Stormwater Best Management Practice

Roadway and Bridge Maintenance

Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations
Subcategory: Municipal Activities

Description

Daily roadway and bridge use, along with scheduled repairs, can generate substantial amounts of sediment and pollutants. The most common contaminants in highway discharges are heavy metals, inorganic salts, polycyclic aromatic hydrocarbons, and suspended solids. Salting and sanding practices, for example, leave concentrations of chloride, sodium and calcium on the roadway surface. Through ordinary operation and wear and tear, vehicles release metals, hydrocarbons, rubber particles and other solid materials on highway surfaces. Rain and melting snow often wash these materials off the highway and into adjacent waterways (FHWA, 1999).

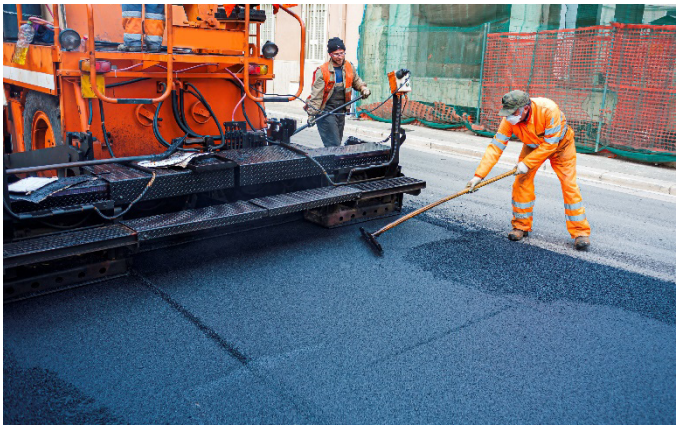
Roadway and bridge maintenance pollution prevention practices can reduce pollutant loadings from existing road surfaces as part of a larger operation and maintenance program. These practices include routine maintenance activities such as sweeping, vegetation maintenance, and cleaning of stormwater discharge control structures. They can also include modification of existing practices such as roadway resurfacing or deicing.

Applicability

Roadway systems make up a large part of urban infrastructure. Because of traffic use and weathering, they need regular repairs and maintenance. The amount of pollutants found on roads and bridges varies, due to climate, traffic volume, and other factors including surrounding land use, the bridge or roadway's design, the presence of roadside vegetation, insecticide use, and the frequency of vehicle accidents and chemical spills. In colder climates, deicing materials applied to roadways can also influence pollutant levels in roadway discharges, thereby affecting local water quality.

Siting and Design Considerations

Proper planning for road and bridge resurfacing is a simple but effective pollution control method. A municipality should schedule roadway inspections throughout the year, and should make sure each inspection includes a careful examination of the function and physical condition of roadway assets and systems including roadway surfaces, drainage structures, vegetation, guardrails and bridges. Municipalities should also map their inspection locations, paying special attention to places that may need extra attention and maintenance (Washington County DLUT, 2017).



Paving operations should be conducted in dry weather.

To prevent stormwater contamination during resurfacing, municipalities should only perform paving operations in dry weather. They should use proper staging techniques to reduce the spillage of paving materials during the repair of potholes and worn pavement. These techniques can include covering storm drain inlets and manholes during paving operations; using erosion and sediment controls to decrease discharges from repair sites; and using drip pans, absorbent materials and other pollution prevention materials to limit leaks of paving materials and fluids from paving machines. Lastly, using porous asphalt for shoulder repair can reduce the amount of stormwater generated from roadway systems. For more information on permeable materials, see the Permeable Pavement fact sheet.

Sweeping and vacuuming heavily traveled roadways to remove sediment and debris can reduce the amount of pollutants in stormwater (see the Parking Lot and Street Sweeping fact sheet). Regular cleaning of stormwater control structures, such as catch basins, can help reduce

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sediment loads in discharges that will end up in local waterways (see the Stormwater Inlet BMPs and Storm Drain System Cleaning fact sheets).

Proper application of deicing materials on roadways also limits stormwater pollution. By routinely calibrating spreaders, a program manager can prevent the over-application of deicing materials. Besides reducing these materials' effects on the aquatic environment, this practice can save money through more efficient material use. Training transportation employees in proper deicer application techniques, timing and type will also help reduce impacts on water quality and aquatic habitat. See the Deicing Material Application and Storage fact sheet for more information.

Maintenance practices for roadside vegetation can improve its stormwater treatment performance. Restricting the use of herbicides and pesticides on roadside vegetation, and training employees on the proper handling and application of pesticides and other chemicals, can help prevent contamination of stormwater. Choosing roadside vegetation with higher salt tolerances will also help to maintain the health of practices such as vegetated swales and biofilters. For more information on roadside vegetated stormwater practices, see the Vegetated Filter Strip and Bioretention fact sheet.

The EPA's National Management Measures to Control Nonpoint Source Pollution from Urban Areas provides more information on how bridge and highway design and maintenance practices can address stormwater pollution.

Besides the roadway practices listed above, improved bridge siting, design and maintenance practices can help reduce water quality impacts. Several studies have shown that scupper drainage that directly enters adjacent waters can result in localized increases of metal concentrations in sediments and in aquatic biota (Transportation Research Board, 2002). Avoiding scupper drains in new bridges and routinely cleaning existing ones to prevent sediment and debris buildup can help. Program managers should also consider retrofitting scupper drains with catch basins or closed pipe systems to redirect stormwater to vegetated areas or other stormwater treatment practices. Other techniques to help reduce pollutant discharges to receiving waters include using suspended tarps, booms or vacuums to capture paint, solvents, rust, paint chips and other pollutants generated by regular bridge maintenance. Additionally, sodium chloride, a common deicer, corrodes metal bridge supports, not only increasing maintenance costs but often leaving corroded material in local waterways. Municipalities should consider less corrosive alternative deicing materials like glycol, urea or calcium magnesium acetate (CMA) for bridge deicing.

Limitations

Pollution prevention practices for road and bridge maintenance come with costs for equipment, maintenance and training. However, since all communities already need to maintain roadways and bridges, they usually have staff and may not need to change their practices or add staffing or administrative labor.

A new bridge's location may be a limitation. If it is near sensitive waters, it may need a better design to adequately treat stormwater. Community requirements may restrict the size of paved areas to limit impervious surface; this can affect roadway and shoulder widths.

Cost Considerations

Most community public works or transportation departments allocate considerable funding to the maintenance of local roads and bridges and the cost of incorporating pollutant reduction strategies will likely be insignificant relative to existing expenditures. New York state, for example, spent $3.6 billion on roadways and bridges in 2018, and more than a third of that went to maintenance and preservation (CBCNY, 2019). These costs attributed to stormwater-related maintenance and generally involve the training and equipment required to apply new stormwater practices.

Strategic planning may also help offset implementation costs. For example, incorporation of road and bridge pollution prevention practices by a community's transportation department may benefit the environmental or stormwater department. Communities working to address metal or sediment impairments through the Total Maximum Daily Load (TMDL) program may be able to gain credit for road and bridge practices that demonstrate a reduction in these pollutant loadings. Similarly, scupper retrofits that redirect stormwater to an approved treatment practice may help offset municipal treatment requirements.

Additional Information

Additional information on related practices and the Phase II MS4 program can be found at EPA's National Menu of Best Management Practices (BMPs) for Stormwater website

References

Citizens Budget Commission (CBCNY). (2019). *Building a sound fiscal future for New York's highway and mass transit systems.*

Federal Highway Administration (FHWA). (1999). *Is highway runoff a serious problem?*

Transportation Research Board. (2002). *Assessing the impacts of bridge deck runoff contaminants in receiving waters (Vol. 2)*.

U.S. Environmental Protection Agency (EPA). (2005). *National management measures to control nonpoint source pollution from urban areas, management measure 7: Bridges and highways*.

Washington Country Department of Land Use and Transportation (DLUT). (2017). *Routine road maintenance water quality and habitat guide best management practices*

Disclaimer

This fact sheet is intended to be used for informational purposes only. These examples and references are not intended to be comprehensive and do not preclude the use of other technically sound practices. State or local requirements may apply.