Emergency Management Coordinator
Seattle Public Utilities. Identification of priority facilities for plowing/snow clearing.	Develop list of Seattle Public Utilities facilities that should be priority for plowing or snow clearing for access. Due: June 2009	Public Utilities Emergency Management Coordinator Strategic Workgroup

Seattle Fire Department

Area for Improvement	Due Date and Solution	Responsibility
Many Administrative Staff personnel could not make it in to work or had difficulty because of a lack of 4-wheel drive vehicles.	Secure 4-wheel drive vehicles for use by critical Administrative positions through an agreement with Fleets and Facilities. Due: February 2009	Fleets and Facilities Fleet Manager Strategic Workgroup
Immediately accessible winter supplies.	Establish a greater minimum inventory of winter supplies (chains, deicer, ice melt. Due: July 2009	Support Services Lieutenant
Reduce time and labor required for putting together tire chain caches.	Palletize and shrink wrap tire chains for quick access and transportation to Battalion Headquarters. Support Services to explore with Fleets and Facilities Fire Garage. Due: April 2009	Support Services Captain and Fleet Manager
Ability to safely distribute	Provide the type of support vehicles	Chief of Staff/Resource

equipment and supplies on a 24-hour basis to fire stations and emergency scenes.	necessary to respond to all types of natural and manmade transportation challenges. Due: April 2009	Management

Seattle Police Department

Area for Improvement	Due Date and Solution	Responsibility
Plowing: Precincts encountered minor problems with snow removal specifically ensuring that when parking lots are plowed by contractors that snow is moved away from as opposed to towards the parked patrol vehicles.	Work with Fleets and Facilities to better define expectations for contractor performance Due: September 2009	Homeland Security Bureau Fleets and Facilities Department
Officers encountered problems getting prisoners into King County Jail due to the road conditions around the jail entrance. Officers had to walk prisoners into the jail. The entrance is located on a steep hill and during a significant snow event plows may not be able to maintain access.	Seattle Police Department will meet with the King County Jail staff to develop a plan for access during snow events. Due: March 2009	Homeland Security Bureau Seattle Department of Transportation
Signage: Precincts and Traffic Section both ended up delivering signage to neighborhoods because Seattle Department of Transportation was overwhelmed with other demands.	Review policy for who is responsible for providing signs to neighborhoods and store adequate signage at the precinct and Traffic Unit. Due: September 2009	Homeland Security Bureau Seattle Department of Transportation
Vehicle Needs: Officers encountered problems accessing certain parts of the City in patrol vehicles that did not have All Wheel or 4-Wheel Drive.	Identify vehicles with all-wheel or 4-wheel drive from City Fleet that can be loaned to Precinct for use during snowstorms. Develop policy for deployment of vehicles in the event of major snowstorms. Due: September 2009	Homeland Security Bureau Fleets and Facilities Fleets Manager Strategic Workgroup
Tracking street closures	SPOC has developed an Excel spreadsheet that will enable 911 radio dispatchers to track street closures and	Homeland Security Bureau

	then report those to SPOC. This process has been completed and is now ready to be implemented under circumstances requiring it. The list of routine street closures will be reviewed following every event. Due: Completed	Strategic Workgroup
Preparation before the storm	Ensure that the Precincts have a sufficient supply of rock salt and other snow/ice removal aids prior to snow. Ensure that the Precincts' Winter Storm Response Plan are current and that all Precincts have a copy of the City's Winter Storm Response Plan. Due: February 2009	Homeland Security Bureau

Public Health Seattle and King County

Area for Improvement	Due Date and Solution	Responsibility
The Department lacked sufficient plans to enable essential staff to get to and from work and to field operation sites.	Develop emergency transportation plans to enable essential staff and volunteers to get to and from work and field operation sites. Due: September 2009	Public Health Preparedness/CPRE
Some essential staff were unable to get home from the downtown Seattle area after their shifts and had to remain overnight at the Chinook Building to enable sufficient staffing for Area Command and critical department functions.	Develop housing plans to temporarily lodge critical department staff in Seattle downtown core. Due: September 2009	Public Health Preparedness/CPRE
Healthcare Workers and patients had difficulty getting to and from work/points of care.	Work with local emergency management, healthcare organizations and the private sector to develop critical personnel/patient transport strategy and identify necessary resources. Due: June 2009	Public Health Preparedness, King County Healthcare Coalition, Seattle Office of Emergency Management

Situation status updates from healthcare organizations varied in frequency and content.	Develop standardized healthcare organization status reporting template and institute routine reporting timeframes. Due: September 2009	Public Health Preparedness and King County Healthcare Coalition

Customer Service Bureau

Area for Improvement	Due date and solution	Responsibility
CSB's emergency response plan calls for CSB to provide a regular call summary to the EOC. CSB staff did not provide a summary during the snow storm.	Review emergency response plan with staff at monthly staff meeting. Due: Completed	Customer Service Bureau

SUMMARY

The December 2008 Winter storm presented significant challenges to the City of Seattle and the region. The central strategy in any Winter Storm Response plan involves clearing the roads of snow and ice. How long that takes depends on the following factors:

- The number of plows and sanding trucks
- The use of chemicals, including salt
- Sufficient staff to operate snow removal equipment 24 hours per day
- A plan that identifies which streets will be plowed and those that won't
- The weather

In the December storm the region experienced a rare snow event that delivered a significant amount of snow accompanied with an extended period of below freezing temperatures which ensured the snow and ice were not going to melt quickly.

In the battle to clear the streets the Seattle Department of Transportation attacked the snow with all of the resources it had under its control. At no point in this analysis has information been revealed that Seattle Department of Transportation failed to put all of its vehicles on the road. It was also able to gather sufficient staff to operate those vehicles continuously for 14 days. Seattle Department of Transportation followed its plan which calls for plowing and sanding efforts at identified primary and secondary arterials only.

The Winter Storm Response plan and equipment are capable of handling most Seattle winter storms; typically not a lot of snow, followed by increasing temperatures and rain which results in short duration events. The severity of this series of storms simply exceeded the ability of the Seattle Department of Transportation plan and resources to address it.

Complaints regarding the performance of the Seattle Department of Transportation during the storm consist of three issues:

- Use of Salt
- Types of plow blades
- The result of all snow and ice removal techniques should have created roads conditions passable to vehicles equipped for winter driving (4x4's, snow tires, chains, and responsible driving)

Salt was abandoned as a de-icer in the 1990's. Seattle Department of Transportation follows best practices regarding salt as outlined in the Regional Road Maintenance Program. It has already amended its policy of use salt in certain conditions, i.e. when 4 inches of snow are forecast, when ice is forecast, or when the duration of the snow or ice is predicted to last more than 3 days. The Seattle Department of Transportation Director also can authorize the use of salt at their own discretion on arterials, hills or hospital access.

The use of steel or carbide plow blades carry the significant risk of causing substantial damage especially to asphalt covered streets, which is on most streets. It should also be noted that many other cities in the region do not use steel or carbide plow blades for the very same reason. The rubber cutting edges deployed in the plow fleet are both effective in clearing snow and protecting asphalt road surfaces. But Seattle Department of Transportation does use steel blades where it makes sense to do so, i.e. on concrete structures. The future use of salt in combination with increased plowing capability should be more effective under extreme weather conditions.

The bottom line lesson is that regardless of the round-the-clock dedication of the full fleet of resources and regardless of the number of times roads were plowed over two weeks, many streets in the City and region remained impassable to vehicles other than 4x4's. This had cascading impacts. Seattle and neighboring cities could not cumulatively maintain passable routes for Metro buses and this too cascaded into problems for passengers who were trying to buy groceries, fill prescriptions, get to work and shop for the holidays, etc.

The primary strategy to address streets covered with ice and snow consisting of a combination of plowing, sanding, and the application of chemicals to counter ice has been revised to include the use of salt and the hiring of contractors. Also essential to the response is adequate preparation on the part of the public to mitigate the impacts.

This plan provides for a number of enhancements to the existing capability to clear the streets. Expanding the number of plows to 29, having agreements in place to hire contractors, a clear policy on salt application and close coordination with Metro Transit increases confidence in the ability of the City to, at minimum, keep primary routes open during a storm similar to the one experienced in December of 2008. It will permit the movement of vehicles, and especially buses, with greater efficiency provided those vehicles are prepared for winter driving.

Every winter storm is different. The solution is to adjust to the conditions sooner in anticipation of these conditions and apply strategies adaptable to the conditions. Seattle Department of Transportation has committed to doing exactly that in their operations. The salt use policy has already been amended, the use of private contractors has set a good example, and the purchase of equipment in the future that can be pressed into storm response service is being incorporated into department plans. The EOC will learn from this event to focus on the bigger picture and try to help solve the problems that cause cascading problems through its advanced planning function. The Mayor's Emergency Executive Board will be assembled earlier during events to assure city-wide executive support and coordination focused on these solutions.

The city-wide ESF-15 (External Affairs and Public Information) team will investigate methods to more effectively get real-time useful information into our customers hands

whether that's estimated date of solid waste collection, transportation detours or any other critical service.

The storm response crews and emergency workers throughout the City demonstrated remarkable dedication in their efforts to combat record-breaking conditions. Their dedication will be further demonstrated by making the improvements to our collective response identified in this report.