

Housekeeping Pavement Management



Source: Tennant Co.

Description

Streets and parking lots make up a significant portion of the total impervious area within a developed watershed, and most, if not all of these areas are directly connected to the storm drain system. Pollutants accumulate on these surfaces and are washed off during storm events, particularly during spring snowmelt. A 1993 study in Wisconsin indicated that streets and parking lots were responsible for 54 percent of total runoff volume in residential areas and 80 percent in commercial areas. The same study found that streets and parking lots were significant sources of runoff pollutants, including suspended solids, phosphorus, copper, zinc and fecal coliform.

This document focuses on applications appropriate for sites of five acres or less. For more in-depth discussion of municipal-level street sweeping, see *Best Practices for Street Sweeping* (Metropolitan Council, 1994).

Three main pavement-related maintenance strategies can help prevent these problems:

- *Sweeping.* When properly designed and implemented, sweeping programs can significantly reduce street and parking lot contributions to pollutant loads.
- *Alternative Products and Application Rates.* Minimizing sand and salt application rates and/or using alternative deicing products can help protect waterways and potentially reduce costs.

Purpose

	Water Quantity	Water Quality
Flow attenuation	N/A	
Runoff volume reduction	N/A	
Pollution prevention		
Soil erosion	N/A	
Sediment control	*	■
Nutrient loading	*	■
Pollutant removal		
Total suspended sediment (TSS)	*	■
Total phosphorus (P)	*	■
Nitrogen (N)	*	▣
Heavy metals	*	■
Floatables	*	■
Oil and grease	*	■
Other		
Fecal coliform	*	■
Biochemical oxygen demand (BOD)	*	■

* *Depends on timing and frequency of sweeping, and extent to which other measures are employed*

■	Primary design benefit
▣	Secondary design benefit
□	Little or no design benefit

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- *Other Prevention Measures.* A variety of measures will prevent accumulation of sediments, salts and other pollutants on pavement and stop them from washing off into storm drains and water bodies. These measures include prompt pavement repair, spill cleanup and appropriate snow management.

Sweeping

Sweeping is a common maintenance activity, often done primarily for aesthetic reasons. Sweeping has important water quality ramifications, however, and should be done in ways that increase its effectiveness for preventing sediment loading of runoff and, whenever possible, decreasing costs. Sweeping is most effective for removing coarse particles, leaves and trash.

Timing

- At minimum, pavement should be swept twice yearly: in early spring, to collect sand, salt and winter debris, and in fall, to capture leaves and other debris.
- Sweep as early in spring as possible (after snow has melted from an area) in order to capture sediment before it is washed away by spring rains.
- An additional sweeping in June, after trees drop seeds and flowers, will prevent a fair amount of phosphorus-laden runoff.
- Sweep after activities or in locations that generate debris, such as at construction entry points.
- When loading or unloading salt, sand, gravel or other granular materials, sweep the loading/unloading areas at the end of each day, as well as along the paths that the trucks use.

Equipment

- Broom sweepers are effective at picking up large particulate matter and cleaning wet street surfaces. They also cost less to operate than vacuum sweepers. Broom sweepers generally create airborne dust during their operation, which increases atmospheric loading.
- Vacuum sweepers are more effective for removing fine particles, which is important because many pollutants are adsorbed to them. However, vacuum sweepers have the disadvantage of being ineffective at cleaning wet street surfaces. For heavy loads, use a mechanical sweeper for large particles followed by regenerative-air cleaner.
- Consider equipment that can be converted to other uses, such as sanding and plowing in winter.



Excessive winter sanding can mean high sediment loading to runoff.

Source: Barr Engineering Co.

Figure 1

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- Install an automatic greasing system on sweepers to decrease maintenance time and reduce wear on critical parts, which can cause unscheduled maintenance and missed sweeping opportunities.

Techniques

- Sweep in a pattern that keeps spilled material from being pushed toward catch basin inlets
- Locate storage and disposal sites for the material collected during sweeping so it will not get back to the storm sewer systems.
- Before sweeping, manually rake sand from any adjacent turf areas onto the surface to be swept.
- Use a small pool of highly trained operators.



Source: American Sweeper Online

Residual Material

- Street sweepings may be reused by cleaning out leaves and other debris then mixing the sweepings with new salt/sand mixture for winter application to roads, parking lots or sidewalks. When screening sweepings for reuse in this way, use a small mesh for the final screening to ensure that all of the larger debris has been removed. (A 3/4-inch mesh will screen out much of the debris.)
- Recycle fall leaf sweepings by finding a composting or agricultural facility that will use them.
- Street sweepings may also be reused as daily cover material on sanitary or demolition landfills, but only those that have ground water monitoring systems. While sweeping residuals are not considered hazardous waste, a wide array of inorganic and organic pollutants are contained, so use caution in disposal.

Alternative Products and Application Rates

The sand and salt compounds applied to icy roads are easily carried into storm drain systems and receiving streams, especially during snowmelt. High salt concentrations are harmful to streams. Furthermore, road salt contains cyanide as an anti-caking agent; cyanide may cause acute or chronic toxicity to aquatic organisms. Since salts are soluble and mobile, they may run off before sweeping can begin. So in areas where salts pose a problem, alternative deicing products may help. However, these alternative products are usually more expensive than salt, and may have other environmental impacts, which need to be carefully weighed.

- Consider alternative deicers, such as calcium magnesium acetate (CMA), which, when used instead of road salt, has been shown to decrease sodium levels in groundwater. Be sure to consider their expense and potential environmental impacts prior to purchase.
- Use a deicer additive or replacement in order to reduce rate of application. A liquid organic product called Ice Ban,* derived from fermenting and distillation industries, has been shown to be cost-effective used as an additive (it can also be used alone). However, it has raised some concerns about BOD loading. If used alone, it must be applied prior to snowfall.

** This mention does not constitute an endorsement of product.*

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- Apply deicers at the appropriate time to reduce rate of application. Applying before snow falls, based on forecasts, means less material is needed to melt snow. The drawback: if the forecast is inaccurate, the deicer will have been applied needlessly.
- Store salt and deicers on an impervious surface and protected from rainfall to eliminate contamination of runoff.
- Use clean sand, that is, sand free of fines, which are difficult to collect via sweeping and are more troublesome when they reach water bodies.
- Train operators to apply the minimum amount of sand necessary

Other Prevention Measures

Commercial and retail operators can help reduce and prevent accumulation of pollutants by:

- limiting exposure of materials and equipment to rain and snowfall by storing indoors or covering
- promptly cleaning up spills using dry instead of wet cleanup techniques.
- promptly repairing potholes and other pavement damage to help prevent erosion of subbase material.
- training workers about these principles

Snow Storage

Snow piles containing sand and salt that build up over the winter months, generate concentrated releases of sand and salt during spring snow melt conditions. Also, trash and debris usually accumulate in snow piles during snow plowing operations. Therefore, five months of potential pollution accumulation may occur over the winter months for rapid release in the spring.

- Plowed snow should not be directly discharged to lakes, streams or wetlands. Storage locations should be flat and well-drained in order to avoid direct drainage into surface waters.
- Pay attention to the location of snow piles, avoiding nearby surface runoff discharge points and impervious surfaces.
- Install berms, skimmers and detention ponds to settle sediment and trap debris.
- Place snow piles so as to avoid or divert surface water run-on from areas outside the snow piles.
- During spring melt conditions, visually observe the snow piles for runoff/run-on conditions and debris contained in the snow that may be subject to blowing.
- Do not pile snow into wooded areas, around trees or into vegetative buffers. The equipment operators usually try to get the snow as far into the area as possible and wind up striking the tree trunks. These injuries eventually lead to rotting of the trunks and premature tree death.

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Sources

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