

Good Housekeeping and Pollution Prevention on Our Roadways

One of the most important aspects of maintaining good roads is the ability to effectively remove moisture from the roadway and the roadside. Keeping your roads sealed and providing good drainage helps promote the preservation of these roads. However, removing the water from the surface and away from the roadway leads to other issues, particularly related to the movement and distribution of pollution.

Since road surfaces act as a roof like structure over the road bed, it also tends to collect everything that lands on it. The roof on a house collects leaves, nuts, branches and bird droppings which end up clogging the gutter and the downspout. On the road, things like oil, gasoline, road salt, sand, leaves, sticks, animal wastes and sediment are just a few of the things that are collected there. These too, when washed by the rain run into the gutter or drainage ditch and can cause similar clogging problems. But worse, it can carry these contaminants into the local surface and ground water. The difference is that while your roof collects mostly natural items that would occur regardless of whether the house was there or not, the roadway also collects stuff that are not naturally occurring. Some of this “stuff” can come from drips from automobiles, be placed to prevent icing or provide grip on slick roads, or are washed onto the road surface from adjacent land. When these items are washed from the road and into adjacent streams and water bodies, it can cause problems to plant and aquatic life. Some streams and water bodies, trout streams for example, are more sensitive to the effects of this type of runoff than are others and as a result have been a focus of the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency (EPA) with regard to the Clean Water Act, and are identified in the MS4 (Municipal Separate Storm Sewer System) Minimum Control Measure #6.

So what does this have to do with road maintenance? A proper approach to maintaining the roadway and drainage along a road can significantly reduce the impacts that result from the contaminants coming from the road surface. Anyone involved in an MS4 understands the effort that is being promoted to reduce the influences of pollution that is sourced from the roadway. As part of these efforts recommendations have been identified by the EPA and the NYSDEC that can assist everyone that maintains the roadways to help minimize the amount of pollution entering into the local surface and ground waters.

As vehicles pass many of them emit drippings of oil, gasoline, and anti-freeze among other things onto the surface of the road. Dust from shoulders or work sites can also fall and collect on the road surface as well as animal waste and sediment from unvegetated areas.

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In the winter season many roads receive sand and/or salt to provide a better travel surface for vehicles. These things collect and are worked to the side of the roadway over time until a rainfall comes and washes all of these contaminants either into an adjacent ditch or into a catch basin. With this washing of the road surface goes the sediment and contaminants with it. As these things collect in the ditch or in the catch basin they slowly build up until they are either removed or washed further down the drainage system and into a surface water body. Because of this progression down stream the goals in reducing these contaminants are focus on maintaining the drainage facilities to allow them to be collected and not be discharged. This is done through regular inspections and maintenance.

ROAD SURFACE

The first step in protecting your roads and reducing the potential for pollution begins with maintaining the road surface. Keeping the surface sealed and preventing potholes reduces the material from within the pothole from becoming debris and allows for an easier means of maintaining the road through sweeping. The first reactive line of defense in reducing the amount of contaminants from the road surface is to perform street sweeping. Street sweeping, when done properly, can effectively remove many of the contaminants that have collected on the road surface prior to them entering into the ditch or a storm sewer system. This may also substantially reduce other maintenance down the road such as ditch and catch basin cleaning.

Road Repairs and Maintenance

Streets and roadways contribute a significant amount of pollutants to storm water discharge. During the practice of maintaining these roads and streets the potential for additional contributions of pollutants can occur if the work is not done correctly. Each type of maintenance, patching, and resurfacing have its own pollutants associated with the materials used and should be dealt with on a site-specific basis. Pollutants associated with operation and maintenance of roads includes sediment, heavy metals, hydrocarbons (oils & gas), organics and debris.

In reducing the effect of pollution from these maintenance procedures the scheduling of work is important for several reasons. Paving, surface treatments, patching or sealing in dry weather allow the water emulsions initially within the asphalt material to evaporate. This allows the application to cure properly and minimizes the potential for runoff to carry any oils into the nearby drainage system. Conducting the operations during rainy and wet weather not only decreases the curing time for the materials but also encourages the migration of oils off of the road surface. The identification of nearby water bodies and drainage structures is important during the planning stage of a project so that efforts to prevent any material from entering them can be made and protected prior to the beginning of work. Storm drain inlet should be covered prior to work and should remain covered until the job is complete. Any excess material should be removed and the area cleaned prior to removing any covered structures.

The migration of material into any drainage structure, ditch or water body must be prevented. Material stock piles are to be kept away from the street, gutter areas, storm

drain inlets and waterways. Stock piles should be covered during wet weather with tarps or have berms around them to prevent material from being carried off in the runoff. It is recommended to pre-heat, transfer or load hot bituminous material away from drainage systems and waterways.

When using concrete materials, the amount of concrete mixed should be limited to what is needed at that time. When washing out concrete trucks or small mixers do so away from any drainage or water bodies and capture the discharged water and wash out material for proper disposal. Prevent the wash water and aggregate from entering any drainage structures or water bodies. All tools, concrete, metal, wood or other work materials should be kept away from drainage and water bodies as well.

To further minimize runoff from work operations, limit the use of water when saw cutting and controlling dust. Do not hose streets down to remove tracked dirt; it is best to use a street sweeper or vacuum truck when necessary. Do not discharge vacuumed liquid in to storm drains.

Fluid leaks should be minimized through regular inspection and maintenance of all equipment. Any drips from leaking equipment should be caught with pans or absorbent material, and disposed of properly. When refueling or repairing equipment on-site, do so away from storm inlet and water courses. Cleaning equipment every day in either a sink or in a designated wash area that discharges to a sanitary sewer will help maintain equipment and reduce the potential for pollutants from being washed into the environment.

When a job is complete follow up by removing all remaining debris and materials by sweeping or shoveling. Clean all gutters and pavement surfaces and remove from the site.

Street Sweeping

Street sweeping is an effective way to minimize pollutants such as sediment, debris, trash, road salt, and trace metals. Impacts reduced by sweeping include decreasing sediment loading within catch basins and water ways. By removing bacteria laden trash there is reduction in the biochemical oxygen demand that would otherwise occur within the water body, which results in a reduction of available amount of oxygen for fish and other aquatic plants and animals. Sweeping also improves the over all appearance of a municipality and reduces the potential for dust accumulation.

Streets should be swept at least once a year; inspections should be conducted to determine areas more likely to need additional sweeping such as flat areas and low points on roadways. The frequency of sweepings may also be dependent of the volume of traffic, land use, sediment and trash accumulation, and proximity to water bodies. In areas where salt and sand are used for winter maintenance sweeping in the spring is recommended, sweeping in the Fall is also suggested to collect leaves to prevent them from collecting and potentially clogging the drainage system. Sweeping should be done in dry weather. Some areas may require initiating a sweeping schedule to coordinate parking requirements to fully sweep some areas. Wet cleaning and flushing should be avoided and all drainage inlet structures should be covered prior to sweeping.

The effectiveness of street sweeping is dependent on several factors. The type of equipment and how that piece of equipment is operated will directly influence the effectiveness of the process. The effectiveness is also dependent on the condition of the pavement, the operator skill, parking, traffic and the amount of litter and debris that is to be removed.

The debris swept up is considered “construction and demolition debris” due to the contaminants that have collected on the roadway. It is, therefore, recommended that the street sweepings be disposed on in an appropriate landfill. The reuse of these sweepings may be possible but should not be done unless it is tested and shown not to contain any harmful contaminants and in accordance with state and federal regulations. Sweepings may be stored temporarily on site provided that they are covered and stored within a secondary containment structure.

As a measurable quantity an MS4 operator is required to document the number of curb miles swept and either the tonnage or volume of the sweepings collected. This documentation and the documentation of the training of all personnel are required for compliance with the MS4.

DRAINAGE STRUCTURES

Catch Basins

Catch basins are typically located at the curb line and serve to collect surface runoff and direct it to the conveyance system. They are usually equipped with a sump, or an area below the outlet pipe, that captures grit and sediment. The collection of this grit and sediment reduces the potential for them to migrate through the pipes and into the receiving waters. If they are not cleaned regularly, the grit and sediment can collect in the pipes reducing their efficiency or resulting in the clogging of the pipes. To prevent the potential migration of pollutants and to continue their ability to capture pollutants, catch basins should be cleaned periodically. Pollutants commonly found in catch basins are sediments, heavy metals, organic compounds and oxygen demanding substances.

Catch basins should be inspected on a regular basis. Inspections should look to determine the catch basin’s sump capacity and detect any deterioration that may affect the structural integrity of the basin. Inspections should be conducted more frequently during the wet season, particularly in low areas and where sediment and debris typically accumulate. While inspections are being conducted particular attention should be given to detect any evidence of oil spills or noxious or hazardous substances. If such things are detected whether by odor, color or any other obvious visible characteristics, the NYSDEC should be contacted to determine the nature of and source of the spill before it is removed. Regular inspection of catch basin grates should also be conducted to prevent the bypass of runoff which may result in other problems.

Catch basins should be cleaned before the sump reaches 40% capacity; once the sump reaches the 60% capacity mark it reaches a steady state and becomes ineffective. Cleaning should be conducted on a regular basis or as needed. The ideal times to clean

out catch basins are in the fall of the year, after the leaves have fallen and before the snow flies, and in the spring after the winter to remove sand, leaves and other debris.

Cleaning catch basins can either be done manually or by the use of a vacuum truck.

If a catch basin requires replacement it is recommended that a deeper sump be provided. The deeper the sump the more effective the catch basin will be to collect debris and the less frequent the required cleaning will be. Retrofits are offered for existing basins which include internal trays and filters, and hooded outlets. Retrofits are intended to increase the efficiency of the pollutant removal, but require more frequent maintenance.

As with street sweeping, the material removed from the catch basin must be disposed of properly. Unless the material has been identified as contaminated through a spill it may be disposed of in a landfill. Depending on your location sampling of the spoil material may be required to verify whether it is contaminated. This will then dictate how the material should be stored, treated and disposed. Material removed from the basin manually may be stored away from storm inlets and streams. When a vacuum truck is used there are three types of discharges; decant waste water, dump waste water and rinse water. Decant waste water is typically discharged from the truck with a sediment trap and hose. Dump waste water is the discharge of both sludge and water from the truck. Rinse water is the discharge resulting from the cleaning of the truck. Discharge of decant waste water and or any other waste water is not to be discharged to a water course, catch basin or wetland. Liquid removed from catch basins are typically considered to have high contents of pollutants, proper disposal of these liquids is required and should be in accordance with state and federal regulations.

As with street sweepings this is also considered a measurable goal item. In an MS4 area it is necessary to verify the quantity of the material removed from within the catch basins. The quantity must be documented in either tons or cubic yards. Any contaminants found relating to a spill should also be documented with regard to type and quantity, and kept with these documents. The scheduled frequency of the cleaning should also be included with the documentation.

Storm Drain System

Storm drains should also be inspected and cleaned regularly to prevent clogging and to reduce the discharge of pollutants, trash and debris to receiving waters. Clogged drains can lead to clogged catch basins which can result in the runoff by-passing the structure causing erosion and flooding. The pollutants found in the drain system are similar to the pollutants found in catch basins.

The most effective way to clean the drainage system is by flushing with an outside water source. When flushing it is important to capture the water once it has flushed through the system. Depending on the condition of the waste water it may or may not be disposed into a sanitary sewer. Special attention should be given to areas where the piping is flat. These areas typically do not have a high enough velocity flow to flush themselves. Flushing has been found to be most efficient on pipes less than 36 inches and in lengths less than 700 feet.

Roadside Ditches:

Ditches serve several purposes with regard to the road. They collect surface runoff from the pavement and intercept surface water from adjacent properties before it gets to the road. Ditches serve a similar purpose as closed pipe drainage systems, convey storm runoff away from the road and toward a receiving water body. Ditches vary in depth and width depending on their location and who constructed it. Typically, roadside ditches should be constructed shallow and wide to minimize the trapping of vehicles should they enter them, although this is not always the case. Proper maintenance of ditches is important for minimizing the generation of sediment and its delivery to the receiving water body. Proper maintenance should minimize soil exposure and erosion.

When performing maintenance on ditches it is important to consider the proximity of the ditch to the receiving body of water and the potential for channel and bank erosion. Modifications to the channel characteristics may help to improve channel hydraulics, reduce pollutant loads, and improve vehicle safety. If modifications are not feasible or necessary, specific steps should be considered in performing ditch cleaning. Ditches should be cleaned when the ditch has filled to 50% of its capacity. Ditch scraping should be done as necessary and kept to a minimum by doing it in patches with vegetative strips left down slope to capture sediments. If necessary the use of geotextile fabric or sediment mats should be used to minimize erosion. Hydroseeding should be done immediately after scraping is complete. The use of check dams may help reduce the potential of erosion on longer runs of cleaned ditches. When cleaning ditches, it is important to inspect and clean any down slope pipe inlets that may have accumulated sediments. Ditches with a slope greater than 10% may require rip rap or geotextiles installed to reduce the flow velocity and reduce erosion. Ditches should be mowed regularly. Side slopes of ditches should not be stripped of their vegetation since this could result in unnecessary erosion from adjacent properties or runoff from the road. If the soil is exposed the slopes should be reseeded as soon as possible. All work on ditches should be done in dry weather and preferably in late summer or early fall.

Ditch maintenance is also considered a measurable goal item. It is therefore necessary in an MS4 to document the approximate length of ditch that requires reseeding.

VEGETATIVE COVER

Maintaining and re-establishing vegetative cover is one of the more effective methods of reducing erosion and sedimentation. Roadside vegetation stabilizes road sides, prevents sediment transfer to water bodies, and improves the appearance of a roadway. Routine maintenance can help reduce the effects of pollutants in the runoff.

Vegetation in critical areas, such as steep embankments or ditch side slopes, should be inspected regularly and at least once a year to ensure that vegetation coverage is maintained and the potential for erosion is minimized. Inspections in late winter can help identify areas that require reseeding. Areas identified during these inspections should be seeded in mid-spring to ensure growth will take place and to reduce the amount of exposed soil. If an area requires reseeding and fertilizing is proposed, it

is recommended to test the soil to verify if and how much fertilization is necessary. Fertilizer should be used minimally if at all. Seeded areas should be protected for a minimum of one year to allow strong root growth to occur. Herbicides should be used minimally and only in areas where mechanical means prohibited access. Any use of fertilizers or herbicides should be done by trained personnel with knowledge of how to handle and apply them. When planting vegetation native species should be used and located in optimal areas. For information on which plants are best suited and for where, consult the County Soil and Water Conservation District, Cornell Cooperative Extension, USDA Natural resources Conservation Services or a local nursery. Plants should be selected for the climate, shade requirements, soil drainage among other parameters the can either benefit or inhibit the success of the plant's growth.

Reducing the impacts of pollution when ever possible is a good practice. Whether it is required as part of an MS4 or not, keeping these steps in mind will substantially reduce the impacts of pollution that are associated with operating and maintaining a roadway and its drainage structures. Reducing the impacts of pollution will not only improve the quality of the roadside vegetation and the aquatic life in local water bodies, but reduce the potential influence from the roadway contaminants from entering into public and private water supplies.

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