

# **City Of Zilwaukee Drainage System Maintenance**

## **Overview**

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, detention basins / retention basins, vegetated swales, rain gardens, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding. To ensure proper maintenance and effectiveness of these drainage systems, please review and apply the following approaches, protocols, and requirements below. This procedure requires that all controls be maintained to reduce to the maximum extent practicable the contribution of pollutants to stormwater. This maintenance standard operating procedure shall be reviewed and updated/revised annually following the implementation of a new structural storm water control. This standard operating procedure shall be reviewed and updated/revised by either the Township's appointed Stormwater Program Manager and/or the Township's designee. Any updates will be included in future progress reports submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

## **Approach**

### **Catch Basin/Inlet Structures**

- Regularly inspect facilities to ensure the following:
  - Immediate repair of any deterioration threatening structural integrity.
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Update maintenance logs to include new structures on an as needed basis.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do NOT dewater near a storm drain, river or stream.

- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.
- All material extracted from catch basins should be hauled to a WWTP, dried on drying beds and then hauled to a licensed landfill.

([http://www.michigan.gov/documents/deq/wb-stormwater-CatchBasinGuidance\\_216198\\_7.pdf](http://www.michigan.gov/documents/deq/wb-stormwater-CatchBasinGuidance_216198_7.pdf))

Accumulated pollutants are not to be discharged during cleaning and are removed prior to discharging to surface waters of the state.

### **Storm Drain Conveyance System**

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.
- Any necessary maintenance warranted from inspections will be performed on an as needed basis. Any maintenance waste material extracted should be disposed of properly.

### **Bio-Retention/Rain Gardens**

- Ensure the bioretention area is easily accessible for maintenance.
- Re-mulch void areas.
- Treat diseased trees and shrubs.
- Mow turf areas.
- Water plants daily for two weeks at the project completion, when applicable.
- Inspect soil and repair eroded areas and remove litters and debris on a monthly basis, or on an as needed basis.
- Remove and replace dead and diseased vegetation twice per year, or on an as needed basis.
- Add mulch and replace tree stakes and wires once per year, or on an as needed basis.
- Any necessary maintenance warranted from inspections will be performed on an as needed basis. Any maintenance waste material extracted should be disposed of properly.

### **Vegetated Swales/Bio-Swales**

- Inspect pea gravel for clogging and remove any issues.
- Inspect grass alongside slopes and the bed of the swale for erosion and the formation of rills and gullies; attend to and correct on an as needed basis.
- Remove trash and debris.
- Replenish vegetation, grass species, and wetland species on an as needed basis.

- Keep grass mowed to a height of 3-4 inches to provide sufficient performance of removing pollutants.
- Any necessary maintenance warranted from inspections will be performed on an as needed basis. Any maintenance waste material extracted should be disposed of properly.

### **Risers/Stand Pipe**

- For a detention basin, check the inlet and outlet structures and assure that flow restricting devices are not blocked and are operating properly. (may also need to additionally examine during wet weather event)
- Ensure that riprap around the inlet and outlet structures within detention basins is intact and replace when the riprap is clogged with sediment and debris.
- Any necessary maintenance warranted from inspections will be performed on an as needed basis. Any maintenance waste material extracted should be disposed of properly.

### **Detention Basins / Retention Basins**

- Clean out any accumulated trash in the basin. Dispose of trash properly.
- Inspect for invasive plant species and remove or eradicate following proper procedures.
- Maintain vegetation properly, per applicable ordinances.
- For a detention basin, check the inlet and outlet structures and assure that flow restricting devices are not blocked and are operating properly. (may also need to additionally examine during wet weather event)
- Regularly inspect the embankments to ensure structural stability and for eroded areas.
- Ensure that riprap around the inlet and outlet structures within detention basins is intact and replace when the riprap is clogged with sediment and debris.
- Inspect for sediment accumulation at the inlet pipes.
- Do not use pesticides, herbicides, or fertilizers.
- Any necessary maintenance warranted from inspections will be performed on an as needed basis. Any maintenance waste material extracted should be disposed of properly.
- Document findings and maintenance completed.

### **Open Channel**

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Contact the State of Michigan to investigate which agencies will regulate the

proposed activity. The developer-applicant should also contact local governments (city, county, special districts).

### **Secondary Containment**

- Evaluate whether the secondary containment system is adequate for the facility, and whether it is maintained to contain oil discharges to navigable waters or adjoining shorelines. This evaluation may include reviewing inspection reports and maintenance records. Some items that the inspector should look for include the following:
  - Capacity of the system to contain oil as determined in accordance with good engineering practice and the requirements of the rule;
  - Cracks in containment system materials (e.g., concrete, liners, coatings, earthen materials);
  - Discoloration;
  - Presence of spilled or leaked material (standing liquid);
  - Corrosion of the system;
  - Erosion of the system;
  - Operational status of drain valves or other drainage controls;
  - Dike or berm permeability;
  - Presence of debris;
  - Level of precipitation in diked area and available capacity versus design capacity;
  - Location/status of pipes, inlets, and drainage around and beneath containers;
  - Excessive vegetation that may inhibit visual inspection and assessment of berm integrity;
  - Large-rooted plants (e.g., shrubs, cacti, trees) that could affect the berm integrity;
  - Holes or penetrations to the containment system created by burrowing animals; and
  - Drainage records for rainwater discharges from containment areas.

### **Underground Storage (Underground vault)**

- Underground storage structures must be cleaned periodically to remove accumulated trash, grit, sediments, and other debris. The installation of catch basins or grates at the inlet will reduce trash accumulation, but suspended solids will still be carried into the storage area, where they may settle out and accumulate on the bottom of the structure. The structures need to be cleaned to remove this accumulated material, which should be tested to determine if it contains any toxic or hazardous materials, and then disposed according to local regulations regarding storm water residuals.

#### Maintenance:

- Periodic inspections of the inlet and outlet areas to ascertain correct operation of system and to clean materials trapped on grates protecting catch basins and inlet area should be required monthly.
  - Routine sweeping and cleaning of impervious drainage areas will reduce floatables and sediment loading to underground storage.
- The primary maintenance concerns are removal of floatables that become trapped and removal of accumulating sediments within the system; this should be done at least on an annual basis, or as deemed necessary. Proprietary traps and filters associated with storage units should be maintained according to manufacturer's guide.
  - Confined space safety procedures must be followed by workers entering an underground storage facility.
  - Sediments are best removed mechanically rather than flushing. If flushing is the only option, then great care must be taken not to flush sediments downstream into native waters.
- Any structural repairs required to inlet and outlet areas should be addressed in a timely manner on an as needed basis.
- Local authorities may require annual inspection or require that they carry out inspections and maintenance.

#### **Vortex Separators**

- Maintenance should be conducted during dry weather when no flow is entering the system. All maintenance, except possibly the attachment of sorbent pads (if required), may be conducted without entering the DVS structure. Once safety measures such as traffic control are deployed, the access covers may be removed and the following activities may be conducted to complete maintenance:
  - Remove floating trash, debris, and oils from the water surface using an extension on the end of the boom hose of the vacuum truck. Continue using the vacuum truck to completely dewater the structure through the vortex tubes and evacuate all accumulated sediment from the sediment sump. Some jetting may be required to fully evacuate sediment from the sump. This is easily achieved by inserting a jet hose through the vortex tube opposite the tube used for vacuum hose access.
  - If sorbent pads are required and are tethered to the structure, only personnel that are OSHA Confined Space Entry trained and certified may enter the structure to remove and replace the spent pads.
  - The structure does not need to be refilled with water after maintenance is complete. The system will fill with water when the next storm event occurs.

- All material removed from the DVS during maintenance must be disposed of in accordance with local regulations. In most cases, the material may be handled in the same manner as disposal of material removed from sumped catch basins or manholes.

### **Pump Stations**

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do NOT allow discharge from cleaning a storm drain pump station, or other facilities to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or if illegal discharges in the watershed are occurring.

### **Oil/Water Separator**

- Inspect the discharge water for obvious signs of poor water quality.
- Clean out oil/water separator when sediment depth in bottom of vault exceeds 6-inches in depth.
- Inspect for trash and debris accumulation in the vault.
- Inspect for oil accumulations; clean out when oil accumulations exceed 1-inch at the surface of the water. Vactor out oil/water separator on an as needed basis and properly dispose of material.
- Repair inlet or outlet piping damaged or broken and in need of repair.
- Inspect the cover for corrosion/deformation.
- Inspect for cracks, corrosion, warping and signs of failure.
- Inspect, clean, and repair as necessary.

### **Infiltration Basins**

- All structural components must be inspected, at least once annually, for cracking, subsidence, spalling, erosion and deterioration. Components expected to receive and/or trap debris and sediment must be inspected for clogging at least four times annually, as well as after every storm exceeding 1-inch of rainfall.
- Sediment removal should take place when all runoff has drained from the planting bed and the basin is dry. Disposal of debris, trash, sediment and other waste material must be done at suitable disposal/recycling sites and in compliance with all applicable local, state and federal waste regulations.
- Access points for maintenance are required on all enclosed areas within an infiltration basin; these access points must be clearly identified in the maintenance

plan. In addition, any special training required for maintenance personnel to perform specific tasks, such as confined space entry, must be included in the plan.

- The basin must be inspected at least twice annually to determine if the permeability of the basin has decreased. Annual tilling of the sand layer, using lightweight equipment, may assist in maintaining the infiltration capacity of a surface type system by breaking up clogged surfaces.

### **Infiltration Trench**

- Remove debris from overflow structure.
- Inspect pretreatment area and diversion structures for sediment build-up and structural damage.
- Ensure the trench is dewatering between storms and not bypassing facility.
- Check the surrounding grass area for erosion.
- Check for adequate mulch cover.

### **Illicit Connections and Discharges**

- During routine maintenance of conveyance system and drainage structures, field staff should look for evidence of illegal discharges or illicit connections:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections
  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil or color code storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should be color coded or have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Please refer to the fact sheet found within the Non-Stormwater Discharges section.

### **Illegal Dumping**

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:

- Illegal dumping hot spots
- Types and quantities (in some cases) of wastes
- Patterns in time of occurrence (time of day/night, month, or year)
- Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
- Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Please refer to the fact sheet found within the Non-Stormwater Discharges section.
- To report environmental violations during business hours, contact the State's Environmental Assistance Division at 800-662-9278. Emergency calls and calls after business hours, during weekends, and holidays should be directed to the Pollution Emergency Alerting System (PEAS) at 800-292-4706.

### **Training**

- Train crews in proper maintenance activities, including record keeping and disposal.
- Only properly trained individuals are allowed to handle hazardous materials/wastes.
- Train municipal employees from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report illegal dumping.
- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.
- Train municipal staff regarding non-stormwater discharges (Please see the Non-Stormwater Discharges section).

### **Spill Response and Prevention**

- Please refer to the Spill Prevention, Control & Cleanup section.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

## **Requirements**

### **Maintenance**

- Two-person teams may be required to clean catch basins with vector trucks.

- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

## Measurable Goals

- Volume of sediment removed from the system per year.
- Volume of trash removed from the system per year.
- Number of structures cleaned or maintained per year.

## References

GLRC Municipal BMP Handbook  
[www.mywatersheds.org](http://www.mywatersheds.org)

### *Secondary Containment*

[https://www.epa.gov/sites/production/files/2014-04/documents/4\\_secondarycontainment\\_impracticability\\_2014.pdf](https://www.epa.gov/sites/production/files/2014-04/documents/4_secondarycontainment_impracticability_2014.pdf)

### *Underground Storage / Underground Vaults*

<http://nepis.epa.gov/Exe/ZyPDF.cgi/P100IL5C.PDF?Dockey=P100IL5C.PDF>

<http://www.lakesuperiorstreams.org/stormwater/toolkit/underground.html>

### *Vortex Separator*

<http://www.nj.gov/dep/stormwater/pdf/dual-vortex-old-castle-main.pdf>

### *U.S. EPA National Pollutant Discharge Elimination System (NPDES) for Bioretention (Rain Gardens)*

<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=72>

### *U.S. EPA National Pollutant Discharge Elimination System (NPDES) for Grassed Swales*

[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=75](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=75)

### *Infiltration Basin*

[http://www.njstormwater.org/bmp\\_manual/NJ\\_SWBMP\\_9.5.pdf](http://www.njstormwater.org/bmp_manual/NJ_SWBMP_9.5.pdf)

### *Infiltration Trench*

[http://geaugaswcd.com/yahoo\\_site\\_admin/assets/docs/Homeowner\\_infiltrationtrenchCMYK.140122545.pdf](http://geaugaswcd.com/yahoo_site_admin/assets/docs/Homeowner_infiltrationtrenchCMYK.140122545.pdf)

[http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool6\\_Stormwater\\_Practices/Infiltration%20Practice/Infiltration%20Trench.htm](http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool6_Stormwater_Practices/Infiltration%20Practice/Infiltration%20Trench.htm)