Highway Maintenance Guidelines
Chapter 6: DRAINAGE
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

HIGHWAY MAINTENANCE GUIDELINES

DRAINAGE

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6.0000 DRAINAGE MAINTENANCE GUIDELINES ON STATE HIGHWAYS

6.0100 Overview

This section of the *Highway Maintenance Guidelines* provides guidance and best practices for maintenance of:
- Roadside ditches
- Slopes and retaining walls
- Culverts and closed drainage systems
- Stream channels and rip rap and
- Stormwater Management Facilities, including Catch Basin Inserts, Stormwater Management Ponds, Hydrodynamic Devices and Infiltration Trenches

Because of recent changes to environmental statutes and regulations, environmental guidance and permit information is offered on an asset specific basis and in section 6.6000 Environmental Considerations for Drainage Maintenance.

6.1000 ROADSIDE DITCHES

6.1100 General Principles

To maintain ditches so that surface water is collected, contained and carried away without eroding roadway sections and to prevent the water seepage into the road subgrade, and to allow the subgrade to drain. While it may not be necessary to deepen ditches, the typical minimum depth of a ditch to drain the roadway subgrade is approximately 30 inches below the edge of the travel lane.

Outlet ditches and drainage easements should be periodically cleaned and cleared of excessive sediment, trees, brush and other vegetation that inhibit the flow of water for which the outlet ditch and easement was intended.

In general, ditch maintenance should preserve the originally constructed ditch profile. However, in cases where ditches have been shown to be undesirable, the following modifications can be implemented:
- realigning or relocating farther from the road with flatter fore slopes and back slopes
- raising the ditch bottom with material adequate for hydraulic conditions (may need to check capacity and to ensure adequate drainage of subgrade),
- rounding the intersection of the ditch fore slope, ditch bottom, and ditch back slope,
- shielding the ditch approaches with an appropriately designed barrier,
- converting to a closed drainage system.
Additional information pertaining to ditches can be found in the Department’s Highway Design Manual – Chapter 8.

6.1200 Types

There is no single best ditch for all situations. The best ditch will provide adequate performance for the least cost. When considering cost, construction, maintenance and environmental performance need to be taken into consideration. Ditches that are inexpensive to construct may require more maintenance. Also, safety is an important consideration when selecting a ditch type.

In general, broad and shallow ditch cross-sections are more desirable than deep and narrow sections especially where the ditch is vegetated. Velocity of flow is less in the broad and shallow section, which gives vegetation a better chance to establish and provide erosion control. They are also aesthetically better and easier to maintain. In rural residential areas, the adjacent property owner will generally mow the ditch areas and maintain it as part of their lawn.

6.1300 Shapes

The three basic ditch shapes are (1) Circular (2) Rectangular and (3) Trapezoidal.

6.1301 Circular Ditches

Circular ditches are good where the right-of-way is narrow. They are the easiest to shape with an excavator. If the sides are too steep, they can be difficult to mow and be hazardous to cars leaving the shoulder. Circular ditches placed too close to the edge of shoulder can remove lateral support along shoulders leading to widening of drop offs and other pavement distress.

Circular
6.1302 Rectangular Ditches

Rectangular ditches are used in areas of high flow through confined areas. They may be multi-step construction and usually require walls such as concrete or gabions to maintain their shape. Where rectangular ditches are needed, guiderail may be required to protect traffic.

6.1303 Trapezoidal Ditches

Trapezoidal ditches are the preferred shape if there is room in the right-of-way to construct them. They are the easiest to mow and maintain and the reduced side slopes improve safety along the highway. The flat bottom reduces the height of flow, which decreases the energy in the flowing water and reduces the chance of erosion. Trapezoidal ditches can be constructed with an excavator, grader or a dozer. The V-ditch is a form of trapezoidal ditch; a V-ditch has the highest depth of flow which could increase erosion in high-flow locations.

6.1400 Types of Cover

The four basic types of ditch cover are (1) vegetated (2) Asphalt Paved (3) Concrete Paved (4) Stone Lined

6.1401 Vegetated Ditches

Vegetated ditches are the most common type. Turf must be established in all vegetated ditches as soon as possible to prevent erosion and minimize the opportunity for invasive plants to establish in the newly established ditch profile. Vegetated ditches require more frequent maintenance than other types, but are easy to maintain with mowing and periodic cleaning. Vegetated ditches should be cleaned, as needed, when the ditch is not performing as designed. When cleaning, take care to maintain the proper side slopes and depth. Vegetated ditches may erode
under high-velocity flows, particularly if they are already filled with sediment, which reduces their capacity.

6.1402 Asphalt Paved Ditches

**Asphalt paved ditches** may be used where erosion is a problem. They have little potential for erosion unless they are overtopped or become cracked or broken. Asphalt paved ditches tend to increase velocity and capacity. The increase in velocity may require outlet protection. They do require periodic crack sealing and must be kept clean of sediment and debris to avoid becoming a vegetated ditch. If asphalt ditches are not properly maintained, slower flow, and therefore deeper flow, may lead to overtopping. Asphalt ditches do increase water temperature and may be undesirable in environmentally sensitive areas, such as near trout streams.

6.1403 Concrete Paved Ditches

**Concrete paved ditches** may also be used where erosion is a problem. Like asphalt ditches, they offer little potential for erosion unless they are overtopped or become cracked or broken, and they tend to increase velocity and capacity. The increase in velocity may require outlet protection. Concrete ditches are more expensive to construct than asphalt ditches, but require less maintenance. They require periodic joint sealing and must be kept clean of sediment and debris to avoid becoming a vegetated ditch and to prevent overtopping. Concrete ditches will also increase water temperature. However, the temperature increase is less severe than asphalt lined ditches.

6.1404 Stone Lined Ditches

**Stone lined ditches** lower water velocity and prevent erosion. Adding stone to a ditch reduces the ditch volume and its flow capacity. It is important that adequate size stone be used to prevent wash-outs and erosion. If needed the Resident Engineer can follow up with other groups for stone sizing. Stone lined ditches are difficult to clean. Once the stones fill in with sediment, vegetation may grow in the ditch. Because of the stone lining it may not be possible to mow the vegetation.
### 6.1405 Summary of Ditch Types

<table>
<thead>
<tr>
<th>DITCH TYPE</th>
<th>MAINTENANCE REQUIREMENTS</th>
<th>PROS</th>
<th>CONS</th>
</tr>
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</table>
| Vegetated  | - Mowing and Periodic cleaning | - Low cost to construct  
- Easy to maintain | - May erode under high flows  
- Can host invasive species  
- May have trouble establishing vegetation cover  
- Requires most R.O.W. to provide more stable fore and back slopes |
| Asphalt Paved | - Cleaning of sediment and debris  
- Period crack sealing  
- Outlet protection may be required | - Increased velocity and capacity over vegetated ditches  
- Little potential for erosion with increased velocity | - More maintenance required than concrete ditches  
- Raises water temperature\(^1\)  
- Increased velocity may lead to scour at the outlet |
| Concrete Paved | - Cleaning of sediment and debris  
- Periodic joint sealing  
- Outlet protection may be required | - Little potential for erosion  
- Less maintenance than asphalt ditches | - Higher cost to construct  
- Raises water temperature\(^1\)  
- Increased velocity may lead to scour at the outlet |
| Stone Lined | - Typically routine maintenance is not required. | - Lowers water velocity  
- Prevents erosion | - Can reduce volume of ditch  
- May require replacement  
- Sediment may lead to vegetation  
- Can host invasive species  
- Unable to mow |

Note 1. Increased water temperature can be critical in watersheds that contain trout streams.

### 6.1500 Inspection

**Inspection:** A road patrol inspection should be made each spring after snow and ice melt and after each heavy rainfall. Needed work should be recorded for the scheduling of necessary repairs.

1. The ditch line should be uniform and free of obstructions
2. Check side slopes of ditches for erosion and possible need for protection from erosion
3. Check condition of ditch paving materials
4. Check for growth of brush or other undesirable vegetation such as purple loosestrife, common reed (phragmites) or cattails.

### 6.1600 Method

**Method:** Vegetated ditches are to be graded and cleaned as needed. After eroded areas are filled, use any excess material to flatten road slopes as R.O.W. permits. Disturbed areas should be seeded to prevent erodible material from migrating to downstream habitats. In ditches where excessive erosion occurs, it will be necessary to flatten the grade by using small check dams, or upgrading protection by the use of one of the paved types of ditch lining. Velocity of water, volume...
carried and availability of materials will determine the type of protection to be used.

Remove any brush growth in ditches that impedes the free flow of water. Permanent features such as check dams and sand filters should not be removed or disturbed as part of ditching operations. If removal is necessary the feature should be reconstructed.

Vegetated ditches are to be repaired as necessary. See Section 3.150 Seeding (in Highway Maintenance Guidelines) for repair method. Cracks and joints in asphalt concrete paved ditches should be sealed with cutback or crackfiller. The mortar in cobble stone gutters and concrete paved gutters should be repaired or replaced as necessary and the joints should be sealed with crackfiller. Undercut sections of paved gutter may require removal and replacement with the addition of end dams or cut-off walls to prevent this underflow of water.

6.1700 Erosion and Sediment Control

Ditching requires careful planning. A plan should be developed that will identify the control measures needed during ditching operations. These measures may use existing vegetation or man-made devices to control sediment and erosion. In most instances, limit clearing of ditch vegetation to the area of need. Establishing ground cover through hydro seeding or other methods should also be done to stabilize ditches and prevent additional erosion.

Ditching operations to restore existing ditches to original line, grade and function do not require State Pollutant Discharge Elimination System (SPDES) permitting to address stormwater. Stormwater runoff needs to be managed through appropriate erosion and sediment control techniques. Refer to Section 3.460 (in Highway Maintenance Guidelines) for further information.

6.1800 Goal

To maintain ditches in a condition such that surface runoff water is collected and carried along and away from the highway without erosion of road section, damage to the adjacent properties, degradation of the environment or saturation of subgrade.

Ditches should be cleaned when not functioning as designed. Indications they are not functioning include ponding of water due to non uniform bottom profile, driveway pipe grades that do not permit continuous flow and deterioration of adjacent pavement, which may indicate poorly drained subgrade. Paved ditches should be maintained in a condition that ensures a smooth and impervious surface with cracks and joints sealed to prevent underflow of water.
6.2000 DRAINAGE FOR SLOPES AND RETAINING WALLS, including top of slope ditches, toe drains, and retaining walls including wall weeps and footing drains

6.2100 General Principles

To maintain slope and retaining wall drainage in a condition that provides positive drainage at the top and toe of slopes and retaining walls. Positive drainage deters excessive erosion and saturation of slope soils, or areas behind retaining walls, that may lead to failure. The lack of proper intercept of runoff at the top of slopes, or obstructions which allow intercepted water to pond, may cause excessive erosion where water runs over the slope face. Channels that may form on slope faces will continue to erode and become more severe if not paved or armored with stone. Ponding of water due to insufficient or poorly maintained drainage at the top and/or toe of slopes contributes to saturated conditions of slope soils and may lead to sloughing and slope failure. Lack of properly functioning drainage at the top, toe and behind retaining walls decreases the strength of the supporting soils and may cause movement of the wall or surrounding slopes or may lead to damage due to freeze and thaw cycles.

6.2200 Inspection

Inspect slopes and top of slope ditches in the spring and after extreme heavy rain. Note any work that is required to keep top and bottom of the slope drainage free flowing. Also note any ponding, saturated slope areas, signs of slope movement, loose rock, eroded slopes, or other slope related concerns. Early detection of developing problems may prevent more serious failures.

6.2300 Method

6.2301 Top of Slope Ditches

Interceptor ditches located at the top of slope may be difficult to access for cleaning. Selection of proper equipment needs to be considered early in work planning. Take care not to scar or rut the slope face and make it susceptible to erosion or surface ponding.
6.2302 Toe of Slope Drainage

Toe of slope drainage should be kept free of any ponding that may lead to saturation of slope supporting soils. Where there is not sufficient offset for an adequate ditch section in cut slopes, a stone lined trench drain or paved gutter with added subsurface drainage (underdrain) may be needed. When cleaning or reshaping ditches, care should be taken to avoid undercutting the toe of slopes which may result in slides.

6.2303 Retaining Wall Drainage

A ditch or swale should be located above retaining walls and should be kept clean and functioning to prevent ponding or runoff over the face of the wall. Weeps need to be kept open, making sure to remove any deposited material that may obstruct outlets.

6.2304 Erosion and Slide Area Repair

Minor sloughing or slope erosion may be repaired using cobbles or stone filling to armor these locations. Remove any slide material that may block toe of slope drainage as soon as possible to avoid further saturation of soils and failure. Any failure areas should be investigated for the cause and source of water and measures developed to intercept the water to prevent recurrence. The regional geotechnical engineer may be contacted for guidance.

6.2400 Goal

To maintain slope and wall drainage to function in a manner that prevents slope saturation, failure or erosion.

6.3000 CLEANING AND REPAIR OF CULVERTS AND CLOSED DRAINAGE SYSTEMS

6.3100 General Principle

To maintain culverts and closed drainage systems in a workable condition so as to safely carry away collected surface and subsurface water.

6.3200 Inspection

Inspect large culverts in accordance with the criteria stated in the Culvert Inventory and Inspection Manual. Closed drainage systems and small culverts should be inspected on a attainable schedule based on available resources. Storm events and known problem locations may warrant additional inspections.
Check catch basins (CB's), man holes (MH's), and drainage inlets (DI's) to determine necessary structural repair work. Check that frames and grates are clear of debris; note any properly seated sumps which need cleaning for scheduled cleaning. Check pipe culverts for the condition of pipe, condition of headwalls, and alignment of entrance and outlet ditches. Inspect pavement over culverts and around drainage structures for distress, which may be an early sign of problems. Check inlet and outlet ends of pipe culverts for obstructions. Bring conditions affecting highway drainage, that are outside the highway ROW, to the Resident Engineer’s attention for evaluation. Subsurface drains should have free flowing outlets. Immediately remove any debris causing severe obstruction to flow.

When working with culverts and closed drainage systems it is important to review Department worker safety policies. The Regional Safety Officer can provide the necessary guidance concerning confined space entry, working in proximity to water and personal protective equipment. Additional information may be obtained in the Department’s *Transportation Maintenance Safety Manual*.

6.3300 Method

Make necessary repairs to concrete and masonry structures as required to provide structurally sound units. All grates and covers should be seated properly. Improperly seated or loose grates and covers may be corrected by application of mortar or asphalt emulsion on the cover seat. Remove and replace defective and broken grates and covers. Frames that support grates and covers should have 100 percent contact with the supporting structure. The sumps for structures should be cleaned to maintain storage so that silt, sand and stones will not be washed into pipes causing possible plugging. Areas that drain to a closed drainage system should be swept annually to limit the amount of debris entering the system. Outlets for subsurface drains should be free flowing. Mark the outlets for french drains and drain tile to make future location of them easier.

Culverts that require replacement should be brought to the attention of the Resident Engineer for review. If the culvert passes a regulated stream the Resident Engineer should contact the Maintenance Environmental Coordinator (MEC) for guidance.

6.3400 Environmental

Before beginning work it is essential to determine whether the water carried by the culvert or closed drainage system is a stream and whether the culvert is located in a wetland. Consult with the Maintenance Environmental Coordinator (MEC) and Department of Environmental Conservation (DEC) personnel. See section 6.6000 (in *Highway Maintenance Guidelines*) for more details.

Maintenance of culverts that do not carry streams and are not located in wetlands is not regulated. For maintenance work in regulated streams contact the
Maintenance Environmental Coordinator. Nonetheless it is important to use good environmental practices, particularly sediment control, when cleaning culverts and closed drainage systems. These systems often have outfalls to streams, wetlands and/or coastal waters. It is also important to recognize, and minimize the spread of, invasive plant species located in the work area. Consult with your Maintenance Environmental Coordinator (MEC) for guidance in working in areas with invasive plants.

6.3500 Goal

To maintain drainage structures in a safe structural condition and to efficiently carry runoff away from traffic areas. All drainage facilities should be maintained so that there is structural soundness and each facility is clean to allow free flow of water. Culverts should be cleaned when any form of obstruction severely decreases its performance. Natural bottoms in culverts should be preserved to enhance fish habitat and facilitate passage. Sumps should be cleaned when 50 percent filled to allow free and efficient flow with adequate storage for debris.

6.4000 MAINTENANCE AND REPAIR OF STREAM CHANNELS AND RIP RAP

6.4100 General Principles

To maintain stream channels and bank protection by incorporating environmental principles to prevent erosion or washout of roadways and related structures.

6.4200 Inspection

Stream channels and rip rap should be inspected on an attainable schedule based on available resources. Storm events and known problem locations may warrant additional inspections. Stream channels should be checked to see the stream flows in proper alignment within the right of way without danger to NYSDOT facilities. Monitor and evaluate gravel bars and washed or eroded banks for further action. Bring conditions affecting highway drainage, that are outside the highway ROW, to the Resident Engineer’s attention for evaluation.

Rip rap or other forms of bank protection should be checked to see that it is providing the required protection, noting the need for replacement of existing stone, the need for additional rip rap or other forms of protection.

6.4300 Method

Repair damaged stream channels to the extent necessary to protect highways or bridges. Replace armoring at or near culverts and bridges, that was lost in flooding. Channel erosion that encroaches on roadway embankments or undermines structures should be armored with stone fill or alternative methods. Deposited material that reduces the capacity of structures should be removed to
restore stream sections in the areas immediately adjacent to the highway. When repairing damaged channels, consider repair methods that may prevent recurrence.

While armoring stream channels with stone fill or rip rap may be appropriate in some cases, alternatives may exist that are as effective as armoring, less expensive, more supportive of overall stream conditions or more environmentally friendly. Armoring alone may not address the cause and may push a problem up or down stream from the problem area. Weirs, rock vanes, and drop pools may be used to channelize and manage the energy of a stream. Willows, logs, fallen trees or other vegetation may be used to help stabilize streams while providing better conditions for fish and other aquatic life.

When planning stream repairs, contact the MEC to obtain guidance or suggestions on alternative repair methods.

6.4400 Environmental

In addition to using best environmental practices, any work in streams requires permits from the United States Army Corps of Engineers (USACE) and the Department of Environmental Conservation (DEC). Additional coordination with regulatory agencies may be required in the New York City Watershed, the Adirondack Park, coastal environments and other specially designated areas. For details of the permitting process please see section 3.460 (in Highway Maintenance Guidelines).

Maintenance of stream channels and stream banks should use best environmental practices. These practices will evolve over time but currently include an understanding of stream hydrology, stream physical characteristics and how the stream dissipates energy. Vegetation is an integral part of any stream. Invasive species need to be recognized and their spread minimized. Shade-giving, non-invasive riparian plants need to be considered during bank stabilization projects. Advice on treatments can be provided by your MEC.

6.4500 Goal

To maintain or restore stream channels to protect the State’s highways and structures, while considering impacts to upstream and downstream properties, fish and animal habitat and the environment.
6.5000 CLEANING AND MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES

6.5100 General Principles

To maintain Stormwater Management Facilities in a workable and operable condition by removing accumulated sediment and debris, and other repairs, as necessary.

6.5200 Types

The most common types of stormwater management facilities found along the highways are Catch Basin Sumps, Catch Basin Inserts, Stormwater Management Ponds, Stormwater Treatment Systems and Infiltration Trenches.

6.5201 Catch Basin Sumps

Catch Basin Sumps refer to section 3.433 (in Highway Maintenance Guidelines) for information.

6.5202 Catch Basin Inserts

Catch Basin Inserts are typically used at a grate or curb inlet where stormwater enters the catch basin to capture sediment, debris and associated pollutants.

6.5203 Stormwater Management Ponds

Stormwater Management Ponds include Wet Ponds and Extended Detention Dry Ponds. A Wet Pond is a depressed basin with a permanent pool that temporarily stores a portion of a stormwater runoff following a precipitation event. An Extended Detention Dry Pond is a depressed basin that temporarily stores a portion of a stormwater runoff following a precipitation event, but does not have a permanent pool of water.

6.5204 Stormwater Treatment Systems

Stormwater treatment systems are proprietary structures having multiple chambers to settle particulates and collect floating debris and oil/grease. The purpose of these devices is to remove particulate pollutants from stormwater runoff. This type of device would be incorporated into a closed drainage system.
6.5205 Infiltration Trenches, Basins and Recharge Basins

Trenches, basins, and recharge basins capture water and treat it by allowing it to percolate into the ground through permeable materials such as sand, stone or naturally occurring permeable soil. These assets could be located along the highway, but may not be easily identified because they resemble vegetated or stone lined ditch. It is important that their locations are well known to prevent damage during normal highway maintenance operations such as ditching or mowing.

6.5206 Bioretention Facilities

A bioretention facility is a modified infiltration basin that is used to treat stormwater runoff using a combination of vegetation and filtration. Its primary purpose is to remove pollutants from stormwater using infiltration and vegetative uptake. It is important that their locations are well known in order to prevent damage during normal highway maintenance operations such as ditching or mowing.

6.5300 Inspection

Catch Basin Inserts should be inspected after each heavy rain or monthly for accumulated sediment and debris, as resources allow. Hydrodynamic devices should be inspected for accumulated sediment and debris on a attainable inspection schedule developed based on available resources. Maintenance is required when amount of sediment and or debris prevents normal operation. If the presence of oil, grease and other petroleum products is noted when inspecting a stormwater treatment system device, they should be removed as soon as practical. Contact the Resident Engineer or MEC for disposal guidance.

Stormwater Management Ponds should be inspected annually for sediment and debris. Maintenance is required when thickness of sediment and/or amount of vegetation growth affect normal operation. Maintenance should be done if 50 percent of storage capacity is lost. Infiltration trenches, basins and bioretention facilities should be monitored periodically during rain events. If excessive ponding or poor percolation is identified, maintenance or replacement may be necessary.

6.5400 Method

Catch Basin Inserts can be removed manually and emptied. Contact the Resident Engineer or MEC for disposal guidance.

Although all Stormwater Management Ponds have similar maintenance requirements, Wet Ponds must be drained prior to cleaning. The following is a typical method for maintaining Stormwater Management Ponds:
The Basin Floor: Remove sediment only when the basin floor is completely dry, after the silt layer has mud-cracked and separated from the basin floor. The silt layer can be carefully placed in windrows using light equipment, then removed by a small front-end loader. Remove the silt sediment to an elevation equal to the elevation of the basin (bottom) invert as shown on the contract plans minus 1 inch. If contract plans are not available, remove all silt sediment above the elevation where you have clean sand with a uniform color. After removal of the sediment, till the basin floor by rotary tiller or disc harrow and then smooth or level to facilitate future sediment removal. Take precautions to avoid working sediment into the basin floor during tilling. Sediment removal must precede tilling.

The Basin Side Slopes: It is desirable that the basin side slopes be covered with a dense turf with extensive root growth, using a good stable grass to discourage weeds. Mow these slopes as required and fertilize if necessary to retain dense and healthy growth.

The most effective and efficient method for removing accumulated sediment in a stormwater treatment system is by using a vacuum truck. Typically the sediment is removed through the manhole over the grit chamber, however this can vary based on make/model of unit. Personnel should refer to specific manufacturer guidelines for maintenance of individual units. Dispose of trash and sediment according to Department standards and environmental regulations. If oil, grease and other petroleum products are present, absorbent pads should be used to capture oil, grease and other petroleum products before removing the sediment. Contact the Resident Engineer or MEC for disposal guidance. If regular maintenance has not occurred, it may be necessary to remove sediments from all chambers of the structure. Once cleaned all manhole covers should be securely seated to prevent surface runoff from entering the unit from above.

6.5500 Goal

Stormwater Management Facilities should be cleaned of sediment and debris and associated pollutants whenever accumulations would interfere with the proper functioning of the system.

6.6000 ENVIRONMENTAL CONSIDERATIONS FOR DRAINAGE MAINTENANCE

6.6100 General Principles

To incorporate sound environmental practices in all drainage maintenance operations.
6.6200 Background

Several information sources can guide operations staff in preparing to do work in ditches and/or culverts. Refer to the NYSDOT Environmental Handbook for Transportation Operations for detailed environmental guidance. DEC mapping and stream classification are accessible with department tools, although classifications should be checked with DEC. Record plans supply critical information regarding changes made to streams during construction and indicate when streams have been used to convey highway drainage.

There are many different types of wetlands, which are regulated by DEC, United States Army Corps of Engineers (USACE) or the Adirondack Park Agency (APA) depending on size, type, and location. Maps of all DEC regulated wetlands and some federally regulated wetlands are available with department mapping tools. However, these maps may not convey the exact limits or locations. Therefore, the MEC or other environmental staff should be contacted. It is also good to maintain an open relationship with local DEC personnel and other environmental professionals such as the Soil and Water Conservation Districts.

If beaver dams are encountered, it is recommended that you contact your MEC for guidance prior to beginning work.

Additional guidance is available in:

- *NYSDOT Guidelines for the Adirondack Park*

Contact your Regional MEC for information.

6.6300 Inspection

Monitor erosion and sediment controls to ensure they are functional. SPDES (State Pollutant Discharge Elimination System) permits required for disturbances greater than 1 acre specify the frequency of sediment and erosion control inspections. In planning or undertaking seeding, evaluate conditions that affect the effectiveness of seeding including, but not limited to, weather conditions, type of seed, type of mixture. All environmental practices should be evaluated for cost effectiveness throughout the life cycle of the practice.

6.6400 Methods

a) Temporary erosion and sediment control should be in place before work begins and remain in place until the work is complete and the site is stabilized. Check dams and other approved items can be used to slow the flow of water in ditches. Straw bales should not be used in ditches; do not use silt fencing across the direction of flow.
b) Natural bottom culverts are preferred to allow fish passage. Sometimes a culvert can be oversized to allow the bottom to be recessed below the stream grade, to provide a natural bottom. Another way to provide a natural bottom is to have a three sided culvert.

c) Techniques to allow animals to freely move beneath highways such as fish ladders and amphibian and other wildlife passages should be considered. DEC biologists, Soil and Water Conservation District staff and other local groups can be very helpful.

d) Invasive species, such as Japanese Knotweed, Phragmites, Purple Loosestrife, Giant Hogweed and Wild Parsnip, should be identified and contained. In some places, herbicides may be used on invasives before work begins. Excavated invasive plants and soil must be properly disposed of to prevent additional spread. Check with the MEC and occupational health staff.

e) When possible, incorporate vegetation into rip rap and stone reinforcements when used for slope or stream bank stabilization. Seed and mulch all areas when the work is done. Different seed mixes may be better for certain locations. Check with environmental staff.

f) Disturbed areas should be mulched with benign material such as straw or wood fiber (hydricseed).

g) During routine inspections and activities illicit discharges such as sewage effluent or chemical contamination should be reported to the Resident Engineer as they have local contacts to address this problem.

h) Even if no permit or agency notifications are required, drainage activities still must comply with the DEC regulations for water quality.

6.6500 Waste Areas

Waste Areas that support drainage or any Maintenance activities should be reviewed for potential regulatory issues i.e. wetlands, cultural resources, proximity to streams, etc.

Waste areas should also be located on NYSDOT owned land as much as practical to prevent transport of invasive plant species to privately-owned lands where future treatment of invasive plant species could be problematic or impossible. Locating waste sites on NYSDOT lands enables NYSDOT forces to manage any infestation of invasive plants, using the most effective methods. This generally requires multiple treatments with herbicides. Any widening in the right of way (ROW) are potentially good waste sites, provided they are not wetlands or floodplains.
Where environmental conditions permit, look for waste areas on NYSDOT owned right of way that will allow flattening of slopes sufficiently to remove the warrant for guiderail. If guiderail can be removed, it reduces guiderail maintenance costs, by reducing the need for hand mowing or herbicides, and improves aesthetics.

Waste areas should be graded and seeded to prevent erosion as soon as work is complete. Waste areas that are needed for long periods of time should have temporary erosion and sediment control measures installed and maintained until such time as the area is stabilized. Portions of larger waste areas should be periodically graded and seeded to limit visual and environmental impact.

Within the Adirondack Park, the location of any waste area, on or off NYSDOT lands, is a regulatory issue and must be reviewed by MEC and APA staff. This requires significant lead time to acquire needed concurrence or permit from APA. A six month lead time is recommended. Refer to APA Permit No. 2002G-1R, effective January 12, 2007. For best results, locate as many waste areas as possible before contacting APA staff for site reviews. Locate enough sites to last at least the entire season. Locating sites that are usable for several years, i.e. gravel mine sites in need of reclamation materials, is also recommended.

6.6600 Permitting

Work in water typically involves obtaining permits from a variety of regulatory agencies. Typically, working in a stream, lake, river, wetland or any “water of the United States” requires permitting from the USACE. Much of the work done by DOT is covered by USACE Nationwide Permits (NWPs). Any work done under a USACE Nationwide Permit will require a Water Quality Certification from DEC. Other regulatory agencies include, but are not limited to, the New York City Department of Environmental Protection (DEP) and the APA. Contact the Regional MEC for current permit information.

Different situations require different permit levels. Examples include:

a) No permits are required to work in highway ditches or culverts that only carry stormwater runoff and are not located in or adjacent to wetlands. To determine whether a ditch carries only stormwater runoff, it is often necessary to evaluate record plans. Even if no permit is required, use best environmental practices and prevent the erosion of sediment into a stream, body of water or wetland. Work should be done when no water is flowing to minimize sediment transport. Leave any vegetation that does not impede the flow of water. Exposed soil should be seeded, or seeded and mulched, as soon as conditions allow, limiting erosion and the likelihood that invasive species will appear. Cleaning ditches that carry only stormwater does not require coverage under a State Pollutant Discharge Elimination System (SPDES) General Permit regardless of the amount of
earth disturbed, provided original line, grade and function are maintained. Disturbed areas should be seeded and mulched or otherwise permanently stabilized as soon as possible.

b) A USACE permit is required to work in highway ditches or culverts that carry a stream. USACE permits are necessary to work in intermittent as well as relocated streams. Most highway drainage work associated with streams can be done under a Nationwide Permit. Whenever work is done under a Nationwide Permit, a DEC Water Quality Certification is also required, regardless of the DEC stream classification. Use of a Nationwide permit also requires consideration of endangered species and cultural resources, including both historic properties and archeology.

If the scope of the proposed activity falls within certain limits, the work can be done without pre-notifying the USACE, but all permit conditions must still be met. Different USACE Districts have different conditions to exempt a project from pre-notification requirement; procedures will vary depending on which District has jurisdiction. Consult your MEC to determine what District has jurisdiction over your area.

In addition, the Nationwide permits are re-authorized at certain time intervals. Re-authorization may change the conditions specified for a particular permit. Contact the Regional MEC for current permit information.

c) A DEC Article 24 wetland permit is required for any work in, or within 100 feet of, a State regulated freshwater wetland. The DEC wetlands and their associated 100 foot buffer zones are available on both paper and electronic maps. The DEC wetlands are always 12.5 acres or larger. DEC must be notified at least 10 days in advance of any rehabilitation or replacement of existing ditches or culverts that require no configuration or alignment changes, that is, the same elevation and capacity, before the work begins. For this type of activity, no response from DEC is necessary. DEC must, however, approve any bank or channel stabilization activity as well as any minor earth fills associated with the rehabilitation or replacement of existing ditches or culverts in or within 100 feet of DEC regulated wetlands before the work begins.

d) A USACE Nationwide permit #14 is required if there is an impact greater than 0.1 acre to any federally regulated wetland. Federally regulated wetlands may or may not be mapped. Their identification is based on hydrology, soil type and vegetation. The Department often maps federally regulated wetlands in conjunction with capital projects. Refer to this mapping before undertaking activities and confer with MEC.
e) Adirondack Park Agency (APA) Within the Adirondack Park, any planned roadside project needs to be reviewed with the MEC, before any work begins, to identify potential regulatory issues such as:

- Streams, wetlands, floodplains
- Invasive plant species
- NYS Wild, Scenic, and Recreational Rivers System
- Other potential issues i.e. Historic or Cultural resources, Threatened or endangered species
- ROW adjoining Adirondack Forest Preserve Lands
- Beaver dam removal
- Waste disposal
- Critical Environmental Areas (CEAs) (Private Property)
  - Within 150’ of area designated as “Rural Use”
  - Within 300’ of lands designated as “Resource Management”
  - Within 660’ of State Forest Preserve land designated as a Wilderness, Primitive, or Canoe area

Follow up with APA, USACE, and/or NYSDEC staff will be required with any project that involves any of the above issues.

f) The City of New York Department of Environmental Protection (NYCDEP) owns and operates a water supply system within the counties of Ulster, Greene, Delaware, Schoharie, Sullivan, Westchester, Putnam, and Dutchess. A large portion of the NYSDOT owned and maintained transportation system in these counties is located in the New York City Watershed. Whenever a project falls within the NYC Watershed, coordination with the NYCDEP is required for additional environmental concerns.

g) The NYSDOT and NYCDEP have a Memorandum of Understanding (MOU) that must be followed with each project within the NYC Watershed. All NYSDOT standards and specifications for storm water management and erosion control must be followed, as a condition of the MOU. Best Management Practices for erosion and sediment control should be employed when operating within the Watershed.

When any culvert replacement project involves a watercourse that will drain into the water supply system, notice must be given to the local NYCDEP section engineer. This must be done even if NYSDEC or USACE authorizes the project. NYCDEP has regulatory review over all watercourses that drain into their water supply system. It is important for Department maintenance personnel to maintain a positive working relationship with local NYCDEP officials.
Any operation that will involve equipment operation and storage or material storage on NYCDEP lands will involve a separate land use permit from the local NYCDEP office. If equipment is to be stored on NYCDEP lands, a spill prevention and response plan must be developed for the equipment. It is advised that use of NYCDEP owned lands for equipment or material storage be used only when there are no other feasible options.

Department personnel should consult with the Regional MEC, if needed, to determine if their project is located within the NYC Watershed and subject to additional regulations.

6.6700 Goal

In addition to complying with regulations and achieving departmental engineering goals drainage work should incorporate best environmental practices. Each location is unique and operations staff should seek to enhance each area in which they work.
Appendix A

Acronyms:

APA	Adirondack Park Agency
CB	Catch Basin
CEAs	Critical Environmental Areas
DEC	Department of Environmental Conservation
DI	Drop Inlet
DOT	Department of Transportation (also NYSDOT)
MH	Manhole
MEC	Maintenance Environmental Coordinator
MOU	Memorandum of Understanding
NYCDEP	New York City Department of Environmental Protection
NWPs	Nationwide Permits
ROW	Right of Way
SPDES	State Pollutant Discharge Elimination System
USACE	United States Army Corps of Engineers
Appendix B

References:


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Memorandum of Understanding between New York State Department of Transportation and New York City Department of Environmental Protection concerning transportation projects in the watershed of the New York City water supply, January 1999.

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