

Ramsey-Washington Metro Watershed
District - June 2005

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Street Sweeping – Report No. 2 Survey Questionnaire Results and Conclusions

Ramsey-Washington Metro Watershed District

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Executive Summary

The Street Sweeping Project is organized into the following three reports:

1. Street Sweeping – Report No. 1, State of the Practice
2. Street Sweeping – Report No. 2, Survey Questionnaire, Results and Conclusions; and
3. Street Sweeping – Report No. 3, Policy Development and Future Implementation Options for Water Quality Improvement

The reports are the information base for the Ramsey-Washington Metro Watershed District to advance efforts to improve water quality within its jurisdictional boundaries. In addition, the reports serve as an education tool for members of the Ramsey – Washington Public Works Forum and other public works staff within Minnesota and across the United States and Canada. The Ramsey-Washington Public Works Forum is a monthly discussion group focused on increasing communications and collaboration related to stormwater quality improvement concerns of the city and county governments within the Ramsey-Washington Metro Watershed District.

Street Sweeping – Report No. 2, Survey Questionnaire, Results and Conclusions summarizes and analyzes the 120 responses to a WEB-based survey of 16 questions soliciting public works practitioners in local governments across Minnesota, other states and Canadian provinces. Report No. 2 was developed to augment the Ramsey-Washington Metro Watershed District (RWMWD) report: Street Sweeping - Report No. 1, State of the Practice. It also provided additional information for establishing future policy recommendations within Report No. 3. The survey response file of 120 local governments was divided into two groups: 57 Minnesota respondents (47.5%) and 63 Greater U.S./Canada respondents (52.5%) in 32 states and four Canadian local governments. The 57 respondents from Minnesota governments included 53 cities or 6.2% of cities statewide.

Survey results from Question #7 indicate a wide disparity by Minnesota respondents in street sweeping equipment type (mechanical brush vs. regenerative-air or vacuum) usage with respect to the local governments in other states and Canadian provinces. When looking at all sweepers in use by local governments, the mechanical brush sweeper is much more common in Minnesota (70%) versus Greater U.S./Canada (41%). In addition, Minnesota respondents are twice as likely (61.8% versus 30.2%) to use mechanical brush sweepers only, rather than vacuum or regenerative-air sweepers. However, the reverse is true, within the Greater U.S./Canada group where vacuum or regenerative-air are nearly twice as likely to be used (69.8% versus 38.2%) than mechanical sweepers only.

Results of street sweeping frequencies from Question #9 contrasted significantly between the two groups. Minnesota respondents swept streets at a twice (2x) per year frequency (response range of 58, 62 and 72% of the respondents for arterial streets, commercial/industrial areas and residential areas). Adding the three - six times per year frequency percentages reflects a combined response of 84, 81, and 95% for these areas. With response percentages of 76, 66 and 76%, the Greater U.S./Canada respondents swept arterial streets, commercial/industrial areas and residential areas: three - six times, more frequently than three – six times per year or biweekly. For Central Business Districts, sweeping frequency differences continued with 75% of Minnesota respondents sweeping twice, three – six times or more frequently per year. In contrast, the Greater U.S./Canada respondents reflected 86% either swept more frequently than three – six times per year, biweekly or weekly.

Within both groups, handling leaves is distinctly different. More than 75% of the respondents in both groups conduct normal sweeping operations. However, with respect to a specific leave collection and pick-up program, Minnesota respondents were much more likely (36% versus 16%) to request or require residents to bag and take leaves to a city or county compost facility. In contrast, the Greater U.S./Canada respondents request or require residents (43% versus 16%) to bag leaves for a collection program. Thus, having a separate bag and collection program for leaves may cause the Greater U.S./Canada group to use specialized pick-up equipment (41% versus 14%) than Minnesota local governments.

Both the Minnesota and Greater U.S./Canada groups rate keeping materials out of the storm sewer system as important to very important (96 – 98%). However, both groups indicate street sweeping when part of a Phase I or II permit requirement (87 – 83%) is least important as a reason for the program.

A majority in both groups (62% versus 57%) would increase street sweeping frequency with adequate funding if it resulted in improved water quality. Response results are similar to Question #2 with both groups showing slight skew to their distributions. For the Minnesota respondents, fifty percent (50%) of the local governments have street-sweeping expenses between \$50,001 – \$250,000 per year with forty percent (40%) falling within an expense range of <\$10,000 to \$50,000. For the Greater U.S./Canada respondents, fifty percent (50%) of the local governments had expenses within the range of \$100,001 to >\$1,000,000 with twenty-three percent (23%) of the respondents falling within the \$250,000 - \$500,000 expense range. Similar to the Minnesota group, thirty-four percent (34%) of the respondents had annual street and roadway expenses from <\$10,000 - \$50,000.

Introduction

The Street Sweeping – State of the Practice Survey was an effort to solicit information on this maintenance practice from local government staff both within and outside the state of Minnesota. The survey had two purposes:

1. To augment existing information contained within the Street Sweeping – Report No. 1, State of the Practice, and
2. Provide information in support of Street Sweeping - Report No. 3, Policy Development and Future Implementation Options for Water Quality Improvement for the Board of Managers of the Ramsey-Washington Metro Watershed District and its local governments.

The survey was developed using a WEB-based program and site called Survey Monkey (<http://www.surveymonkey.com>). The survey was designed to solicit information reasonably available by most local government public works practitioners and not take more than 10 to 15 minutes to complete.

The survey focused on the following topics:

- Geographic location
- System street or roadway miles
- Population and ZIP or Postal Code
- Labor and equipment used
- Street sweeping frequency by area
- Leaf pick-up programs
- Street sweeping importance
- Street sweeping measurement objectives
- Street sweeping expenditures

Topics that are more technical or issues shown below were purposely avoided as being somewhat more difficult to answer quickly or more suitable for future follow-up:

- amount (cubic yards or tons) of materials removed by street sweeping,
- street sweeping equipment efficiency,
- street sweepings characteristics (organic, inorganic, gradation, etc.),
- street sweepings disposal or recycling, or
- demonstrated water quality improvements.

Conclusions

Overall Survey

1. A WEB-based survey was completed, during a month-long period [January to February 2005] asking 16 questions of public works staff on the street sweeping state of the practice.
2. A filtering effort for errors and duplications produced a usable file of 120 respondents of local governments in 32 states and 4 Canadian provinces. Most respondents were represented from Minnesota [53 (44.2%)] resulting from the solicitation method, followed by six each from California (5%) and Illinois (5%) and smaller numbers from other locations.
3. More than half (54.1%) the respondents were represented by directors of public works, street superintendents, and public works superintendents.
4. Nearly half (47.5%) the respondents represented local governments of 25,000 to 100,000 population with the majority (56.7%) maintaining 100 – 500 miles of streets or roadways.
5. Three-quarters (77.5%) of the respondents use city or county equipment or labor to conduct street sweeping operations with a similar percentage (71.7%) using brush mechanical sweepers.
6. Sweeping of sediment accumulation areas three to six times per year was identified by 44% of the respondents with the next highest level being residential areas at a twice per year frequency by 41%.
7. Most respondents (82.5%) performed a fall sweeping, usually as a normal operation (73.3%). None of the specific leaf pick-up programs were identified by a majority of respondents.
8. While keeping materials out of the storm water system was the most important reason for three-quarters of the respondents. Nearly all felt (89.7%) observed street or roadway cleanliness was the best method to determine if the sweeping program was meeting objectives.
9. Street sweeping expenditures nearly followed a normal distribution with the highest response level for 24.8% being \$50,000 to \$100,000 per year.

Minnesota and Greater U.S./Canada Groups

1. The survey respondent population was divided geographically in two nearly equal groups as follows: Minnesota, 57 respondents (47.5%) and Greater U.S./Canada, 63 respondents (52.5%).
2. Minnesota respondents were somewhat more likely from smaller governments (10,000 – 25,000) and conversely within the Greater U.S./Canada distribution, somewhat more likely from larger local governments (50,000 – 100,000).
3. The majority of local governments in both groups (70% versus 85.7%) use their own equipment and labor. However, Minnesota respondents use private (equipment and labor) contractors (26.5%) at a higher percentage to conduct street sweeping operations than the Greater U.S./Canada respondents (3.2%).
4. With respect to all sweepers used by local governments, the mechanical brush sweeper is more common in Minnesota (70%) versus Greater U.S./Canada (41%). Minnesota respondents are twice as

likely (61.8% versus 30.2%) to use mechanical brush sweepers only rather than vacuum or regenerative-air sweepers. However, the reverse is true, within the Greater U.S./Canada group who are nearly twice as likely (69.8% versus 38.2%) to use vacuum or regenerative-air sweepers than only mechanical brush sweepers.

5. The majority of Minnesota respondents swept arterial streets (58%), commercial & industrial areas (62%) and residential areas (72%) at a frequency of twice per year. Central Business Districts were swept by a majority of Minnesota respondents (64%) at rates of either twice per year (39%) to three – six times per year (25%).
6. With respect to arterial streets, more than half the respondents (52%) either swept more frequently than three - six times per year or biweekly. Commercial/industrial areas reflected a range of sweeping frequencies by a majority of respondents: three – six times per year by 28%, weekly by 23% or more frequently by 21%. Higher sweeping frequencies were seen in residential streets with 56% of the respondents indicating either three - six times per year or more frequently. Central Business Districts were swept by the Greater U.S./Canada respondents at higher frequencies with 86% of the respondents sweeping weekly (37%), “more frequent” than three – six times (31%) or biweekly (18%).
7. With respect to leaf pick-up programs, three quarters of the respondents in both groups conduct normal sweeping operations. Minnesota respondents (36% versus 16%) are more likely to request or require residents to take their leaves to a city or county compost facility. In contrast, the Greater U.S./Canada respondents are more likely (43%) to request or require their residents to bag leaves for a collection program than the Minnesota group (16%). The Greater U.S./Canada group is more likely (41% versus 14%) to have special equipment for leaf pick-up.
8. Both the Minnesota and Greater U.S./Canada groups rate keeping materials out of the storm sewer system as important to very important (96 – 98%). However, both groups indicate street sweeping as part of a Phase I or II permit requirement (87 – 83%) was the least important reason for the program.
9. Overwhelmingly, both groups (95% versus 81%) identify “observed street or roadway cleanliness” as the method the city or county determines its street sweeping program was meeting objectives.
10. A majority in both groups (62% versus 57%) would increase street sweeping frequency with adequate funding if it resulted in improved water quality.
11. The Minnesota distribution reflects 49% of the local government respondents have street-sweeping expenses between \$50,001 – \$250,000 per year. Forty percent (40%) fell within an expense range of <\$10,000 to \$50,000. Fifty percent (50%) of the Greater U.S./Canada local government respondents had expenses within the range of \$100,001 to >\$1,000,000. Twenty-three percent (23%) of the respondents fell within a higher expense range of \$250,000 - \$500,000.

Methods

The survey included sixteen (16) questions as shown in the questionnaire included in Appendix A. Two public works communities were solicited, a target Minnesota group and a broad national and international (Canada) group. The first group was an email solicitation request sent to approximately 300 members of Minnesota Public Works Association (Minnesota Chapter of American Public Works Association, APWA). The second group was sent a similar email solicitation posted on four APWA infoNOW (Information and Networking on the WEB) communities (<http://www.apwa.net>). Specific APWA infoNOW communities solicited were *Environment, Management, Administration & Finance*, and *Operations*. Both groups were sent a similar email request:

“I would appreciate if you or the appropriate staff person could take a short amount of time to fill out this questionnaire on street sweeping. Simply hit the following link, <http://www.surveymonkey.com/s.asp?u=33222765774>. Thank you and please excuse any email duplications. This message was sent to several APWA - infoNOW communities”.

The WEB-based survey was implemented on January 4-6, 2005 for both groups. Response to the survey was purely voluntary and respondents were anonymous, except for identifying their respective job position category, state and ZIP code. The Survey Monkey questionnaire was open for approximately 30 days for respondents to use with a closure date of February 4, 2005.

Upon closure, the Survey Monkey program provided basic statistics for preliminary review such as: total number of respondents, percent distribution of question responses and bolding of the major percent response for each question. Summary statistics were immediately available for viewing. In addition, Survey Monkey has the capability to permit downloading of the results in an Excel[®] format.

Results – Overall Survey

The questionnaire had 138 respondents following its closure. An initial filtering step was performed on the file results removing duplications from the same local governments or blank responses. The filtering effort reduced the file to 120 responses.

Appendix B is a copy of the Survey Monkey overall results for the 120 respondents. Highlights of the results are as follows:

Question #1: More than half (54.1%) the respondents are represented by directors of public works, street superintendents, and public works superintendents.

Questions #2 and #3: Nearly half (47.5%) the respondents are within local governments of 25,000 to 100,000 population with a majority (56.7%) having 100 – 500 miles of streets or roadways.

Question #4: Staff from 32 states and 4 Canadian provinces provided responses. Most were represented from Minnesota [53 (44.2%)], six each from California (5%) and Illinois (5%) and smaller numbers from other locations.

Question #6: Three-quarters (77.5%) of the respondents use city or county equipment and labor to conduct street sweeping operations.

Question #7: Nearly three-quarters (71.7%) of the respondents use mechanical brush sweepers.

Question #9: Respondents indicated the following areas are swept more frequently than once per year.

- **arterial streets** – twice or three – six times per year 53% of the respondents;
- **commercial/industrial areas** – twice or three – six times per year by 59% of the respondents;
- **residential areas** – twice or three – six times per year by 68% of the respondents;
- **central business district** – more frequently than three – six times per year or weekly by 50% of the respondents;
- **areas near lakes, rivers and streams** – twice or three - six times per year by 59% of the respondents; and
- **sediment accumulation areas** - three - six times per year or more frequently by 66% of the respondents.

Question #10: Fall sweeping was conducted by 82.5% of the respondents. performed fall sweeping while most often (73.3%) this was a normal sweeping operation.

Question #11: With respect to leaf pick-up programs, 73.3% of respondents conducted a normal sweeping operation while there was a nearly even distribution among other programs (i.e. residents taking leaves to compost facilities, leaf pick-up or using specialized equipment).

Question #12: Three-quarters (75%) of the respondents considered keeping materials out of the storm water system to be very important reason for street sweeping.

Question #13: Observation of street or roadway cleanliness was most often (89.7%) indicated as the method to determine if the street sweeping program was meeting objectives.

Question #14: Nearly 60 percent (59.8%) of the respondents would increase street sweeping frequency with adequate funding if it resulted in improved water quality.

Question #15: The most common range of street sweeping expenditures was \$50,000 - \$100,000 by 24.8% of the respondents.

The 120 respondents did not reveal any unusual results. With nearly half the respondents from Minnesota, it appeared useful to determine if their responses were appreciably different than colleagues elsewhere in the public works profession or materially affected the survey's overall responses.

Results: Minnesota versus Greater U.S./Canada

The overall survey results file was downloaded as an Excel® spreadsheet for further division and analysis. Four responses had coding errors for state designation, but the appropriate ZIP code for Minnesota. Each of the four was corrected using the Minnesota abbreviation (MN) because the respondent had incorrectly selected a nearby two-character state abbreviation [e.g. MO(2), MT or NV]. This action assumed the respondent's ZIP code (reflective of a Minnesota location) was correct. With these four corrections, the overall file was divided into two groups: 57 Minnesota respondents and 63 Greater U.S./Canada respondents.

The 57 respondents from Minnesota governments included 53 cities or 6.2% of cities statewide [based upon 853 cities in Minnesota, League of Minnesota Cities, 2005 (<http://www.lmnc.org/cities/citydirectory.cfm>)] and four counties.

Dividing the survey population resulted in two nearly equal groups by distribution as follows: Minnesota, 57 respondents (47.5%) and Greater U.S./Canada, 63 respondents (52.5%). Spreadsheet results for both groups are in Appendix C. Below are results for each question and from the Minnesota and Greater U.S./Canada groups, distribution percentages for the various answer choices and a brief discussion.

Questions 1 – 3

1. Who is filling out this survey?

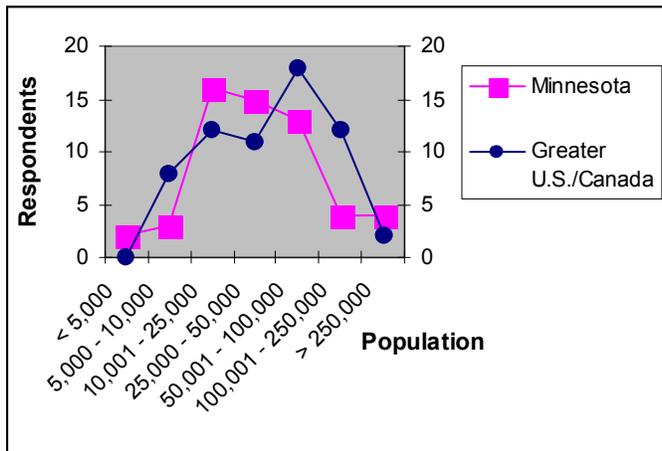
	Minnesota	%	Greater U.S./Can.	%
Director of Public Works	11	19%	14	22%
City Engineer	8	14%	1	2%
Street Superintendent	12	21%	8	13%
Operations Manager	4	7%	7	11%
Director/Manager	2	4%	13	21%
Utility Superintendent	0	0	3	5%
Contractor	0	0	0	0
Public Works Superintendent	15	26%	12	19%
County Engineer	0	0	0	0
Highway Engineer	2	4%	0	0
Others	3	5%	5	8%
Total Respondents:	57	100%	63	100%

Others: foreman, crew chief, fleet mgr., shop supervisor, technical assistant, team leader, storm water supervisor, equipment supervisor.

The most common job title for Minnesota respondents was public works superintendent, followed closely by director of public works and street superintendent. The Greater U.S./Canada respondents were similar with most job titles being public works superintendent, director of public works and director/manager. The much lower response for street superintendent for the Greater U.S./Canada respondents (13%) may be the result of this job title perhaps being somewhat more parochial to Minnesota.

2. City or County Population?

	Minnesota	%	Greater U.S./Can.	%
< 5,000	2	3.5%	0	0
5,000 - 10,000	3	5.3%	8	12.7%
10,001 - 25,000	16	28.1%	12	19.0%
25,000 - 50,000	15	26.3%	11	17.5%
50,001 - 100,000	13	22.8%	18	28.6%
100,001 - 250,000	4	7.0%	12	19.0%
> 250,000	4	7.0%	2	3.2%
Total Respondents:	57	100.0%	63	100.0%



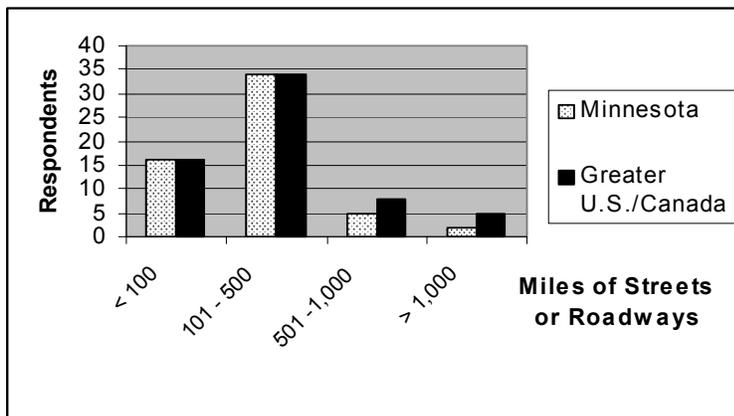
The above spreadsheet and graph reflects the distribution of respondents in both groups. Responses from both groups show tendency toward a normal distribution. However, the Minnesota group has a slight positive (right) skew while the Greater U.S./Canada group has a slight negative (left) skew. The Minnesota distribution positive skew means slightly more respondents from smaller governments (10,000 – 25,000) were represented and conversely in

the Greater U.S./Canada distribution, somewhat larger local governments (50,000 – 100,000) had more representation.

Of particular note, however, is both groups have exactly the same number of local governments responding (49) within the population range of <5,000 and 100,000. In addition, 93% of the Minnesota respondents and 97% of the Greater U.S./Canada respondents were from communities with less than or equal to 250,000 in population.

3. Enter approximate miles of streets or roadways in city or county

	Minnesota	%	Greater U.S./Can.	%
< 100	16	28.1%	16	25.4%
101 - 500	34	59.6%	34	54.0%
501 -1,000	5	8.8%	8	12.7%
> 1,000	2	3.5%	5	7.9%
Total Respondents:	57	100.0%	63	100.0%



The spreadsheet and histogram for Question #3 are very similar. Both show the same number (50) of respondents with street or roadway systems that are either < 100 miles in length or 101 – 500 miles. Thus, more than 80% of the respondents in both groups are responsible for similar street or roadway system mileage, notwithstanding the slight disparity in representative populations. Results from Questions #2 and #3 are particularly useful, as they appear to reflect two similar statistical populations whose only differentiation may be geography.

Questions 4 - 5

Results for Question #4, “Enter State or Canadian Province” are not repeated here. They are the same as discussed previously in the section: Results – Overall Survey and Appendix B, except for the changes initially discussed in this chapter regarding miscoding of four states. Similarly, results for Question #5, “Enter ZIP of mail code for city hall or courthouse” are not repeated in this section in an effort to keep respondents anonymous. However, a ZIP code was associated with a specific local government, as far as possible. Approximately 85 – 90% of the ZIP codes were identified with a specific local government with remaining codes having duplicative locations. Because population response further defined the locality, the duplicative locations did not appear to be a major problem.

Questions 6 – 7

6. How are street sweeping operations conducted?

	Minnesota	%	Greater U.S./Can.	%
City or county equipment and labor	40	70.0%	54	85.7%
Contractor equipment and labor	2	3.5%	6	9.5%
Combination of the above	15	26.50%	2	3.2%
Conducted by another unit of government	0		0	0
Other	0		1*	1.6%
Totals:	47	100%	63	100%

Other*: Use City equipment and manpower except in the CBD which has its own privately funded operation

The majority of local governments in both groups (70% versus 85.7%) use their own equipment and labor. However, Minnesota respondents use private (equipment and labor) contractors (26.5%) at a higher percentage to conduct street sweeping operations than the Greater U.S./Canada respondents (3.2%). The higher percentage of private contracted services was unexpected by Minnesota respondents. The survey did not include a follow-up question or comment regarding the breakdown of equipment used by private versus public. However, anecdotal evidence from Minnesota street superintendents and communication with national sweeping contractors suggest the private contractor provides the sweeper equipment and the public entity provides labor and trucks for hauling the street sweeping materials.

The shift toward more private contractor usage by Minnesota’s local governments may have occurred for two possible reasons:

1. Capital cost of street sweeper equipment, and/or
2. Maintenance expense related to street sweeping.

7. What type(s) of street sweeping equipment is used? (check all that apply)

	Minnesota	%	Greater U.S./Can.	%
Sweeper: mechanical brush	51	70.0%	35	41.2%
Sweeper: mechanical brush with vacuum assist	9	12.3%	23	27.0%
Sweeper: regenerative-air with mechanical brush	13	17.7%	27	31.8%
Other	0		0	
Totals:	<u>73</u>		<u>85</u>	
Additional Results				
Sweepers: mechanical brush only	34	61.8%	19	30.2%
Sweepers: mechanical brush and vacuum assist	15	27.3%	16	25.4%
Sweepers: regenerative-air with mechanical brush	6	10.9%	28	44.4%
Total Respondents:	<u>55 govt.</u>	100.0%	<u>63 govt.</u>	100.0%

Results from Question #7 are noteworthy because of the significant differences in equipment usage. Note the question asks for all equipment types that are used. Local governments may have one or more types of mechanical, vacuum and regenerative-air street sweepers; thus, the total sweeper types may be greater than total respondents. Nonetheless, the differences with respect to the responses are significant and unexpected. Mechanical brush sweeper use is much greater in Minnesota (70%) versus Greater U.S./Canada (41%). Conversely, the use of vacuum and regenerative-air street sweepers appears much more prevalent elsewhere than in Minnesota.

The disparity between the groups is equally apparent with respect to Question #7, **Additional Results**. The spreadsheet depicts summations for specific equipment types for each local government group. Minnesota respondents are twice as likely (61.8% versus 30.2%) to use mechanical brush sweepers than vacuum or regenerative-air sweepers. However, the reverse is true, within the Greater U.S./Canada group who are nearly twice as likely (69.8% versus 38.2%) to use vacuum or regenerative-air rather than mechanical sweepers.

The reasons for this disparity are not apparent from the results, however several possibilities have been suggested:

1. Minnesota's severe winter and sand usage for traction reflects the use of mechanical brush sweepers during spring clean-up operations.
2. The higher percent use of contract sweepers may be dominated by their use of mechanical brush sweepers.

Questions 8 – 9

8. Are there areas that are swept more frequently than once per year?

	Minnesota	%	Greater U.S./Can.	%
Yes	57	100%	62	98%
No	0	0%	1	2%

Question #8 results were expected. However, based upon the results discussion below regarding Question #9, perhaps Question #8 should have inquired about “areas that are swept more frequently than *twice* per year.” Had such a question adjustment been made, their may have been more of a differentiation between the Minnesota and Greater U.S./Canada groups with respect to the Question #8 results.

9. If you answered Yes to Question 8, please indicate those areas that are swept more frequently than once per year (check all that apply)

Minnesota govt.	Weekly		Biweekly		2x/year		3x-6x/year		More frequently		Response Total
Arterial streets	(1)	3%	(3)	8%	(22)	58%	(10)	26%	(2)	5%	38
Commercial/Industrial areas	(3)	7%	(2)	5%	(26)	62%	(8)	19%	(3)	7%	42
Residential streets	(2)	5%	(0)	0%	(31)	72%	(10)	23%	(0)	0%	43
Central Business District	(7)	16%	(4)	9%	(17)	39%	(11)	25%	(5)	11%	44
Areas near lakes, rivers and streams	(2)	5%	(3)	7%	(17)	42%	(14)	35%	(4)	10%	40
Sediment accumulation areas	(4)	9%	(0)	0%	(13)	29%	(22)	49%	(6)	13%	45
Greater U.S. & Canada govt.	Weekly		Biweekly		2x/year		3x-6x/year		More frequently		Response Total
Arterial streets	(11)	21%	(14)	26%	(1)	2%	(13)	24%	(14)	26%	53
Commercial/Industrial areas	(11)	23%	(8)	17%	(5)	11%	(13)	28%	(10)	21%	47
Residential streets	(4)	7%	(11)	20%	(10)	18%	(16)	29%	(15)	27%	56
Central Business District	(20)	37%	(10)	18%	(3)	6%	(4)	7%	(17)	31%	54
Areas near lakes, rivers and streams	(5)	16%	(5)	16%	(2)	6%	(10)	31%	(10)	31%	32
Sediment accumulation areas	(4)	12%	(5)	15%	(1)	3%	(12)	36%	(11)	33%	33

Minnesota Governments

With respect to the Minnesota local governments and specific areas, there was a consistent response range of 58 – 72% of the respondents sweeping arterial streets, commercial/industrial areas and residential areas at a frequency of twice (2x) per year. Central Business District, areas near lakes, rivers and streams, and sediment accumulation areas had response levels somewhat evenly divided between twice and three - six times per year frequencies (64 – 78%). The low sweeping frequency response levels suggests several possible reasons:

1. Central Business Districts as a commercial land-use type are generally less prevalent in suburban development with strip and shopping malls more likely.
2. The local government respondent may not have areas near lakes, rivers or streams in their community.
3. Sediment accumulation areas are not problem areas identified for frequent sweeping.

Greater U.S./Canada Governments

With respect to arterial streets, more than half the respondents (52%) swept more frequently (greater than three - six times per year) or biweekly. Commercial/industrial areas reflected a range of sweeping frequencies by a majority of respondents: three – six times per year (28%), weekly (23%) or more frequently (21%). Residential streets also reflected higher sweeping frequencies with 56% of the respondents indicating three - six times per year or more frequently. The somewhat even distribution of sweeping frequencies for the arterial streets, commercial/industrial areas and residential areas suggest individual local government decision-making rather than a performance level standard or criteria.

The highest sweeping frequencies were shown for Central Business Districts with 86% of the respondents either sweeping more frequently than three - six times per year, biweekly or weekly. Areas near lakes, rivers and streams, and sediment accumulation areas were somewhat less in their response levels. Adding the response levels for three - six times per year and more frequently, reflected a combined response of 62 – 69% for these areas. The much lower combined response levels suggests two possible reasons:

1. The local government respondent may not have areas near lakes, rivers and streams in their community.
2. Frequent sweeping of sediment accumulation areas is not an identified problem.

Street sweeping frequency results contrasted sharply between the Minnesota and Greater U.S./Canada groups. In general, Minnesota respondents swept streets at a twice (2x) per year frequency versus the Greater U.S./Canada respondents that swept at three - six times or more frequently depending upon the area (e.g. Central Business Districts). It is well to note that the Minnesota respondent survey population had a material effect upon the overall survey results discussed previously. The effect of the Minnesota respondents being nearly have the survey population and practicing lower street sweeping frequencies was to lower the overall results. By separating out the two groups, this effect of the Minnesota respondents is clearly observed by the contrasting street sweeping frequencies.

Questions 10 – 11

10. Do you conduct a fall sweeping?

	Minnesota	%	Greater U.S./Can.	%
Yes	50	88%	49	78%
No	7	12%	14	22%

A high percentage of both groups conduct fall sweeping as reflected in the results from Question #10. However, the ten- percent difference between both groups carries onto the results for Question #11.

11. If you answered Yes to Question 10, how do you address the challenge of leaf pick-up? (check all that apply)

	Minnesota	%	Greater U.S./Can.	%
Conduct normal sweeping	39	78%	38	77%
Residents take leaves to city or county compost facility	18	36%	8	16%
Residents bag leaves for collection program	8	16%	21	43%
Use specialized pick-up equipment	7	14%	20	41%
Other (comments - see below)	8		6	

Within both groups, handling leaves is distinctly different. More than 75% of the respondents in both groups conduct normal sweeping operations. With respect to a specific leave collection and pick-up program, Minnesota respondents were much more likely (36% versus 16%) to request or require residents to bag and take leaves to a city or county compost facility. In contrast, the Greater U.S./Canada respondents request or require residents (43% versus 16%) to bag leaves for a collection program. Thus, having a separate bag and collection program for leaves results in the Greater U.S./Canada group more often having specialized pick-up equipment (41% versus 14%) for leaves.

A fair number of comments were provided by respondents within both groups and are provided as follows:

Minnesota

1. Gravel tracking areas, construction sites
2. Property owner responsible for disposing of their leaves either by composting, rubbish hauler, or hauling to a disposal site.
3. Dual operation. Leaves flush to gutter, bunch in piles, pick up and haul with loaders/trucks. Then sweep with street sweepers.
4. Considering offering a bag pickup program to residents
5. Sweep all high back curb areas before the leaves fall
6. Newsletter about nutrients in lakes

7. Contractor equipment & labor with city equipment & labor.
8. Sucker

Greater U.S./Canada

1. Follow sweeper with multiple dump trucks
2. We have leaf vacs with flat bed trucks
3. Leaf collection and street sweeping are conducted at the same time
4. Follow leaf equip. with sweeper
5. LEAF & BRUSH PICKED UP BY GARBAGE CONTRACTOR ON A WEEKLY YEARAROUND BASIS
6. During the fall sweeping program, attention is given to areas of the City that have many hardwood trees. The shed leaves are swept up from the gutter areas of the street to prevent flooding.

Question 12

12. How important are these reasons to your street sweeping program (check all that apply)?

Minnesota govt.	V. Impt.	Impt.	S. Impt.	Not Important	Respondent Total
Maintain street or roadway safety	(34) 61%	(16) 29%	(5) 9%	(1) 2%	56
Keep materials out of the storm water sys.	(47) 82%	(8) 14%	(1) 2%	(1) 2%	57
Phase I or II permit requirement	(30) 58%	(15) 29%	(4) 8%	(3) 6%	52
Water quality improvement	(38) 68%	(13) 23%	(5) 9%	(0) 0%	56
Aesthetics and/or cleanliness	(32) 56%	(20) 35%	(5) 9%	(0) 0%	57

Greater U.S. & Canada govt.	V. Impt.	Impt.	S. Impt.	Not Important	Respondent Total
Maintain street or roadway safety	(30) 50%	(24) 40%	(5) 8%	(1) 2%	60
Keep materials out of the storm water sys.	(41) 67%	(19) 31%	(1) 2%	(0) 0%	61
Phase I or II permit requirement	(30) 53%	(17) 30%	(6) 10%	(4) 7%	57
Water quality improvement	(29) 50%	(23) 40%	(5) 9%	(1) 2%	58
Aesthetics and/or cleanliness	(41) 67%	(19) 31%	(1) 2%	(0) 0%	61

Results from Question #12 are interesting because the Minnesota respondents identify the highest percentage (82%) for keeping materials out of the storm water system as a very important reason for sweeping. Another way to interpret the results is to combine the percent responses for both “very important” and “important”. The assumption being there may not be a great deal of difference between the two terms, notwithstanding the previous discussion regarding the Minnesota group response. In this regard, both groups show essentially the same results. Keeping materials out of the storm sewer system is very important (average: 97%) and street sweeping being part of the Phase I or II permit requirement is least important (average: 85%). Aesthetics and/or cleanliness closely follow keeping materials out of the storm sewer

system in importance (average: 94.5%). Interestingly, both to maintaining street or roadway safety and water quality are lower in importance (averages: 90.5% and 90%, respectively).

Question 13

13. How do you know the city or county street sweeping program is meeting objectives (Check all that apply)?

	Minnesota	%	Greater U.S./Can.	%
Customer feedback	40	70%	36	57%
Observed street or roadway cleanliness	54	95%	52	82%
No objectives in place	3	5%	4	7%
Storm water runoff monitoring	17	30%	11	17%
Private contract requirements are met	5	9%	3	5%
Other (comments - see below)	4		8	

Overwhelmingly, the response from both groups (95% versus 82%) identified observed street or roadway cleanliness as the method the city or county determines the street sweeping program is meeting objectives. Customer feedback was the second most important reason (70% versus 57%) in both groups. The high percent response indicates the public observation of street sweeping and willingness to provide feedback is useful. In this regard, the level of service for street sweeping by local governments may well be important because of the apparent observational feedback mechanism. Interestingly, nearly one-third of the Minnesota respondents identified storm water runoff monitoring as a measurement method.

A fair number of comments were provided by respondents within both groups and are provided as follows:

Minnesota

1. Reduction in a mount of debris being removed from storm sumps
2. Meet NPDES permit requirements (two complete sweeps per year). Also, there had been some water quality measurements done in past - not sure to what level they are still being done.
3. # of trucks filled with dirt sweep up
4. Catch basins and storm sewer pipe have less silt and sediment deposits as a result of road sweeping

Greater U.S./Canada

1. We record how often and the date that streets are cleaned.
2. Low rate of storm sewers backing up and flooding streets during large rains.
3. Scheduled operations
4. Our main objectives at this time are to meet permit requirements, productivity and cleanliness goals; we may one day implement water quality goals.
5. Tracking tonnage
6. We do not have nearly the problems with plugged catch basins that we could have. In addition, during heavy rainfall, we do not have the amount of flooded streets that we used to.
7. Records being maintained on quantity and sweeping frequency

8. Established operational performance standards

Question 14

14. Would the city or county increase street sweeping frequency if it resulted in improved water quality?

	Minnesota	%	Greater U.S./Can.	%
No, due to lack of funding	5	9%	7	12%
Yes, with adequate funding	35	62%	35	58%
No	4	7%	2	3%
Yes	4	7%	7	12%
Other (comments - see below)	8	14%	9	15%
Totals:	56	100%	61	100%

Increasing street sweeping frequency if it resulted in improved water quality were similar responses in both groups when tied to adequate funding. A fair number of comments were provided by respondents within both groups and are provided as follows:

Minnesota

1. Spring and fall sweeping make sense- A good return on investment. Mid-summer sweeping makes no sense after a rain- nothing to sweep.
2. Does not seem to be needed
2. This would be a policy decision based upon data. In Minneapolis, water quality is extremely important, so it would be given great consideration. Nevertheless, we already have a very aggressive program for these reasons.
4. Staffing shortage. Would need to see appreciable gain in water quality.
5. We sweep year round almost, other than the month of January-we overhaul all sweepers for the year.
4. We double shift for sweeping; it takes our whole crew a month to sweep the entire city. We do not have the time to do it more than once a year.
7. We may, but there would be more factors taken into account in addition to funding.
8. If the need/desire for fall sweeping program was justified & funding provided it would likely be considered.
1. As part of municipal storm water monitoring program, city has installed sump manholes and or V-2 b-1 storm water structures to catch sediment and or floatables before discharge into receiving stream or lake. These structures are vacuumed out yearly or as needed.

Greater U.S./Canada

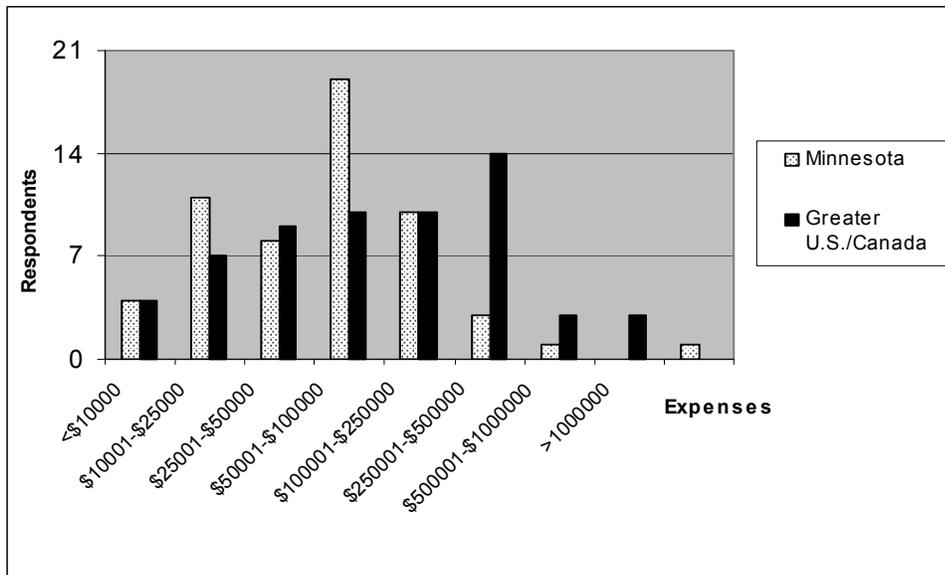
1. Would depend on council direction
2. The entire city is swept once a month. Could only do more with additional sweeper and operator
3. Only if there was a problem directly related to street run-off.
4. The sweeping schedule is done with 2 trucks and 3 shifts. All sweeping of streets is done on a continuous basis
5. I do not believe that the city would go beyond what is required due to funding considerations.
6. I believe that we will be mandated to sweep more often and more efficiently soon due to storm water reg's. until then, no changes.
7. No, due to lack of funding. We recently went through a public process to prioritize street maintenance activities and it was recommended to cut the sweeping program by 25%.

8. We feel that weekly sweeping is adequate and anything more would be an unfair burden to the residents.
 (parking is heavily used in the beach residential areas)
9. Not sure what you mean by the question

Question 15

15. What are the city or county approximate street or roadway sweeping expenses (labor, equipment, etc.)?

	Minnesota	%	Greater U.S./Can.	%
< \$10,000	4	7%	4	7%
\$ 10,000 - \$25,000	11	19%	7	12%
\$ 25,001 - \$50,000	8	14%	9	15%
\$ 50,001 - \$100,000	19	33%	10	17%
\$100,000 - \$250,000	10	17%	10	17%
\$250,000 - \$500,000	3	5%	14	23%
\$500,001 - \$1,000,000	1	2%	3	5%
>\$1,000,000	1	2%	3	5%
Total Respondents:	57	100%	60	101%



Minnesota Governments

The above spreadsheet and histogram reflects the distribution of respondents in both groups that were nearly equal in size. The responses are similar to Question #2 with the Minnesota group showing a positive (right) skew. Forty-nine percent (49%) of local government respondents have street-sweeping expenses between \$50,001 – \$250,000 per year. Forty percent (40%) fell within an expense range of <\$10,000 to \$50,000. Thus, the Minnesota governments distribution is affected positively or accounts for the fatness in the skew by lower expenditures for the respondents within the <\$10,000 - \$50,000 subgroup.

Greater U.S./Canada Governments

The Greater U.S./Canada respondents reflect a distribution that is negative (left) skew. Fifty percent (50%) of local government respondents had expenses within the range of \$100,001 to >\$1,000,000. Twenty-three percent (23%) of the respondents fell within the \$250,000 - \$500,000 expense range accounting for the fatness in the negatively skewed distribution. Similar to the Minnesota group, thirty-four percent (34%) of the respondents had annual street and roadway expenses from <\$10,000 - \$50,000.

Question 16

16. Do you have any additional comments?

1. A lot of time is also spent sweeping sealcoat sand and rock in summer
2. The primary purpose of the sweeping operation is to keep the catch basin grates from plugging. Incidentally, cleaning off the grates and gutters in the fall or after a windstorm keeps the debris out of the ponds. I question if street sweeping is more cost effective than dredging a stormwater pond.
3. Since we stopped using, sand for snow and ice control our sweeping has become a very small issue.
4. Sweeping frequency should also relate to new construction areas. Also if swept materials are recycled.
5. There is a need for a street sweeper that will pickup and mulch leaves effectively. Programs are also needed to reduce the amount of trash in the curb line.
6. NPDES permit did not change the amount of sweeping we are doing. It gave us another way to defend what we are spending in our budget.
7. As traffic volumes and speeds increase demand for bare pavements and dry pavements 12 months per year is becoming an expectation. Sand, salt, brine are applied during the winter months to try to meet expectations and limit silt and sediment from entering the storm water conveyance systems. Silt and sediment on our roads pose safety threat do to increase stopping distance when debris is present on our highway.
8. The weekly sweeping operation is with a contracted service during the summer/fall. Typically on Fridays a list of citizen requested, construction areas, and or streets having an accumulation after a rain event are provided to the contractor for sweeping.

Greater U.S./Canada

1. The city of Greenville does the sweeping in the city limits. I don't believe that Greenville county has a sweeping program.
2. This does not include equipment costs. We do not have a rental rate so the cost of equipment is only shown in the year purchased.
3. Central business district swept twice/week other streets with curb swept on a 10 workday cycle. Perimeter suburbs without curb approx. three times annually
4. We put a priority on street sweeping many years ago. This is an average sized Midwestern city that does experience snow and ice during the winter months. That said, we continue to run street sweepers during the winter months as long as the temperatures and weather permits.

Discussion

Street Sweeping Equipment

Survey results from Question #7 indicate a wide disparity by Minnesota respondents in street sweeping equipment type (mechanical brush vs. regenerative-air or vacuum) usage with respect to the local governments in other states and Canadian provinces. When looking at all sweepers in use by the local governments, the mechanical brush sweeper is much more common in Minnesota (70%) versus Greater U.S./Canada (41%). In addition, Minnesota respondents are twice as likely (61.8% versus 30.2%) to use mechanical brush sweepers only, rather than vacuum or regenerative-air sweepers. However, the reverse is true, within the Greater U.S./Canada group where vacuum or regenerative-air are nearly twice as likely to be used (69.8% versus 38.2%) than mechanical sweepers only.

Sweeping Frequencies

Results of street sweeping frequencies from Question #9 contrasted significantly between the two groups. Minnesota respondents swept streets at a twice (2x) per year frequency (response range of 58, 62 and 72% of the respondents for arterial streets, commercial/industrial areas and residential areas). Adding the three - six times per year frequency percentages reflects a combined response of 84, 81, and 95% for these areas. The Greater U.S./Canada respondents swept the same areas at three - six times, more frequently than the former rate or biweekly (response range of 76, 66, 76% of the respondents for arterial streets, commercial/industrial areas and residential areas). For Central Business Districts, sweeping frequency differences continued with 75% of Minnesota respondents sweeping twice, three – six times or more frequently per year. In contrast, the Greater U.S./Canada respondents reflected 86% either swept more frequently than three – six times per year, biweekly or weekly.

It is apparent from survey results, reported street sweeping frequencies are significantly less for the Minnesota respondents versus Greater U.S./Canada respondents across both land use areas and street types. Reasons for the differences are not obvious from the survey results. Further analysis of the results will be undertaken in Report No. 3.

Leaf Programs and Equipment

Within both groups, handling leaves is distinctly different. More than 75% of the respondents in both groups conduct normal sweeping operations. However, with respect to a specific leave collection and pick-up program, Minnesota respondents were much more likely (36% versus 16%) to request or require residents to bag and take leaves to a city or county compost facility. In contrast, the Greater U.S./Canada respondents request or require residents (43% versus 16%) to bag leaves for a collection program. Thus, having a separate bag and collection

program for leaves may cause the Greater U.S./Canada group to use specialized pick-up equipment (41% versus 14%) than Minnesota local governments.

However, the number of respondents (<30) within each of the categories or answers is not adequate to derive further conclusions from the two groups responses. However, leaf collection and disposal is an interesting subject area worthy of future additional survey efforts because of its expense and benefits.

Program Objectives and Measurements

Question #12 results are interesting because Minnesota respondents identify “keeping materials out of the storm water system” with the highest percentage (82%) as a very important reason for sweeping. For the Greater U.S./Canada respondents, aesthetics and cleanliness was also identified as very important, but only for 67% of the respondents. Combining percent responses for “very important” and “important” and averaging the sum for both groups show essentially the same results.

1. Keeping materials out of the storm sewer system (average: 97%);
2. Aesthetics and/or cleanliness, (average: 94.5%);
3. Maintaining street or roadway safety, (90.5%);
4. water quality improvement; (90%), and
5. Phase I or II permit requirement, (85%).

Keeping materials out of the storm sewer system is the main reason for conducting a street sweeping program.

Street Sweeping Program Funding

A majority in both groups (62% versus 57%) would increase street sweeping frequency with adequate funding if it resulted in improved water quality. Response results are similar to Question #2 with both groups showing slight skew to their distributions. For the Minnesota respondents, fifty percent (50%) of the local governments have street-sweeping expenses between \$50,001 – \$250,000 per year with forty percent (40%) falling within an expense range of <\$10,000 to \$50,000. For the Greater U.S./Canada respondents, fifty percent (50%) of the local governments had expenses within the range of \$100,001 to >\$1,000,000 with twenty-three percent (23%) of the respondents falling within the \$250,000 - \$500,000 expense range. Similar to the Minnesota group, thirty-four percent (34%) of the respondents had annual street and roadway expenses from <\$10,000 - \$50,000.

The following table shows similarities and differences with respect to the two groups based upon results from population ranges in Questions #2 and expenditure ranges from Question #15.

City Population or Street Sweeping Expenditures	Number of Minnesota Respondents	Number of Greater U.S./Canada Respondents
Cities or counties: <5,000 – 25,000 population	21	20
Expenditures: <\$10,000 - \$50,000	23	20
Cities or counties: 25,000 – 250,000 population	32	41
Expenditures: \$50,000 - \$500,000	32	34

For small cities or counties (<5,000 – 25,000) in both groups, street sweeping expenditures fell within the same range of <\$10,000 - \$50,000 per year. For the medium sized cities or counties (25,000 – 250,000), a higher, number of cities in the Greater U.S./Canada group were represented (41 versus 32). However, a similar number as the Minnesota group (34 versus 32) expended \$50,000 - \$500,000 on street sweeping. The difference in the number cities or counties (7) in the Greater U.S./Canada group probably reflects higher street sweeping expenditures. This is because six cities or counties had expenditures ranging from \$500,001 to >\$1,000,000 and yet there were only two cities or counties with populations greater than 250,000. Thus, the higher street sweeping frequencies reported by the Greater U.S./Canada respondents may partially be supported by greater expenditures.

A small number of cities or counties in both groups had higher expenditures, but was not analyzed further.

Appendix A – Survey Monkey Questionnaire

Street Sweeping - State of the Practice Survey

Introduction and Background Information

This survey is being requested on behalf of Ramsey-Washington Metro-Watershed District in Minnesota. If your city or county operates a street or roadway sweeping program, would you please take 10 minutes to complete this survey?

Survey results are important to the District and Minnesota Chapter of APWA and will be incorporated into a Street Sweeping - State of the Practice Report.

If you would like to see the results, please visit <http://www.rwmwd.org> or <http://www.minnesota.apwa.net> after January 31, 2005.

*** 1. Who is filling out this survey (check all that apply)?**

County engineer

Utility superintendent

City engineer

Public works superintendent

Highway engineer

Contractor

Street superintendent

Operations Manager

Director/manager

Director of public works

Other (please specify)

*** 2. City or County population?**

< 5,000

5,000 - 10,000

10,001 - 25,000

25,001 - 50,000

50,001 - 100,000

100,001 - 250,000

>250,001

*** 3. Enter approximate miles of streets or roadways in the city or county**

<100

100 - 500

501 - 1,000

>1,001

*** 4. Enter State or Canadian Province**

United States: AL AK AZ AR CA CO CT DE DC FL GA HI ID IL IN IA KS KY LA ME MD
MA MI MN MS MO MT NE NV NH NJ NM NY NC ND OH OK OR PA RI SC SD TN TX UT
VT VA WA WV WI WY

Canada: AB BC MB NB NL NT NS NU ON PE QC SK YT

*** 5. Enter ZIP or mail code for city hall or courthouse**

Next >>

Please provide us with some background information to assess the state of the practice.

*** 6. How are city or county street sweeping operations conducted?**

- City or county equipment and labor
- Combination of the above
- Conducted by another unit of government
- Contractor equipment and labor
- Other (please specify)

*** 7. What type(s) of street sweeping equipment is used (check all that apply)?**

- Sweeper: regenerative-air with mechanical brush
- Sweeper: mechanical brush
- Sweeper: mechanical brush with vacuum assist
- Other (please specify)

*** 8. Are there areas that are swept more frequently than once per year?**

Yes No

9. If you answered Yes to Question 8, please indicate those areas that are swept more frequently than once per year (check all that apply)

Weekly Bi-weekly Twice per year (spring and fall) Three to six times per year
More frequently

- Areas near lakes, rivers and streams
- Arterial streets
- Commercial/industrial areas
- Sediment accumulation areas
- Residential areas
- Central Business District

*** 10. Do you conduct a fall sweeping?**

Yes No

11. If you answered Yes to Question 10, how do you address the challenge of leaf pick-up (check all that apply)?

- Conduct normal sweeping
- Residents take leaves to city or county compost facility
- Use specialized leaf pick-up equipment
- Residents bag leaves for collection program
- Other (please specify)

<< PrevNext >>

**Street Sweeping - State of the Practice Survey
Performance**

12. How important are these reasons to your street sweeping program (check all that apply)?

Very important Important Somewhat important Not important

- Keep materials out of the storm water system
- Water quality improvement
- Maintain street or roadway safety
- Aesthetics and/or cleanliness
- Phase I or II storm water permit requirement

*** 13. How do you know the city or county street sweeping program is meeting objectives (check all that apply)?**

- Observed street or roadway cleanliness
- Storm water runoff monitoring
- Private contract requirements are met
- No objectives in place
- Customer feedback
- Other (please specify)

*** 14. Would the city or county increase street sweeping frequency if it resulted in improved water quality?**

No

Yes, with adequate funding

Yes

No, due to lack of funding

Other (please specify)

*** 15. What are the city or county approximate annual street or roadway sweeping expenses (labor, equipment, etc.)?**

<\$10,000

\$10,000 - \$25,000

\$25,001 - \$50,000

\$50,001 - \$100,000

\$100,001 - \$250,000

\$250,001 - \$500,000

\$500,001 - \$1,000,000

>\$1,000,000

16. Do you have any additional comments?

Appendix B – Survey Monkey Questionnaire Results: Overall Survey

1. Who is filling out this survey (check all that apply)?

Response	Percent Response Total
Director of public works:	20.8% [25]
City engineer:	5.8% [7]
Street superintendent:	13.3% [16]
Operations Manager:	9.2% [11]
Director/manager:	10.8% [13]
Utility superintendent:	2.5% [3]
Contractor:	0% [0]
Public works superintendent:	20% [24]
County engineer:	0% [0]
Highway engineer:	0.8% [1]
Other (please specify):	16.7% [20]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

2. City or County population?

Response	Percent Response Total
< 5,000	1.7% [2]
5,000 - 10,000	9.2% [11]
10,001 - 25,000	23.3% [28]
25,001 - 50,000	21.7% [26]
50,001 - 100,000	25.8% [31]
100,001 - 250,000	13.3% [16]
> 250,001	5% [6]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

3. Enter approximate miles of streets or roadways in the city or county

Response	Percent Response Total
<100	26.7% [32]
100 - 500	56.7% [68]
501 - 1,000	10.8% [13]
>1,001	5.8% [7]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

4. Enter State or Canadian Province

Response	Percent Response Total
United States	0% [0]
AL	0.8% [1]

AK	0% [0]
AZ	1.7% [2]
AR	0% [0]
CA	5% [6]
CO	1.7% [2]
CT	0.8% [1]
DE	1.7% [2]
DC	0% [0]
FL	3.3% [4]
GA	0.8% [1]
HI	0% [0]
ID	0% [0]
IL	5% [6]
IN	0% [0]
IA	0.8% [1]
KS	0.8% [1]
KY	0% [0]
LA	0% [0]
ME	1.7% [2]
MD	0% [0]
MA	0.8% [1]
MI	1.7% [2]
MN	44.2% [53]
MS	0% [0]
MO	0.8% [1]
MT	3.3% [4]
NE	0.8% [1]
NV	1.7% [2]
NH	0% [0]
NJ	0.8% [1]
NM	0% [0]
NY	1.7% [2]
NC	0.8% [1]
ND	0% [0]
OH	0.8% [1]
OK	0% [0]
OR	0.8% [1]
PA	2.5% [3]
RI	0% [0]
SC	0.8% [1]
SD	0% [0]
TN	0.8% [1]
BC	0.8% [1]
MB	0% [0]
NB	0.8% [1]
NL	0% [0]
NT	0% [0]
NS	0% [0]
NU	0% [0]
ON	0.8% [1]
PE	0% [0]
QC	0% [0]

SK	0% [0]
YT	0% [0]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

5. Enter ZIP or mail code for city hall or courthouse.

Total Respondent:	120
(filtered out)	0
(skipped this question)	0

6. How are city or county street sweeping operations conducted?

Response	Percent Response Total
City or county equipment and labor:	77.5% [93]
Contractor equipment and labor:	5.8% [7]
Combination of the above:	7.5% [9]
Conducted by another unit of government:	0% [0]
Other (please specify):	9.2% [11]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

7. What type(s) of street sweeping equipment is used (check all that apply)?

Response	Percent Response Total
Sweeper: mechanical brush:	71.7% [86]
Sweeper: mechanical brush with vacuum assist:	26.7% [32]
Sweeper: regenerative-air with mechanical brush:	30.8% [37]
Other (please specify):	5% [6]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

8. Are there areas that are swept more frequently than once per year?

Response	Percent Response Total
Yes	99.2% [119]
No	0.8% [1]
Total Respondents	120
(filtered out)	0
(skipped this question)	0

9. If you answered Yes to Question 8, please indicate those areas that are swept more frequently than once per year (check all that apply)

	Weekly	Bi-weekly	Twice per year (spring and fall)	Three to six times per year	More frequently	Response
Total						
Arterial streets	13%	(12)	18%	(17)	27%	(25)
Commercial/industrial areas	15%	(14)	11%	(10)	34%	(31)
Residential areas	6%	(6)	11%	(11)	41%	(41)
Central Business District	28%	(27)	14%	(14)	20%	(20)
Areas near lakes, rivers and streams	10%	(7)	11%	(8)	26%	(19)
Sediment accumulation areas	10%	(8)	6%	(5)	18%	(14)
Total Respondents	118					
(filtered out)	0					
(skipped this question)	2					

10. Do you conduct a fall sweeping?

Response	Percent	Response Total
Yes	82.5%	[99]
No	17.5%	[21]
Total Respondents	120	
(filtered out)	0	
(skipped this question)	0	

11. If you answered Yes to Question 10, how do you address the challenge of leaf pick-up (check all that apply)?

Response	Percent	Response Total
Conduct normal sweeping	73.3%	[77]
Residents take leaves to city or county compost facility	24.8%	[26]
Residents bag leaves for collection program	27.6%	[29]
Use specialized leaf pick-up equipment	25.7%	[27]
Other (please specify)	14.3%	[15]
Total Respondents	105	
(filtered out)	0	
(skipped this question)	15	

12. How important are these reasons to your street sweeping program (check all that apply)?

	Very important	Important	Somewhat important	Not important	Respondent Total
Maintain street or roadway safety	55% (64)	35% (41)	9% (10)	2% (2)	117
Keep materials out of the storm water system	75% (88)	23% (27)	2% (2)	1% (1)	118
Phase I or II storm water permit requirement	55% (60)	29% (32)	10% (11)	6% (7)	110
Water quality improvement	59% (67)	32% (36)	9% (10)	1% (1)	114
Aesthetics and/or cleanliness	62% (73)	33% (39)	5% (6)	0% (0)	117
Total Respondents	118				
(filtered out)	0				
(skipped this question)	2				

13. How do you know the city or county street sweeping program is meeting objectives (check all that apply)?

Response	Percent Response Total
Customer feedback	64.1% [75]
Observed street or roadway cleanliness	89.7% [105]
No objectives in place	6% [7]
Storm water runoff monitoring	23.9% [28]
Private contract requirements are met	6.8% [8]
Other (please specify)	10.3% [12]
Total Respondents	117
(filtered out)	0
(skipped this question)	3

14. Would the city or county increase street sweeping frequency if it resulted in improved water quality?

Response	Percent Response Total
No, due to lack of funding	10.3% [12]
Yes, with adequate funding	59.8% [70]
No	5.1% [6]
Yes	9.4% [11]
Other (please specify)	15.4% [18]
Total Respondents	117
(filtered out)	0
(skipped this question)	3

15. What are the city or county approximate annual street or roadway sweeping expenses (labor, equipment, etc.)?

Response	Percent Response Total
<\$10,000	6.8% [8]
\$10,000 - \$25,000	15.4% [18]
\$25,001 - \$50,000	14.5% [17]
\$50,001 - \$100,000	24.8% [29]
\$100,001 - \$250,000	17.1% [20]
\$250,001 - \$500,000	14.5% [17]
\$500,001 - \$1,000,000	3.4% [4]
>\$1,000,000	3.4% [4]
Total Respondents	117
(filtered out)	0
(skipped this question)	3

16. Do you have any additional comments?

Total Respondents 13
(filtered out) 0
(skipped this question) 107

Appendix C – Survey Monkey Questionnaire Results: Minnesota versus Greater U.S./Canada Groups

1. Who is filling out this survey?

	Minnesota	%	Greater U.S./Can.	%
Director of Public Works	11	19%	14	22%
City Engineer	8	14%	1	2%
Street Superintendent	12	21%	8	13%
Operations Manager	4	7%	7	11%
Director/Manager	2	4%	13	21%
Utility Superintendent	0	0	3	5%
Contractor	0	0	0	0
Public Works Superintendent	15	26%	12	19%
County Engineer	0	0	0	0
Highway Engineer	2	4%	0	0
Others	3	5%	5	8%
Total Respondents:	57	100%	63	100%

Others: foreman, crew chief, fleet mgr., crew chief, shop supervisor, tech. Asst., team leader, stormwater supervisor, equipment supervisor.

2. City or County Population?

	Minnesota	%	Greater U.S./Can.	%
< 5,000	2	3.5%	0	0
5,000 - 10,000	3	5.3%	8	12.7%
10,001 - 25,000	16	28.1%	12	19.0%
25,000 - 50,000	15	26.3%	11	17.5%
50,001 - 100,000	13	22.8%	18	28.6%
100,001 - 250,000	4	7.0%	12	19.0%
> 250,000	4	7.0%	2	3.2%
Total Respondents:	57	100.0%	63	100.0%

Additional Results

<5,000 - 10,000: 36.9% in MN and 31.2% in Greater U.S./Canada (difference of 5.7%)
 10,000 - 100,000: 77.2% in MN and 65.1% in Greater U.S./Canada (difference of 12.1%)
 100,000 - >250,000: 14% in MN and 21.9% in Greater U.S./Canada (difference of 8%)

3. Enter approximate miles of streets or roadways in city or county

	Minnesota	%	Greater U.S./Can.	%
< 100	16	28.1%	16	25.4%
101 - 500	34	59.6%	34	54.0%
501 -1,000	5	8.8%	8	12.7%
> 1,000	2	3.5%	5	7.9%
Total Respondents:	57	100.0%	63	100.0%

Additional Results

<100: 28.1% in MN and 25.0% in Greater U.S./Canada (difference of 3.1%)
 101 - 1,000: 68.4% in MN and 66.7% in Greater U.S./Canada (difference of 1.7%)

>1,000: 3.5% in MN and 7.8% in Greater U.S./Canada

(difference of 4.3%)

4. States or Canadian Provinces

(only those with responses)

	Minnesota	and	Greater U.S./Can.	%
AL			1	0.80%
AZ			2	1.70%
CA			6	5.00%
CO			2	1.70%
CT			1	0.80%
DE			2	1.70%
FL			4	3.30%
GA			1	0.80%
IL			6	5.00%
IA			1	0.80%
KS			1	0.80%
ME			2	1.70%
MA			1	0.80%
MI			2	1.60%
MN			57	47.50%
MO			1	0.80%
MT			2	1.70%
NE			1	0.80%
NJ			1	0.80%
NY			2	1.70%
NC			1	0.80%
OH			1	0.80%
OR			1	0.80%
PA			3	2.50%
SC			1	0.80%
TN			1	0.80%
TX			3	2.50%
UT			1	0.80%
VA			1	0.80%
WA			4	3.30%
WI			3	2.50%
Alberta			1	0.80%
British Columbia			1	0.80%
New Brunswick			1	0.80%
Ontario			1	0.80%
Total Respondents:			120	99.40%

5. Enter ZIP Code (results skipped)

6. How are street sweeping operations conducted?

	Minnesota	%	Greater U.S./Can.	%
City or county equipment and labor	40	70.0%	54	85.7%
Contractor equipment and labor	2	3.5%	6	9.5%
Combination of the above	15	26.50%	2	3.2%
Conducted by another unit of government	0		0	0
Other	0		1	1.6%
Totals:	47	100%	63	100%

7. What type(s) of street sweeping equipment is used? (check all that apply)

	Minnesota	%	Greater U.S./Can.	%
Sweeper: mechanical brush	51	70.0%	35	41.2%
Sweeper: mechanical brush with vacuum assist	9	12.3%	23	27.0%
Sweeper: regenerative-air with mechanical brush	13	17.7%	27	31.8%
Other	0		0	
Totals:	73		85	

Additional Results

Sweepers: mechanical brush only	34	61.8%	19	30.2%
Sweepers: mechanical brush and vacuum assist	15	27.3%	16	25.4%
Sweepers: vacuum only	6	10.9%	28	44.4%
Total Respondents:	55 govts.	100.0%	63 govts.	100.0%

8. Are there areas that are swept more frequently than once per year?

	Minnesota	%	Greater U.S./Can.	%
Yes	57	100%	62	98%
No	0	0%	1	2%

9. If you answered Yes to Question 8, please indicate those areas that are swept more frequently than once per year (check all that apply)

Minnesota govts.	Weekly		Bi-weekly		2x/year		3x-6x/year		More frequently	
Arterial streets	(1)	3%	(3)	8%	(22)	58%	(10)	26%	(2)	5%
Commercial/Industrial areas	(3)	7%	(2)	5%	(26)	62%	(8)	19%	(3)	7%
Residential streets	(2)	5%	(0)	0%	(31)	72%	(10)	23%	(0)	0%
Central Business District	(7)	16%	(4)	9%	(17)	39%	(11)	25%	(5)	11%
Areas near lakes, rivers and streams	(2)	5%	(3)	7%	(17)	42%	(14)	35%	(4)	10%
Sediment accumulation areas	(4)	9%	(0)	0%	(13)	29%	(22)	49%	(6)	13%
Greater U.S. & Canada govts.	Weekly		Bi-weekly		2x/year		3x-6x/year		More frequently	
Arterial streets	(11)	21%	(14)	26%	(1)	2%	(13)	24%	(14)	26%
Commercial/Industrial areas	(11)	23%	(8)	17%	(5)	11%	(13)	28%	(10)	21%
Residential streets	(4)	7%	(11)	20%	(10)	18%	(16)	29%	(15)	27%
Central Business District	(20)	37%	(10)	18%	(3)	6%	(4)	7%	(17)	31%
Areas near lakes, rivers and streams	(5)	16%	(5)	16%	(2)	6%	(10)	31%	(10)	31%
Sediment accumulation areas	(4)	12%	(5)	15%	(1)	3%	(12)	36%	(11)	33%

10. Do you conduct a fall sweeping?

	Minnesota	%	Greater U.S./Can.	%
Yes	50	88%	49	78%
No	7	12%	14	22%

11. If you answered Yes to Question 10, how do you address the challenge of leaf pick-up? (check all that apply)

	Minnesota	%	Greater U.S./Can.	%
Conduct normal sweeping	39	78%	38	77%
Residents take leaves to city or county compost facility	18	36%	8	16%
Residents bag leaves for collection program	8	16%	21	43%
Use specialized pick-up equipment	7	14%	20	41%
Other (comments - see below)	8		6	

Minnesota

1. Gravel tracking areas, construction sites
2. Property owner responsible for disposing of their leaves either by composting, rubbish hauler, or hauling to a disposal site.
3. Dual operation. Leaves: flush to gutter, bunch in piles, pick up and haul with loaders/trucks. Then sweep with street sweepers.
4. Considering offering a bag pickup program to residents
5. Sweep all high back curb areas before the leaves fall
6. Newsletter about nutrients in lakes
7. Contractor equipment & labor with city equipment & labor.
8. Sucker

Greater U.S./Canada

1. Follow sweeper with multiple dump trucks
2. We have leaf vacs with flat bed trucks
3. Leaf collection and street sweeping are conducted at the same time
4. Follow leaf equip. with sweeper
5. LEAF & BRUSH PICKED UP BY GARBAGE CONTRACTOR ON A WEEKLY YEARAROUND BASIS
6. During the fall sweeping program, attention is given to areas of the City that have a lot of hardwood trees.
The shed leaves are swept up from the gutter areas of the street to prevent flooding.

12. How important are these reasons to your street sweeping program (check all that apply)?

Minnesota govts.	V. Impt.		Impt.		S. Impt.		Not Important		Respondent Total
	(#)	%	(#)	%	(#)	%	(#)	%	
Maintain street or roadway safety	(34)	61%	(16)	29%	(5)	9%	(1)	2%	56
Keep materials out of the storm water sys.	(47)	82%	(8)	14%	(1)	2%	(1)	2%	57
Phase I or II permit requirement	(30)	58%	(15)	29%	(4)	8%	(3)	6%	52
Water quality improvement	(38)	68%	(13)	23%	(5)	9%	(0)	0%	56
Aesthetics and/or cleanliness	(32)	56%	(20)	35%	(5)	9%	(0)	0%	57
Greater U.S. & Canada govts.	V. Impt.		Impt.		S. Impt.		Not Important		Respondent Total
Maintain street or roadway safety	(30)	50%	(24)	40%	(5)	8%	(1)	2%	60
Keep materials out of the storm water sys.	(41)	67%	(19)	31%	(1)	2%	(0)	0%	61
Phase I or II permit requirement	(30)	53%	(17)	30%	(6)	10%	(4)	7%	57
Water quality improvement	(29)	50%	(23)	40%	(5)	9%	(1)	2%	58
Aesthetics and/or cleanliness	(41)	67%	(19)	31%	(1)	2%	(0)	0%	61

13. How do you know the city or county street sweeping program is meeting objectives (check all that apply)?

	Minnesota	%	Greater U.S./Can.	%
Customer feedback	40	70%	36	57%
Observed street or roadway cleanliness	54	95%	52	82%
No objectives in place	3	5%	4	7%
Storm water runoff monitoring	17	30%	11	17%
Private contract requirements are met	5	9%	3	5%
Other (comments - see below)	4		8	

Minnesota

1. Reduction in a mount of debris being removed from storm sumps
2. Meet NPDES permit requirements (two complete sweeps per year).

Also, there had been some water quality measurements done in past - not sure to what level they are still being done.

3. # of trucks filled with dirt sweep up
4. Catch basins and storm sewer pipe have less silt and sediment deposits as a result of road sweeping

Greater U.S./Canada

1. We record how often and the date that streets are cleaned.
2. Low rate of storm sewers backing up and flooding streets during large rains.
3. Scheduled operations
4. Our main objectives at this time are to meet permit requirements, productivity and cleanliness goals;

We may one day implement water quality goals.

5. Tracking tonnage
6. We do not have nearly the problems with plugged catch basins that we could have.

Also, during heavy rainfall, we do not have the amount of flooded streets that we used to.

7. Records being maintained on quantity and sweeping frequency
8. Established operational performance standards

14. Would the city or county increase street sweeping frequency if it resulted in improved water quality?

	Minnesota	%	Greater U.S./Can.	%
No, due to lack of funding	5	9%	7	12%
Yes, with adequate funding	35	62%	35	58%
No	4	7%	2	3%
Yes	4	7%	7	12%
Other (comments - see below)	8	14%	9	15%
Totals:	56	100%	61	100%

Minnesota

1. Spring and fall sweeping make sense- A good return on investment. Mid-summer sweeping makes no sense after a rain- nothing to sweep.
2. Does not seem to be needed
3. This would be a policy decision based upon data. In Minneapolis, water quality is extremely important, so it would be given great consideration. But we already have a very aggressive program for these reasons.
4. Staffing shortage. Would need to see appreciable gain in water quality.
5. We sweep year round almost, other than the month of January-we overhaul all sweepers for the year.
6. We double shift for sweeping; it takes our whole crew a month to sweep the entire city. We do not have the time to do it more than once a year.
7. We may, but there would be more factors taken into account in addition to funding.
8. If the need/desire for fall sweeping program was justified & funding provided it would likely be considered.
9. As part of municipal storm water monitoring program, city has installed sump manholes and or V-2 b-1 storm water structures to catch sediment

and or floatables before discharge into receiving stream or lake. These structures are vacuumed out yearly or as needed.

Greater U.S./Canada

1. Would depend on council direction
2. The entire city is swept once a month. Could only do more with additional sweeper and operator
3. Only if there was a problem directly related to street run-off.
4. The sweeping schedule is done with 2 trucks and 3 shifts. All sweeping of streets is done on a continuous basis
5. I do not believe that the city would go beyond what is required due to funding considerations.
6. I believe that we will be mandated to sweep more often and more efficiently soon due to storm water reg's. until then, no changes.
7. No, due to lack of funding. We recently went through a public process to prioritize street maintenance activities and it was recommended to cut the sweeping program by 25%.
8. We feel that weekly sweeping is adequate and anything more would be an unfair burden to the residents. (parking is heavily used in the beach residential areas)
9. Not sure what you mean by the question

15. What are the city or county approximate street or roadway sweeping expenses (labor, equipment, etc.)?

	Minnesota	%	Greater U.S./Can.	%
< \$10,000	4	7%	4	7%
\$ 10,000 - \$25,000	11	19%	7	12%
\$ 25,001 - \$50,000	8	14%	9	15%
\$ 50,001 - \$100,000	19	33%	10	17%
\$100,000 - \$250,000	10	17%	10	17%
\$250,000 - \$500,000	3	5%	14	23%
\$500,001 - \$1,000,000	1	2%	3	5%
>\$1,000,000	1	2%	3	5%
Total Respondents:	57	100%	60	101%

Additional Results

<\$10,000 - \$50,000: 40.3% in MN and 34.0% in Greater U.S./Canada (difference of 5.9%)
 \$50,000 - \$500,000: 56.0% in MN and 57.0% in Greater U.S./Canada (difference of 1%)
 \$500,000 - >\$1,000,000: 3.5% in MN and 9.8% in Greater U.S./Canada (difference of 6.3%)

16. Do you have any additional comments?

Minnesota

1. A lot of time is also spent sweeping sealcoat sand and rock in summer
2. The primary purpose of the sweeping operation is to keep the catch basin grates from plugging. Incidentally, cleaning off the grates and gutters in the fall or after a windstorm keeps the debris out of the ponds. I question if street sweeping is more cost effective than dredging a stormwater pond.
3. Since we stopped using sand for snow and ice control our sweeping has become a very small issue.
4. Sweeping frequency should also relate to new construction areas. Also if swept materials are recycled.
5. There is a need for a street sweeper that will pickup and mulch leaves effectively. Programs are also needed to reduce the amount of trash in the curb line.
6. NPDES permit did not change the amount of sweeping we are doing. It gave us another way to defend what we are spending in our budget.
7. As traffic volumes and speeds increase demand for bare pavements and dry pavements 12 months per year is becoming an expectation. Sand, salt, brine are applied during the winter months to try to meet expectations. Sweeping is an important task to keep roads clean and limit silt and sediment from entering the storm water conveyance systems. Silt and sediment on our roads pose safety threat do to increase stopping distance when debris is present on our highway.
8. The weekly sweeping operation is with a contracted service during the summer/fall. Typically on Fridays a list of citizen requested, construction areas, and or streets having an accumulation after a rain event are provided to the contractor for sweeping.

Greater U.S./Canada

1. The city of Greenville does the sweeping in the city limits. I do not believe that Greenville county has a sweeping program.
2. This does not include equipment costs. We do not have a rental rate so the cost of equipment is only shown in the year purchased.
3. Central business district swept twice/week other streets with curb swept on a 10 workday cycle.

Perimeter suburbs without curb approx. three times annually

4. We put a priority on street sweeping many years ago. This is an average sized Midwestern city that does experience snow and ice during the winter months. That said, we continue to run street sweepers during the winter months as long as the temperatures and weather permits.