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Minnesota Stormwater Manual



Sediment control practices - Vehicle tracking BMPs

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A vehicle tracking BMP is a rock (stone, gravel) pad, shaker rack, wheel washer, or other BMP designed to remove soil and mud from vehicles leaving the work zone and entering offsite areas, such as public roadways and public or private parking lots.

Purpose and function

Vehicles leaving construction sites track sediment onto adjoining roadways. This sediment can create safety hazards and contribute significantly to sediment pollution in waterways. The purpose of a vehicle tracking BMP is to prevent soil and mud on work vehicles from being carried offsite and deposited on public roads, parking lots, and other areas. Temporary site entrances/exits are used during the construction period, prior to the time when roadways, parking lots, and other areas are either paved or stabilized. Vehicle tracking BMPs limit the amount of sediment and other pollutants leaving the construction site and reduces discharge of sediment and pollutants to surface waters. Pollutant removal is primarily accomplished through the removal of soil and mud from construction equipment, including nutrients and heavy metals that are associated with sediment (see [section on Effectiveness](#)).

Caution: To the extent feasible, [erosion prevention practices](#) such as [stabilization](#) are preferred to [sediment control](#) practices.



Properly constructed BMP for vehicle tracking.



Example of a site with poor vehicle tracking practices.

Applicability

Vehicle tracking BMPs are installed at all construction sites where there is a risk of mud and soil clinging to vehicles leaving the site.

Site applicability

Vehicle tracking BMPs are appropriate during the construction period for all sites with vehicles passing through disturbed areas prior to entering public roadways or other offsite areas.

Permit applicability

The [2018 Construction Stormwater permit](#) states: In any areas of the site where final vegetative [stabilization](#) will occur, permittees must restrict vehicle and equipment use to minimize soil compaction. Permittees must install a vehicle tracking BMP to minimize the track out of sediment from the construction site or onto paved roads within the site. Permittees must use street sweeping if vehicle tracking BMPs are not adequate to prevent sediment tracking onto the street. In any areas of the site where final vegetative stabilization will occur, permittees must restrict vehicle and equipment use to minimize soil compaction. Permittees must inspect construction site vehicle exit locations, streets and curb and gutter systems within and adjacent to the project for sedimentation from erosion or tracked sediment

from vehicles. Permittees must remove sediment from all paved surfaces within one (1) calendar day of discovery or, if applicable, within a shorter time to avoid a safety hazard to users of public streets.

If permittees wash the exterior of vehicles or equipment on the project site, washing must be limited to a defined area of the site. Runoff from the washing area must be contained in a sediment basin or other similarly effective controls and waste from the washing activity must be properly disposed of. Permittees must properly use and store soaps, detergents, or solvents. No engine degreasing is allowed on site.

Effectiveness

Properly installed, and maintained vehicle tracking BMPs are effective at removing mud and soil from vehicles leaving the site. The overall effectiveness can range from low (less than 30 percent soil removal) to moderate (30 to 60 percent removal) for rock pads and shaker racks, depending on the design, installation, frequency of use, and maintenance. For example, effectiveness of rock pads will decrease as rock voids become clogged with soil and mud. To prevent this, the rock must be periodically toppedressed with additional rock, replaced, or the length of the pad increased. Properly installed and operated wheel washer units are effective at removing more than 75 percent of sediment in nearly all applications. The following table summarizes expected performance for an array of typical water quantity and quality target constituents for temporary vehicle tracking BMPs.

Expected performance for temporary vehicle tracking BMPs.

Link to this [table](#)

Water quantity	
Flow attenuation	Little or no design benefit
Runoff volume reduction	Little or no design benefit
Water quality	
Erosion prevention	Little or no design benefit
Sediment control	Primary design benefit
Nutrient loading	Secondary design benefit
Pollutant removal	
Total suspended solids	Primary design benefit
Total phosphorus	Secondary design benefit
Heavy metals	Secondary design benefit
Floatables	Little or no design benefit
Oil and grease	Little or no design benefit

Planning considerations

When planning a vehicle tracking BMP, the following guidelines should be followed.

- Install the vehicle tracking BMP prior to any land disturbing activity.
- All construction traffic should be limited to exiting the site through these designated locations.
- Locate vehicle tracking BMPs on well drained areas if possible, such as on hilltops or upper slopes.
- Keep exit pads away from streams and wetlands if possible.

- Ensure traffic safety at exit points in addition to siting exits in well drained locations.
- Avoid siting exits at dips, low spots, and areas that stay wet or remain wet after precipitation.
- Exit pads can be set back off the roadway if there is no risk of tracking mud or debris after vehicles traverse the pad. For example, an exit pad could lead to a gravel access road connecting the site to a paved roadway, rather than immediately adjacent to the roadway.
- For most sites with a low risk of sediment tracking, a rock exit pad will suffice if it is located, installed and maintained properly.
- Sites with moderate and high-risk of sediment tracking may require a shaker rack or a wheel washer.
- Where wheel washers are used, a source of wash water is required.
- The use of a wheel washer also requires a turnout or doublewide exit to avoid entering vehicles having to drive through the wash area.
- Sediment that collects on or adjacent to the exit pad will need to be managed by a trap or other BMP, to keep it from moving off-site.
- When planning the most effective entrance/exit, the following should be taken into account:
 - Underlying soils on site – silty and clayey soils cling more readily to tires, and require longer or otherwise more effective exit pads.
 - Frequency of use – heavier traffic will wear out small, thin rock pads quickly.
 - Length and width of the entrance/exit –longer, wider pads can accommodate heavier traffic and more challenging soils (e.g., clays, silts).
 - Depth of rock – Thin rock layers do not scrape mud off tires as effectively as thicker rock pads.
 - Size and type of vehicles – tractor trailers and heavy delivery trucks require a thicker, longer exit pad than exits serving pickup trucks and automobiles.
 - Frequency of maintenance – exit pads sited in wet conditions, with clay or silt soils, and used frequently by heavy vehicles will require more frequent cleaning and maintenance than those located in well drained, sandy areas and used by light vehicles less frequently.

Design and construction

In this section, design and construction guidance is provided for three designs:

- Rock/stone pad (vehicle tracking pad)
- Shaker rack
- Wheel washer/wash rack

All three designs include the planning and siting information discussed above, along with considerations for managing sediment that accumulates at the site. For most applications, the vehicle tracking BMP area can be graded to facilitate drainage toward a stabilized swale or ditch which empties into a treatment area. This treatment area can include a sediment trap, a curved section of silt fence (i.e., with the ends turned uphill to prevent bypasses), a sediment pond, or other sediment removal device. Additionally, a pipe, culvert, or water bar can be constructed as part of the BMP if needed to prevent surface water and runoff from flowing across the entrance and out onto paved roadways.

Rock/stone pad (vehicle tracking pad)

Rock/stone pads remove material from vehicle tires through physical scraping action. Additionally, vehicle tracking pads can be installed to provide a barrier and keep the truck wheels from coming in contact with wet, sticky underlying



Vehicle tracking rock pad at site entrance/exit rock. Source: Created by Tetra Tech for US EPA and State of Kentucky.

soils. The amount of construction traffic and frequency of use should be considered when designing a vehicle tracking pad. Specific design requirements include the following:

- Exit pads constructed of rock should be of sufficient width to treat the widest vehicles.
- Pads should be a minimum 20 feet wide and 50 feet long. Longer pads should be used if needed to remove mud, soil, and rock from tires.
- The pad can be laid at grade on the exit road – excavation is not required.
- Rock used for the pad should be coarse aggregate of sufficient size to remove mud from vehicles (e.g., approximately 2 to 6 inches, depending on site conditions). Generally, the larger the aggregate, the better.
- Pad thickness should be sufficient to remove material from tires – 6 to 12 inches.
- The rock pad should be underlain with nonwoven geotextile fabric, to prevent subsidence and migration of mud from underlying soil.
- A turning radius of 20 feet should be included on each edge where the pad intersects the road.
- Design so that drainage from the pad area leads to a trap, silt fence, or other BMP for settling.



Example vehicle tracking pad. Source: City of Milwaukee.

Shaker rack

Shaker racks – also called exit grids, rumble strips, rumble racks, rumble plates, etc. – remove material from vehicle tires through bouncing and shaking action. These are appropriate when the rock pad alone is not sufficient to remove sediment from tires. Wheel washers (see below) may be necessary if rock pads and shaker racks are ineffective. Where used, shaker racks must be long enough and create enough rumble or shake to dislodge mud, soil, and rock. They can be fabricated from concrete or metal (i.e., similar to cattle guards), or acquired from construction site stormwater compliance vendors. Specific design requirements include the following:

- Shaker rack exit pads should be of sufficient width to handle the widest vehicles.
- Pads should be long enough to remove mud, soil, and rock from tires.
- Racks with less than 4 inches of soil storage space below the top of the rack should be installed over a 6 inch pad of coarse aggregate.
- Design so that drainage from the pad area leads to a trap, silt fence, or other BMP for settling.



Example shaker rack installation. Source: Tetra Tech.

Wheel washer/wash rack

In many cases, the action of tires moving over the rock pad may not adequately remove sediment, and a wash rack may be required. Wheel washer systems – also called wash racks – use pressure-sprayed water to remove mud, soil, and rock from vehicles exiting the site. They can be fabricated from piping, hoses, driveway racks (e.g., concrete and metal cattle guards), and other materials, or acquired from construction site stormwater compliance vendors. Designs range from pipe units that can be hung from Jersey wall sections to wash stations that include elevated driveways above sediment trapping basins. Specific design requirements include:

- Washer spray must be directed to remove material on the inside as well as outside of wheels.
- Design so that drainage from the wheel wash area leads to a trap, silt fence, or other BMP for settling.

- Wash water migrating off the site will need to be treated to remove sediment (e.g., via a sediment trap, rock berm, or sediment pond) or recycled.
- Consider ice buildup on roadways as dripping vehicles leave the site during cold weather.

A wash rack installed on the rock pad may make washing more convenient and effective. The wash rack would consist of a heavy grating over a lowered area. The grating may be a prefabricated rack, such as a cattle guard, or it may be constructed on site of structural steel. The wash rack must be strong enough to support the vehicles that will cross it.



Example commercial wheel wash system.
Source: Meeds Environmental, LLC

Standards and specifications

[MnDOT Standard Plan 5-297.405](#) provides standard detail for “Construction Exits” (effective date: 8/6/2014). BMPs covered include “Slash Mulch, Crushed Rock, or Sheet Pad Construction Exit” and “Rumble Pad Construction Exit” (See page 31, Standard Plan 5-297.405, 5 of 7).

[MnDOT Specification 2573.3.K](#) (Construction Exit Controls) provides guidance for exit type selection and use, and ranks exit controls from lowest to highest protection. Specification 3882 (Mulch Material) may also be applicable, depending on the exit type selected (See page 507).

Inspection

Vehicle tracking BMPs require continuous monitoring, especially during and after rain events and during snowmelt, due to the risks posed by mud, soil, and other debris on roadways – especially high speed urban and rural highways. Specific inspection requirements include the following.

- Check continuously for mud and soil deposits on offsite roads and other areas.
- Inspect sediment deposition area for accumulations that affect exit pad performance.
- Ensure that exit pad area has positive drainage toward treatment BMP device/area.
- Inspect exit pad drainage ditch or swale to ensure proper vegetation or other stabilization.
- Inspect downgradient sediment treatment BMP to ensure ongoing effectiveness.
- During cold weather, monitor any drip-induced ice buildup on offsite paved surfaces.

Maintenance

If site inspection(s) reveal concerns, maintenance will be necessary. Maintenance of vehicle tracking BMPs includes the following:

- Immediately remove mud, soil, and other debris from offsite areas – particularly roadways.
- Remove sediment that accumulates in the pad area, ditch/swale, or nearby stormwater facilities if performance is affected.
- Revegetate or otherwise stabilize eroding ditches, swales, or traps/basins treating exit pad runoff.
- Adjust the vehicle tracking BMPs to ensure proper functioning if performance is poor, including the following:
 - Clean or add rock – including larger rock, or extend the length of rock pads.
 - Regrade rock as needed to ensure positive drainage.
 - Extend the length of shaker racks; ensure drivers use enough speed to dislodge debris.

Maintenance of wheel washers/wash racks includes the following:

- Ensure wash water drainage, collection, and treatment systems are functioning.
- The wash water collection area should be regularly cleaned out to ensure sediment is contained properly.
- Remove/dischage wash water as needed.
- Maintain a clean run-out pad.
- Adjust wheel washer nozzle direction and spray pressure, and add nozzles as needed.

Cold weather considerations include the following:

- As with summer months, additional rock/aggregate should be readily available for top dressing and maintenance of the pad throughout winter.
- Construction sites should maintain a functioning vehicle tracking BMPs during the winter even if no construction activities are taking place.
- Use salt or sand if ice accumulates on roadways due to dripping caused by wheel washer.
- Plowing and street sweeping may be needed to ensure mud does not remain on roadways.
- Promptly remove sediment and sediment laden snow and ice on roadways prior to spring melt.

Costs

The following estimated BMP cost is based on [MnDOT data](#) summarizing average bid prices for awarded projects in 2014.

- Bid item 2573.535/00010, stabilized construction exit - \$5,763.08

Reference materials

Except where more stringent requirements are presented in this guidance, vehicle tracking BMPs shall comply with MnDOT and other state requirements. Primary design references include:

- [MnDOT Erosion Control Handbook II](#)
- [Minnesota Urban Small Sites Best Management Practice Manual \(Vehicle Tracking Pad\)](#)
- [2018 Minnesota NPDES/SDS Construction Stormwater General Permit](#)
- [MnDOT Standard Specifications for Construction \(2016 Edition\)](#)
- [MnDOT Standard Drawings for use in Construction Plans](#)

The following is a list of additional resources that are not specific to Minnesota:

- [Clean Water Services Erosion Prevention and Sediment Control Manual \(4.2.2 Construction Entrance, 4.2.13 Tire Wash Facility\)](#)
- [North Carolina Erosion and Sediment Control Planning and Design Manual \(6.06 Temporary Gravel Construction Entrance/Exit\)](#)
- [Tennessee Department of Environment and Conservation \(TDEC\) Erosion and Sediment Control Handbook \(7.28 Construction Exit, 7.29 Tire washing facility\)](#)
- [Virginia Erosion and Sediment Control Handbook \(3.02 Temporary Stone Construction Entrance\)](#)
- [Clark County Washington Stormwater Manual \(BMP C105: Stabilized Construction Entrance/Exit, BMP C106: Wheel Wash\)](#)
- [Best Management Practices \(BMPs\) for Controlling Erosion, Sediment, and Pollutant Runoff from Construction Sites. University of Kentucky, 2009](#)
- [Delaware Erosion and Sediment Control Handbook. 2003](#)

Related pages

- [Stabilization practices](#)
- [Erosion prevention practices](#)
 - [Erosion prevention practices - temporary seeding and stabilization](#)
 - [Erosion prevention practices - natural and synthetic mulches](#)
 - [Erosion prevention practices - tackifiers and soil stabilizers](#)
 - [Erosion prevention practices - erosion control blankets and anchoring devices](#)
 - [Erosion prevention practices - turf reinforcement mats](#)
 - [Erosion prevention practices - Riprap](#)
- [Sediment control practices](#)
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 - [Sediment control practices - Check dams \(ditch checks, ditch dikes\)](#)
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