

STORMWATER MANAGEMENT

RESOURCE GUIDE

Operation and Maintenance of
Stormwater Systems

DECEMBER 2019



PREFACE

As part of the Boise City Stormwater Management Program, Boise City developed this resource guide as a reference for property owners and managers for properly operating and maintaining onsite stormwater systems. This guide should be used in conjunction with best professional judgement, sound engineering principles, and the specifications and requirements outlined in Boise City's stormwater design and maintenance manual titled: "Stormwater Management: A Design Manual".

This resource guide provides guidance for:

- Developing, implementing, and maintaining an effective stormwater system operation and maintenance plan;
- Inspecting the facility and the stormwater system;
- Performing maintenance on the stormwater system, including stormwater controls; and
- Proper disposal of wastes derived from stormwater system maintenance and cleaning activities.

Following these sections, this guide also includes an example inspection form applicable to all types of facilities and a set of stormwater control assessment tables. Several assessment tables are included which are specific to the types of structural stormwater controls included in Boise City's stormwater design manual. The assessment tables identify common problems and issues to look out for as well as likely causes and recommendations for addressing identified problems.

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Introduction

Whether managing an apartment complex, a commercial development or an industrial facility, properly operating and maintaining stormwater systems is extremely important. Stormwater systems that are properly operated and maintained not only function better and provide better stormwater treatment, but also reduce maintenance costs and liability problems.

This resource guide provides information on properly operating and maintaining stormwater systems for multi-family residential, commercial, and industrial facilities. Guidance includes developing an operation and maintenance plan, conducting facility and stormwater system inspections, maintaining stormwater structural controls, and properly disposing of maintenance wastes. Detailed guidance for each component of an effective operation and maintenance plan is described in this resource guide. Additional information is available in Boise City's stormwater design manual, or by contacting the Boise City Public Works Department.

In this Section:

- ✓ Introduction
- ✓ Importance of proper maintenance

PROPER MAINTENANCE IS IMPORTANT

Every stormwater system needs to be properly maintained to effectively treat stormwater and reduce or eliminate costly repair problems. The lack of proper maintenance is the most common cause of stormwater system failure. Proper stormwater system maintenance contributes to the following benefits intended in stormwater system design:

- Reduced risk of flooding due to system failure. By ensuring the system is in good operational health, the chances of having a system component fail or lose capacity to hold or channel water because of excessive sediment or debris buildup.
- Maintaining expected pollutant removal efficiency. Without proper maintenance, stormwater systems may lose their functionality or capacity in removing pollutants, similar to a filter needing regular cleaning or replacement.
- Avoiding accumulation of hazardous chemicals or compounds. If the system is not maintained regularly, then the debris removed by the system may accumulate enough chemicals to characterize as hazardous waste and will have to be disposed of as hazardous waste. This disposal process can be quite costly; removing sediment or other debris on a regular basis is not.
- Eliminated or reduced safety hazards on a site. Maintenance issues often result in ponded stormwater in areas designed for pedestrian or vehicle traffic. Maintenance issues can also result in exposure to materials transported in stormwater, then concentrated at a treatment device.
- Improved aesthetics. Visual appeal is a function of many stormwater systems. Regular maintenance keeps vegetation in check and avoids accumulation of trash and other debris.



Developing an Operation and Maintenance Plan

This section describes the guidelines to follow to develop an Operation and Maintenance (O&M) plan. An O&M plan helps coordinate inspection and maintenance activities for each type of system and track any problems that may be observed when performing inspection and maintenance activities. O&M plans can be developed for new or existing stormwater systems.

NEW SYSTEMS

Having an O&M plan prepared at the time a new stormwater system is being designed will make maintaining the system easier. Preparing an O&M plan for new systems is more convenient than preparing a plan for existing systems because new system information is more readily available.

Work closely with a design professional when developing an O&M Plan for a new system because the design professional can specify maintenance procedures, material specifications, and operation practices specifically for the system. Discuss any design problems encountered while inspecting or maintaining the system with the design professional. These comments will help the design professional

In this Section:

- ✓ **Developing an O&M Plan for a New System**
- ✓ **Developing an O&M Plan for an Existing System**

modify the design so that the same problem will not occur in the future.

EXISTING SYSTEMS

Preparing an O&M Plan for an existing stormwater system is also recommended, although the information may be harder to find. Still, the extra step taken to develop an O&M Plan for an existing system will make long-term operation and maintenance easier and more effective. To prepare an O&M Plan for an existing system, gather available design plans and past maintenance information. If unable to locate the stormwater systems original design plans onsite, contact the design professional who originally designed the system. The Boise City Public Works Department has copies of most of the original approved design plans for stormwater systems. The Ada County Highway District retains design plans for residential stormwater systems.

The O&M Plan consists of the following items:

- Site plans, design plans and material specifications for the stormwater system
- Landscape design plan
- Inspection frequency information
- Inspection and Maintenance forms
- Safety information
- Scope of work, responsible personnel, waste disposal, and maintenance budget, if known.
- Source control BMPs listed in the Boise Stormwater Best Management Practices (BMP) Guidebook, if applicable



Inspecting and Maintaining the Stormwater System

Frequent, thorough, and consistent inspections are key to the successful operation and maintenance of a stormwater system. Inspections reveal the operational status of the system, identify needed routine and non-routine maintenance actions and provide the information to update the O&M plan. Routine maintenance is the maintenance an individual performs on a stormwater system to ensure that the stormwater system is functioning as designed and that the system aesthetics are well maintained, while non-routine maintenance is the maintenance an individual performs as a result of a catastrophic event, such as a hazardous chemical spill. It is recommended to inspect stormwater systems after construction, at least twice a year, and after any rainstorm event that produces more than 0.5 inches of rainfall.

Perform regular inspections until inspectors are able to identify how often the system needs regular maintenance. The time interval in which to perform subsequent inspections should be determined by actual maintenance requirements. It is recommended to inspect

In this Section:

- ✓ **Safety**
- ✓ **Inspection Frequency**
- ✓ **Routine Maintenance**
- ✓ **Non-routine Maintenance**
- ✓ **Special Circumstances**
- ✓ **Recordkeeping**

stormwater systems after construction, at least twice a year, and after any rainstorm event that produces more than 0.5 inches of rainfall. This section addresses inspection frequency, conducting inspections and maintenance safely, maintenance types and activities, and using the Inspection and Maintenance forms.

SAFETY

The individual inspecting or maintaining the stormwater system should always consider safety as the first priority. The inspector should have the proper safety equipment (heavy duty gloves, steel-toed boots, first aid kits, for example) and training before conducting any inspections, and all work should be done in accordance with OSHA regulations. Although the safety precautions listed here are common sense, they should not be disregarded. Neglecting to follow even the simplest safety precaution can potentially cause serious injury. If the stormwater system inspection reveals a safety problem, then it may be necessary to modify site activities to reduce or eliminate the safety risk. Relevant safety information needs to be included into the O&M plan. The following is a list of safety precautions an individual should be aware of when inspecting or maintaining stormwater systems:

- Never enter a confined space unless possessing proper Occupational Health and Safety Administration (OSHA) training. Do not enter any confined space unless the atmosphere has been checked and proper safety equipment is worn and/or erected. Never enter pipes or conduits without another individual present. If the structural strength of a pipe or conduit is questionable, then do not enter the pipe or conduit at all.
- Check the ventilation in the stormwater system before using any type of ignitable materials. Some stormwater systems may be sealed and have poor ventilation, posing a safety risk to the inspector if the vapor comes in contact with an open flame. Also, be sure to allow the stormwater system to vent for a period of time if a peculiar odor is present.
- Wear gloves if any mechanical parts or structural components are going to be handled. Wearing gloves not only reduces the risk of getting cuts and abrasions, but also reduces the exposure of pollutants to the skin.
- Lift man hole covers or other structural covers (trash racks, access covers, etc.) carefully. These items can be very heavy and slippery if wet. Also, learn the correct way to lift heavy items to avoid back injury.
- Check the water depth of the system before stepping in the water. The water may be deeper than originally thought or there may be steep slopes below the water line.
- Be aware that nails, broken glass, or other sharp debris may be in the stormwater system and can cause injury. Wearing the proper safety clothing will reduce the safety risk associated with coming in contact with these objects.
- Check for poison ivy, poison oak, or other poisonous plants when inspecting ponds or other large stormwater systems. Inform the individual who will perform maintenance on the system that these plants are present.
- Look where walking. Rodent holes may be present around ponds or constructed wetlands. Some holes may be partially covered and not easily seen at first glance.
- Operate equipment safely and in accordance with manufacturers specifications. Equipment operators should be aware of site personnel at all times to avoid causing injury to others.
- Contact utility companies prior to excavating a site.
- Underground utility wires may be present. Cover or clearly mark excavated areas that cannot be filled in at the end of the day to alert site employees of the potential risk. Also, be aware of overhead electrical wires that could come in contact with maintenance equipment.

- Identify where to dispose of removed sediment or wastes prior to cleaning the stormwater system. Use shovels, trowels, or a high-suction vacuum to remove wastes. Do not clean out sediment or waste with bare hands; it may be hazardous. Place the sediment or waste in an area.
- Wear gloves if any mechanical parts or structural components are going to be handled. Wearing gloves not only reduces the risk of getting cuts and abrasions, but also reduces the exposure of pollutants to the skin.
- Take caution when mowing detention ponds, retention ponds, or other stormwater systems that, by design, have steep slopes

INSPECTION FREQUENCY

The frequency to inspect a stormwater system depends on a variety of conditions:

- Type of system, including pretreatment
- Seasonal weather conditions
- Characteristics of the drainage area

TYPE OF SYSTEM

The type, size, and design of a stormwater system determines how frequently to inspect the system. For example, a vegetated swale needs to be inspected frequently to ensure that the grass cover is thriving, and that sediment and debris are not accumulating in the swale. Whereas, a retention pond, once constructed, may only have to be inspected once or twice a year.

SEASONAL WEATHER CONDITIONS

Seasonal weather conditions can also determine the inspection schedule. Summer storms, because of their intensity, may cause more problems for a system than storms which occur at other times of the year. Therefore, inspect the stormwater system before and after the summer months when the system can experience its greatest use. For detention and evaporation ponds, inspect them at least once when the pond is empty. Inspections may need to be done more frequently if seasons are wetter than usual.

CHARACTERISTICS OF THE DRAINAGE AREA

The type of drainage area and the activities which occur in the drainage area will affect inspection frequency. It may be needed to inspect the stormwater system more frequently in drainage areas where construction is taking place and creating a large amount of sediment. Likewise, stormwater systems located in the Boise foothills may require more frequent inspections because the combination of vast open areas and steeper slopes increases the potential for sediment to accumulate more quickly in a stormwater system. Finally, sites which may generate more wastes, such as industrial and high vehicle-use areas, need to be inspected more frequently.

ROUTINE MAINTENANCE

The type and frequency of maintenance for a specific stormwater system is determined by inspection results and the maintenance schedule in the O&M plan. Maintenance should be performed in accordance with system design information and safety procedures provided in the O&M Plan. Performing timely maintenance is important in preventing system failure and will save money in the long-term. Budget for maintenance on a yearly basis to ensure that there will be the necessary resources to perform maintenance adequately.

NON-ROUTINE MAINTENANCE

In addition to routine maintenance, the stormwater system may require non-routine maintenance. If illegal dumping into the system, accidental spills, or massive sediment and debris inflows occurs, it will be

necessary to perform non-routine maintenance. Inspect the system by using the applicable Inspection and Maintenance forms.

If there is an accidental spill, isolate the spill to keep it from reaching other water bodies (including groundwater). Check the stormwater system flow control points, such as gates, valves, orifices, and outlet pipes, to see if those points are closed to help isolate the spill. Purchase spill kits to keep onsite and place them in areas that are easily accessible by maintenance personnel. If the spill consists of flammable or hazardous materials, call the Boise city Fire Department at 911 for assistance.

The owner of the stormwater system is responsible for cleaning the spill and disposing of the waste properly. If the spill contains hazardous materials, it may be preferable to contact a qualified environmental consultant who specializes in spill containment, cleanup and disposal. These consultants may be found by searching on the internet for “environmental services”.

SPECIAL CIRCUMSTANCES

It may be required to obtain permits from federal, state, or local agencies to conduct stormwater maintenance activities. The following permits may be required:

- 404 permit and a Stream Channel Alteration permit. A 404 (dredge and fill) permit is required to remove sediment and vegetation from a wetland which meets the legal definition of a jurisdictional wetlands. The U.S. Army Corps of Engineers (Corps) also requires a 404 permit to place fill (soil) in any water body considered “waters of the United States”. Most commercial stormwater ponds are not considered wetlands or waters of the U.S. The Idaho Department of Water Resources (IDWR) requires a Stream Channel Alteration permit for any work below the highwater mark in water bodies classified as “waters of the State”.
- Grading permit. If excavating more than 50 cubic yards of material within the City of Boise, it may be needed to obtain a grading permit. See the 1994 Uniform Building Code Appendix Chapter 33, Section 3306.1 and 3306.2 for more information.
- Dewatering permit. If it is needed to dewater a stormwater system as part of maintenance operations, it may be able to pump uncontaminated groundwater or stormwater into the storm sewer system with the permission from the Ada County Highway District.
- Short term activity exemption. If it is needed to discharge stormwater from stormwater ponds to surface water, then a short-term activity exemption from the Idaho Department of Environmental Quality (Idaho DEQ) will be required.
- Land application permit. If discharging stormwater collected from dewatering a stormwater system to land, then a land application permit from the Idaho DEQ will be required.

INSPECTION AND MAINTENANCE RECORDKEEPING

Keeping adequate records on the operation and maintenance of the stormwater system is important. Not only does proper record keeping provide a useful record of past operation and maintenance practices, but also provides the owner or operator documentation that the stormwater system has been properly operated and maintained. In addition, proper record keeping provides the following advantages:

- It provides a new system owner or operator with needed information on routine operation and maintenance procedures, frequencies, and associated costs.
- It contains information which may be useful in updating the O&M plan.
- It provides a central source of information to any federal, state, or local agency that may request information on the stormwater system. Information that can be included in records includes the

O&M Plan, maintenance reports, invoices for materials or work contracted, copies of permits, and laboratory analysis results which characterize clean-out wastes.

Information that can be included in records includes the O&M Plan, maintenance documentation, invoices for materials or work contracted, copies of permits, and laboratory analysis results which characterize clean-out wastes.

After the stormwater system has been maintained, complete a brief narrative to document the activities conducted. The narrative may include descriptions of the type of work conducted, completion dates, contractors used, time needed, and costs. Documenting the maintenance performed on a stormwater system is useful in planning future maintenance activities.



Properly Disposing of Maintenance Wastes

Most storm water system wastes consist of trash, leaves, grass, and sediment. For many system owners, maintaining a storm water system is not difficult because the quantity of wastes is small, or the wastes may not be hazardous. For others, however, disposing of storm water system wastes may be more complex because the quantity of wastes is large, or the wastes are hazardous. The purpose of this section is to provide information on how to properly and legally dispose of both hazardous and non-hazardous wastes.

In this Section:

- ✓ **How to determine whether maintenance wastes are hazardous**
- ✓ **Identifying the appropriate disposal method**
- ✓ **Requirements for waste disposal**

ARE THESE MAINTENANCE WASTES HAZARDOUS?

Use Process Knowledge and/or Analytical Testing to determine whether a waste is hazardous.

If the waste is non-hazardous follow the guidance under the 'NONHAZARDOUS WASTE DISPOSAL' heading below.

If the waste is determined to be hazardous follow the proper course of action under the 'HAZARDOUS WASTE DISPOSAL' heading below.

In many cases determining whether a waste is likely to be hazardous or nonhazardous is a straightforward process. Sediment and debris removed from storm water systems located in residential and commercial areas generally does not contain pollutants that would characterize the sediment or debris as hazardous waste. Those storm water systems located in industrial facilities or vehicle-related high-use areas, however, have the greatest potential for sediments and debris to be characterized as hazardous waste.

If a facility uses hazardous materials or generates hazardous waste as part of daily operations (for example, automotive repair shops or fueling stations), it must be determined if the waste from storm water system maintenance is a hazardous waste under federal and state law, regardless of where the storm water system is located on the property. It should be determined if the sediment or debris is hazardous prior to cleaning out the system and disposing of the waste. Determine if the waste is hazardous by using one of the following methods: process knowledge or analytical testing.

PROCESS KNOWLEDGE

"Process knowledge" is the term used to describe "the understanding of the processes and activities conducted at a site and the waste resulting from those activities." In most cases, process knowledge may be used to show that hazardous materials or wastes are not stored, handled, or used in a process within an area that discharges to a storm water collection system. It may also be able to show that access to the storm water system is controlled so that unauthorized activity or illegal dumping will not occur.

However, there may be cases where process knowledge may not be adequate to determine if a waste is hazardous:

- The access to the storm water system is uncontrolled.
- The storm water system is located in an area where hazardous chemicals or materials are used.
- The storm water system is located in an area where used oil or antifreeze is handled or stored.
- The storm water system is located in an area where engine washing/steam cleaning or other degreasing activities are conducted.

If any of these situations or similar circumstances exist, then the process knowledge method of determining if the maintenance waste is hazardous cannot be used. Regulations pertaining to management of hazardous waste can be found in the Resource Conservation and Recovery Act (RCRA) (40CFR Parts 260-282) and Idaho DEQ regulations (IDAPA 58.01.05).

Hazardous waste is defined as either a listed waste (listed within the regulations) or a characteristic waste (see discussion below). Analytical testing is used to determine whether the storm water system waste is a hazardous waste or that the waste can be managed as a non-hazardous waste.

ANALYTICAL TESTING

Analytical testing requires that a sample be taken from the sediment or liquids and tested to determine if the sample contains constituents that are listed within the regulations or if physical or chemical properties of the material would cause it to be categorized as a hazardous waste. The three physical property tests used for this procedure are Flash Point (to determine ignitability), pH (to determine corrosivity), and Toxicity Characteristics Leaching Procedure (to determine toxicity). A pesticide screening analysis may also be required if the facility handles or uses pesticides.

Collection of the sediment or liquid sample for analytical testing can be done by an individual or by a consultant. For an individual to complete the sampling an analytical laboratory must be chosen. When contacting a laboratory, ensure the lab conducts hazardous waste analysis. Some labs limit their services to construction-related testing and will not be able to provide the necessary analysis.

Once a laboratory is chosen, explain to the lab representative the need to characterize stormwater system waste. The lab will be able to provide the appropriate sample containers, explain how the samples should be taken, demonstrate how to fill out the associated paper work, and provide the appropriate container for transporting the samples back to the lab for analysis.

After collecting sample results from the lab, the results must be interpreted. A lab representative or employee with the Hazardous Materials/Waste Group of the Idaho DEQ can assist in explaining the sampling results. Analytical results, whether indicating a hazardous waste characteristic or not, should be kept on file at the facility where the samples were taken for a minimum of three years.

Idaho regulatory agencies recommend facilities to keep sampling results on file indefinitely. The analytical results from the storm water system sample will be valid for the facility unless there are changes in facility processes or activities that could potentially impact the storm water system. New samples and testing would have to be conducted in this case.

Sampling Frequency

The Idaho DEQ recommends the following sampling frequencies:

- If there are no changes in the types of activities or processes AND access is controlled to the storm water system, it may be possible to characterize the storm water system sediment only once.
- If the facility restricts access to the storm water system and there are site activities which could result in the release of a hazardous substance, testing should be conducted annually.
- If there is unrestricted access to the system, or site activities that could result in the release of a hazardous substance to the storm water system, it is necessary to test system sediments every time sediment is removed or disposed of.

DISPOSAL

The following section discusses how to properly dispose of maintenance wastes once determined whether they are non-hazardous or hazardous.

NON-HAZARDOUS WASTE DISPOSAL

Non-hazardous sediment and debris can be routinely disposed of at the local landfill, in accordance with state and local solid waste regulations. Disposal of maintenance wastes and other non-stormwater wastes are to comply with Boise City Code 10-6 and the adopted 2019 Boise City Stormwater Pollution Prevention Controls and Practices guide. The Boise City ordinance does not list this material as an

allowable non-stormwater use of storm drains. Additionally, all public storm sewers are operated by the Ada County Highway District which controls these and other discharges through a dewatering permit.

If using a waste disposal service other than normal garbage disposal, provide the waste hauler with documentation that the facility's stormwater system sediment is not hazardous waste (see section above on Analytical Testing). Any questions concerning the disposal of sediment with solid waste should be directed toward the waste hauler or the Environmental Division of Boise City Public Works Department.

Stormwater system maintenance wastes must be disposed at an authorized solid waste facility. Idaho Waste Systems is a regional waste facility that is certified to receive non-hazardous liquid wastes.

HAZARDOUS WASTE DISPOSAL

If sampling results indicate that the sediment or liquid in the facility's stormwater system is classified as hazardous, the sediment or liquid must be disposed of as hazardous waste in accordance with state and federal regulations.

Two general disposal options are available. The option chosen will depend on the facility's hazardous waste generator status. Under federal and state regulations, the amount of hazardous waste a facility generates in a calendar month will determine a facility's generator status.

If generator status is unknown or the facility does not have a contractor to assist, call the Idaho DEQ and request technical assistance from a hazardous materials/waste specialist. Based on the facility's generator status, disposal options for stormwater sediment or liquid that characterizes as hazardous waste will vary. For more information on generator status and hazardous waste disposal options, visit cityofboise.org/departments/public-works/curb-it/hhw.

Inspection and Maintenance Form

The inspection form included in this resource guide can be printed and used as is, or it can be customized for each facility.

Stormwater System and Facility Inspection Report

General Information			
Facility Name			
Date of Inspection		Time	
Inspector's Name(s)			
Inspector's Contact Information			
Type of Inspection: <input type="checkbox"/> Routine <input type="checkbox"/> During storm event <input type="checkbox"/> Post-storm event <input type="checkbox"/> Non-Routine			
Weather Information			
Weather at time of this inspection? <input type="checkbox"/> Clear <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Sleet <input type="checkbox"/> Fog <input type="checkbox"/> Snowing <input type="checkbox"/> High Winds <input type="checkbox"/> Other: Temperature:			
Has there been any runoff observed since the last inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			
Is there any runoff occurring at the time of inspection? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe:			

Site-specific controls

- *Recommendation: Number the structural and non-structural stormwater controls identified in your operation and maintenance plan on your site map and list them below (add as many controls as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required stormwater controls at your facility.*

	Structural or nonstructural stormwater control	Control installed/implemented?	Maintenance required on the control?	Corrective action needed and notes
1		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections.

	Control/activity	Implemented?	Maintenance required?	Corrective action needed and notes
1	Are any discharge points and receiving waters free of any sediment deposits?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are storm drain inlets properly protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Is trash/litter from work areas collected and placed in covered dumpsters?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are any washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are any vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6	Are any materials that are potential stormwater contaminants stored inside or under cover?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Non-Compliance/Pollution Reports

Describe any incidents of non-compliance not described above or any incidence of pollution:

Additional Control Measures Needed

Describe any additional control measures needed to comply with the permit requirements:

Notes

Use this space for any additional notes or observations from the inspection:

Inspector name: _____

Signature: _____ **Date:** _____

Structural Control Assessment Tables

The assessment tables in this section provide users with critical components of each type of stormwater structural control to assess. When an issue is discovered the tables are designed to help the user identify likely cause(s) of the issue along with recommendation(s) for correcting issues and maintaining full functionality in the stormwater system. Detailed specifications on design and maintenance are available in Boise City's Stormwater Design Manual.

Structural Control Assessment Tables:

Table OM-1. Dry Ponds and Basins (Infiltration and Evaporation)

Table OM-2. Wet Ponds and Basins (Detention)

Table OM-3. Seepage Beds and Dry Wells

Table OM-4. Sand Filters

Table OM-5. Vegetated Swales

Table OM-6. Irrigated Grass Buffer Strips

Table OM-7. Constructed Wetlands

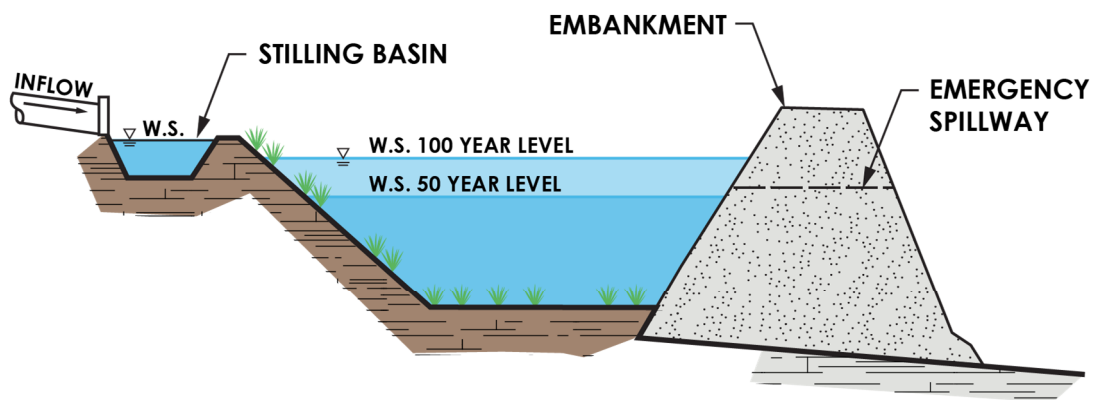
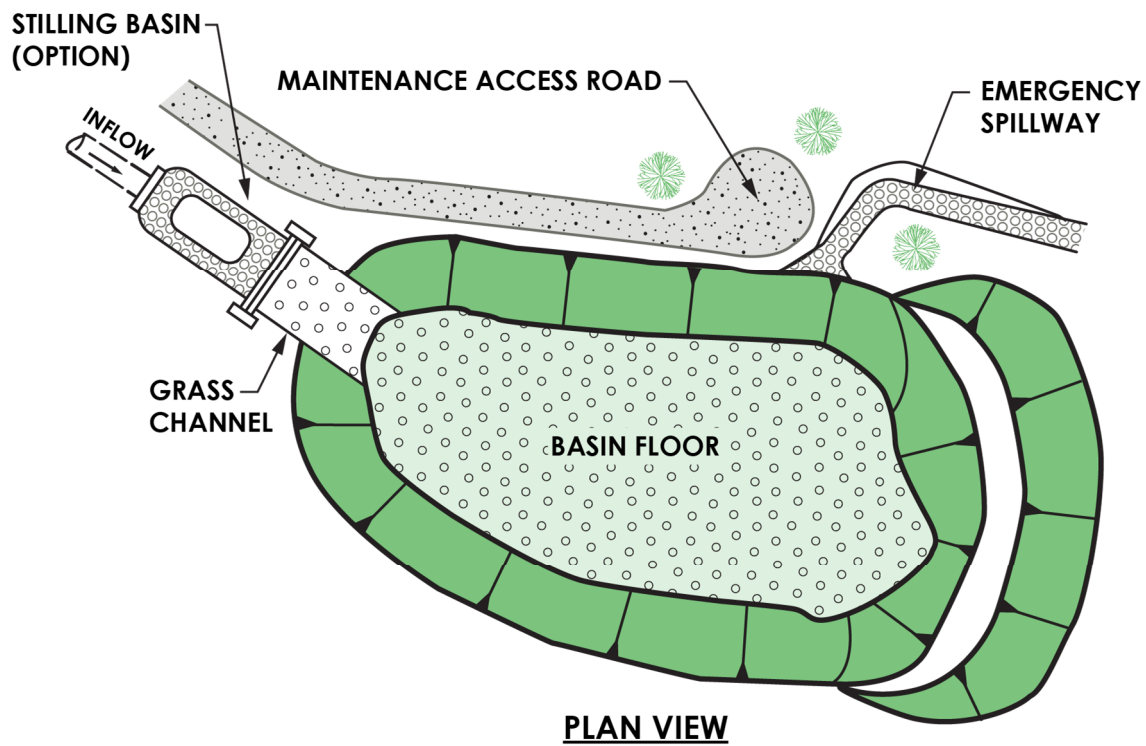
Table OM-8. Oil Water Separators

Table OM-9. Catch Basins

Table OM-10. Pipes and Surface Conveyance

OM-1 Dry Ponds and Basins (Infiltration and Evaporation)

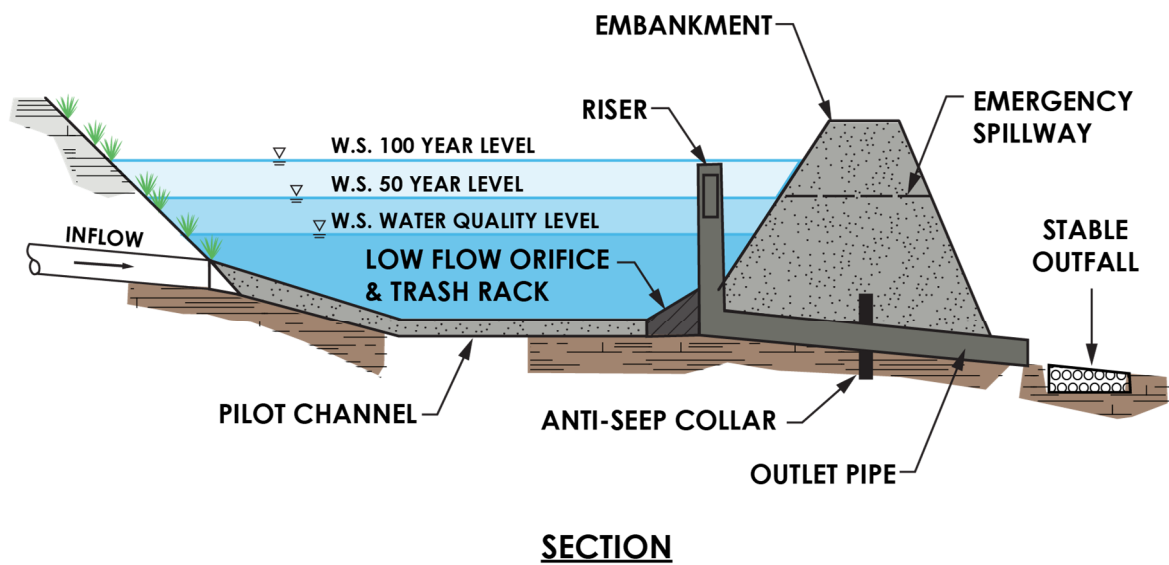
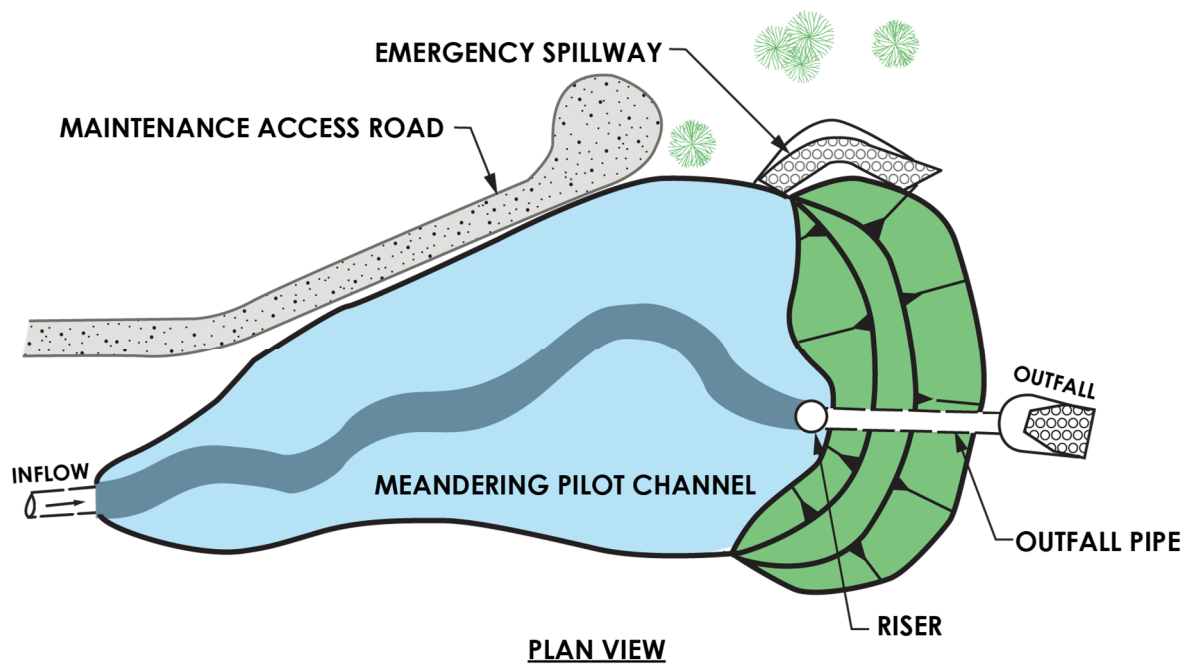
ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Undesirable vegetation is invading the pond/basin	Nuisance, poisonous, or noxious weeds	Manually remove undesirable vegetation. Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept. of Agriculture before applying pesticides. Certain pesticides should not be used near waterbodies.
Bare spots or sparse vegetation is evident in the pond	Compaction	Aerate and amend soils, re-seed, and mulch bare areas. Re-contour and re-seed pond to original design specifications.
	Insect infestation	Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept of Agriculture regarding appropriate methods for controlling insects.
Water flows through holes in dam or berm; holes are present around pond	Rodents	Control rodents and repair dam or berm. Contact the Idaho Department of Fish and Game for information on controlling rodents.
Large trees interfere with maintenance activities	Overgrown trees	Remove trees that interfere with access or maintenance activities. Preserve trees that are not a problem.
Accumulated sediment exceeds 10% of the designed pond depth	Excessive sediment	Clean out sediment to original shape and depth of the pond. Re-seed pond, if necessary, to control erosion.
Dike or berm has settled 4" lower than design elevation	Dike/berm settlement	Repair dike/berm to original design specifications. Re-seed or sod.
Bare soil is visible at top of spillway or outside slope	Inadequate rock layer	Add enough rock to cover up bare soil.
Debris covers at least 25% of the bar screen or bar screen is missing.	Trash rack is plugged or missing	Replace screen, if necessary. Remove trash and debris. Dispose of waste properly.



Evaporation Pond

OM-2 Wet Ponds and Basins (Detention)

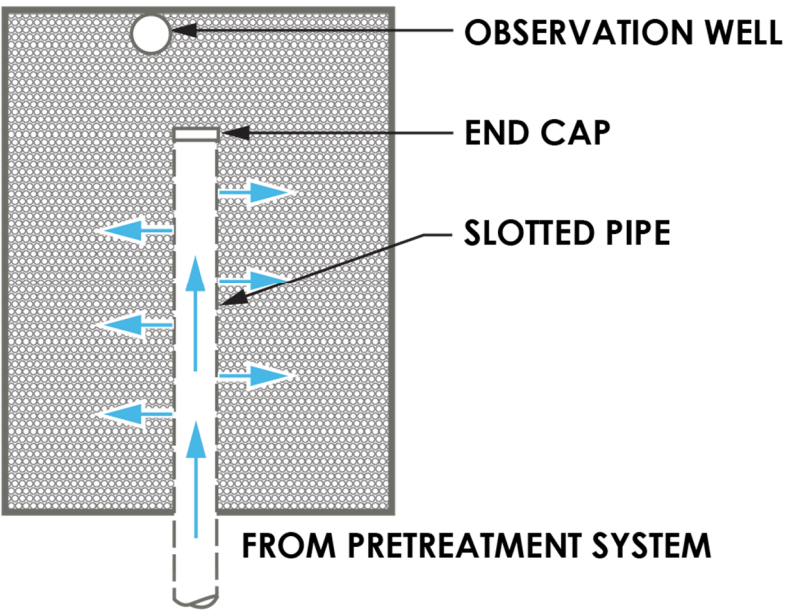
ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Undesirable vegetation is invading the pond/basin	Nuisance, poisonous, or noxious weeds	Manually remove undesirable vegetation. Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept. of Agriculture before applying pesticides. Certain pesticides should not be used near waterbodies.
Bare spots or sparse vegetation is evident in the pond	Compaction	Aerate and amend soils, re-seed, and mulch bare areas. Re-contour and re-seed pond to original design specifications.
	Insect infestation	Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept of Agriculture regarding appropriate methods for controlling insects.
Excessive mosquito population is present	Mosquitos	Install predacious bird and bat nesting boxes to control insects. Mosquito fish (Gambusia) can be used are available locally.
Water flows through holes in dam or berm; holes are present around pond	Rodents	Control rodents and repair dam or berm. Contact the Idaho Department of Fish and Game for information on controlling rodents.
Large trees interfere with maintenance activities	Overgrown trees	Remove trees that interfere with access or maintenance activities. Preserve trees that are not a problem.
Accumulated sediment exceeds 10% of the designed pond depth	Excessive sediment	Clean out sediment to original shape and depth of the pond. Re-seed pond, if necessary, to control erosion.
Dike or berm has settled 4" lower than design elevation	Dike/berm settlement	Repair dike/berm to original design specifications. Re-seed or sod.
Bare soil is visible at top of spillway or outside slope	Inadequate rock layer	Add enough rock to cover up bare soil.
Debris covers at least 25% of the bar screen or bar screen is missing.	Trash rack is plugged or missing	Replace screen, if necessary. Remove trash and debris. Dispose of waste properly.
Side slopes, channels, or outfall has areas where erosion is at least 2" deep and there is potential for further erosion	Soil erosion	Eliminate causes of erosion, if possible. If it isn't possible, use erosion and sedimentation control best management practices (SMPs) listed in the Boise Storm Water SMP Guidebook.



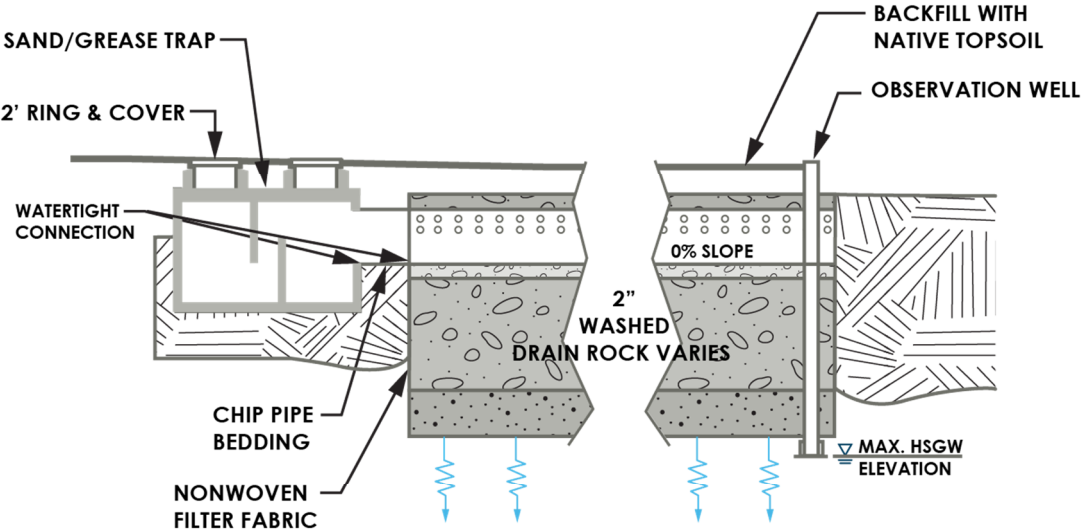
Detention Pond

OM-3 Seepage Beds and Dry Wells

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Pre-treatment BMP not functioning properly	Excessive sediment, erosion, lack of vegetation maintenance, etc.	Consult Boise City's stormwater design manual for additional guidance related to the pre-treatment BMP installed.
Trees or shrubs are present over top of the seepage bed/dry well	Trees or shrubs planted or sprouting above seepage bed	Remove trees and shrubs from above seepage bed to prevent damage by invading roots.
Standing water around seepage bed/dry well is present; water infiltration out of seepage bed takes longer than 48 hours	Clogged or damaged pipes, clogged drain rock	Remove sediment or debris in pipes with a vacuum truck. A high-pressure hose can also be used to remove sediment/debris. See OM-10 for more information. Ensure pre-treatment BMP ahead of seepage bed/dry well is present and properly maintained.
Inlet drain pipes become clogged with sediment or debris	Excessive sediment	Remove sediment or debris with a vacuum truck or shovel. See OM-10 for more information.



PLAN VIEW



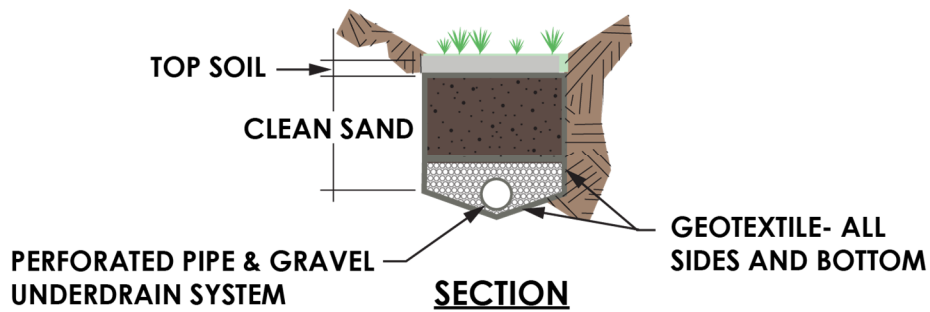
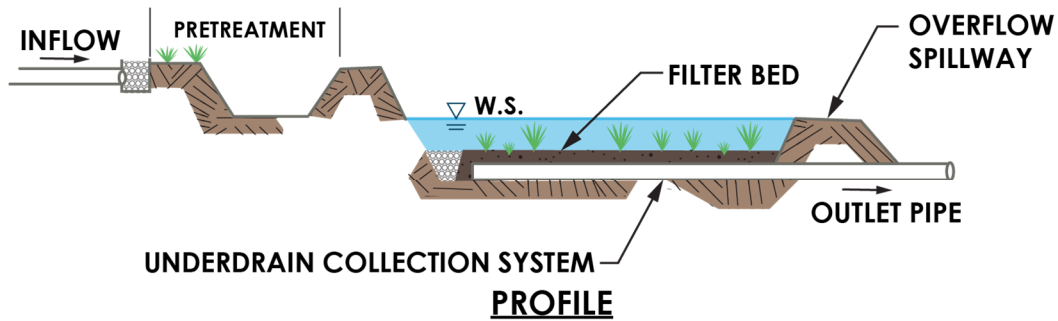
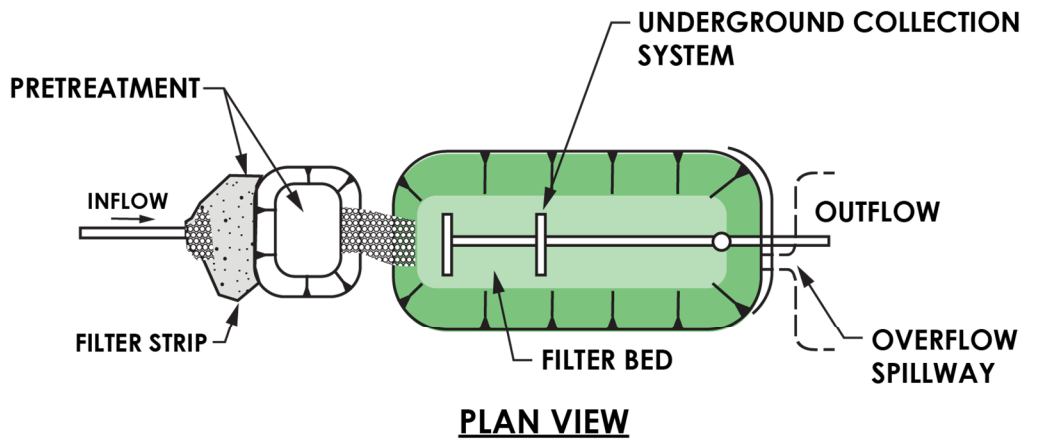
SECTION

Infiltration Trench (Seepage Bed)

OM-4 Sand Filters

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Sediment accumulation exceeds 1/2 in depth in sand filter basin	Sediment buildup on grass layer (if applicable)	Remove sediment so that no deposits remain on the grass layer of the sand filter. Dispose of sediment properly.
Concentrated water flow occurs over the sand filter	Clogged or damaged weir	Clean or repair weir so that water flow is uniform across the sand filter.
Overgrown vegetation or nuisance weeds	Grass is taller than 6"; weeds begin to invade the sand filter	Mow grass regularly. Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept. of Agricultural regarding methods for controlling weeds.
Standing water around sand filter is present	Clogged or damaged pipes	Repair or replace parts as needed.
Bare soil beneath the rock is visible	Rock pad is missing or out of place	Replace or rebuild the rock pad to design specifications.
Slope has areas where erosion is at least 2 deep and there is potential for further erosion	Soil erosion	Eliminate causes of erosion, if possible. If it isn't possible, use erosion and sedimentation control best management practices (SMPs) listed in the Boise Storm Water SMP Guidebook.
Water drawdown through sand filter takes longer than 24 hours; waterflow bypasses sand filter; or, concentrated water flow occurs over the sand filter.	Clogged sand filter media	Replace the top 6"-12" of sand media. Use a flat shovel to remove the sand. May require replacement of entire sand filter section. OR Replace sand filter media so that the flow and percolation of water through and across the sand filter is uniform.
Sediment accumulation exceeds 1/2" in depth on sand media section and/or 6" or more accumulation in depth in vault	Excessive sediment	Use a vacuum truck or shovel to remove sediment deposits on sand filter or first chamber of the vault and dispose of properly.
Inlet/outlet drain pipes become clogged with sediment or debris.	Excessive sediment	Remove sediment or debris with a vacuum truck or shovel. A high-pressure hose can also be used to remove sediment/debris. See OM-10 for more information.
Underdrain pipe is damaged, broken, cracked, or corroded.	Defective pipe	See OM-10 for more information.
Underdrain pipe has sediment accumulation that impedes water flow.	Excessive sediment	Remove sediment from and pipe and dispose of properly. Repair or replace pipe to design specifications.

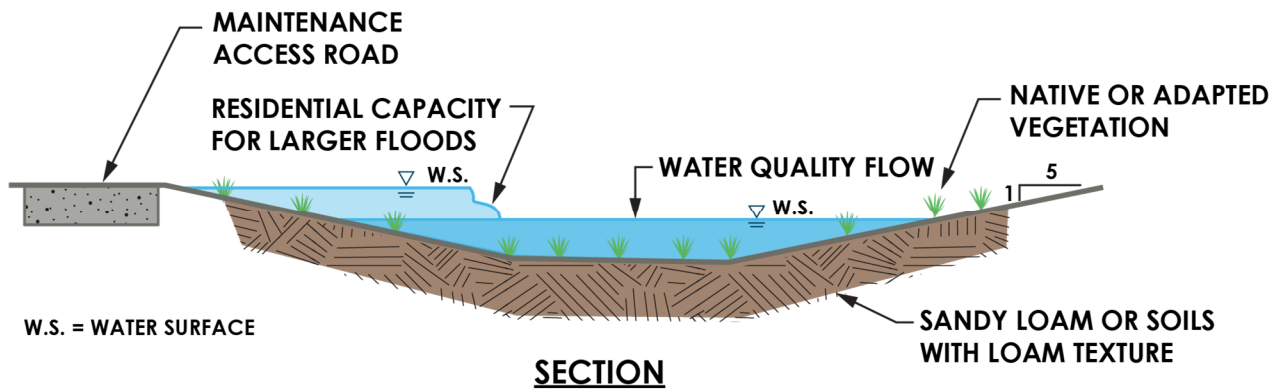
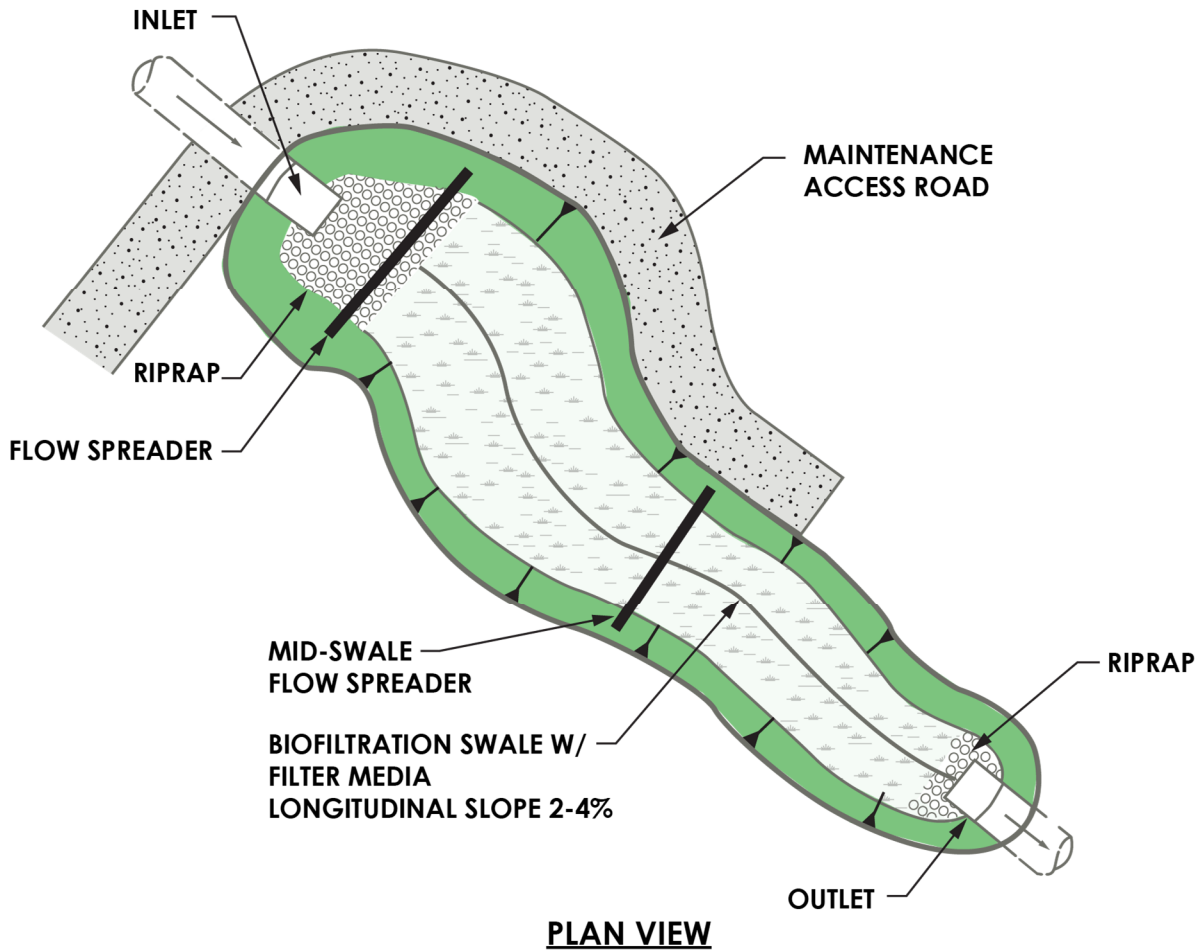
ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Debris covers at least 25% of the bar screen or bar screen is missing	Trash rack is plugged or missing	Replace screen, if necessary. Remove trash and debris and dispose of waste properly.
Cover crop appears very dry or dead	Cover crop lacks water	Irrigate cover crop regularly during dry season or periods of drought.



**Sand Filter
(Generalized)**

OM-5 Vegetated Swales

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Grass is taller than 10"	Overgrown vegetation	Mow grass regularly. Grass should be mowed to a height of 4-9" for best stormwater control. Avoid over-applying fertilizers. Excessive fertilizer application may compound water quality problems.
Accumulated sediment exceeds 2" in depth	Sediment buildup on grass	Remove sediment so that no deposits remain on the buffer strip. Dispose of sediment properly.
Poisonous or noxious vegetation that is a potential hazard to the public is present	Poisonous or noxious weed infestations	Remove poisonous or noxious vegetation either by digging up or hand-pulling the weeds. Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Department of Agriculture regarding appropriate methods for controlling weeds. Re-seed to original design specifications.
Presence of standing water in swale or flow velocity is slow and water becomes stagnant.	Inadequate swale grade	Conduct a survey to check grades. Swale grades need to be between 2-4%. If the grades are less than 2%, re-grade and re-seed the swale.
Slope has areas where erosion at least 2" deep and there is potential for further erosion	Soil erosion	Eliminate causes of erosion, if possible. If it isn't possible, use erosion and sedimentation control BMPs listed in the Boise City's stormwater design manual.
Swale shows signs of active erosion; bottom of swale is scoured.	High flow velocity; flow channelization	Re-grade and re-seed swale to original design specification. Install a rectangular weir to spread out the flow if necessary. Over-seed bare spots.
Stormwater is not flowing into or out of the swale; water is puddling near the pipe.	Clogged pipe	Clean sediment and debris from inlet or outlet pipe. See OM-10 for more information.

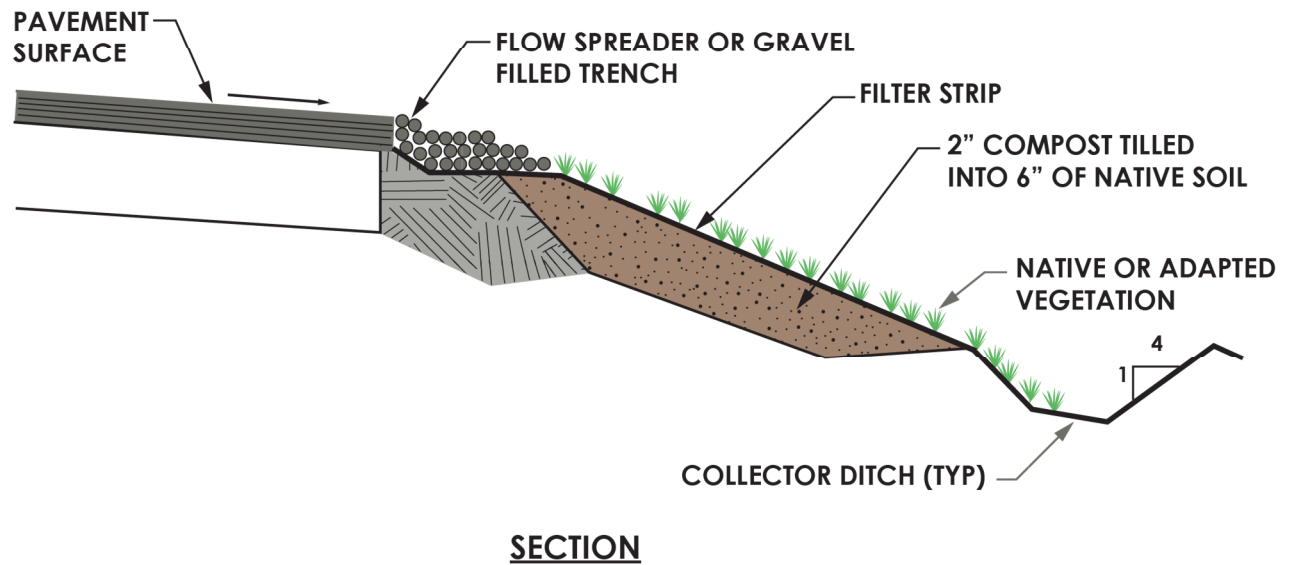
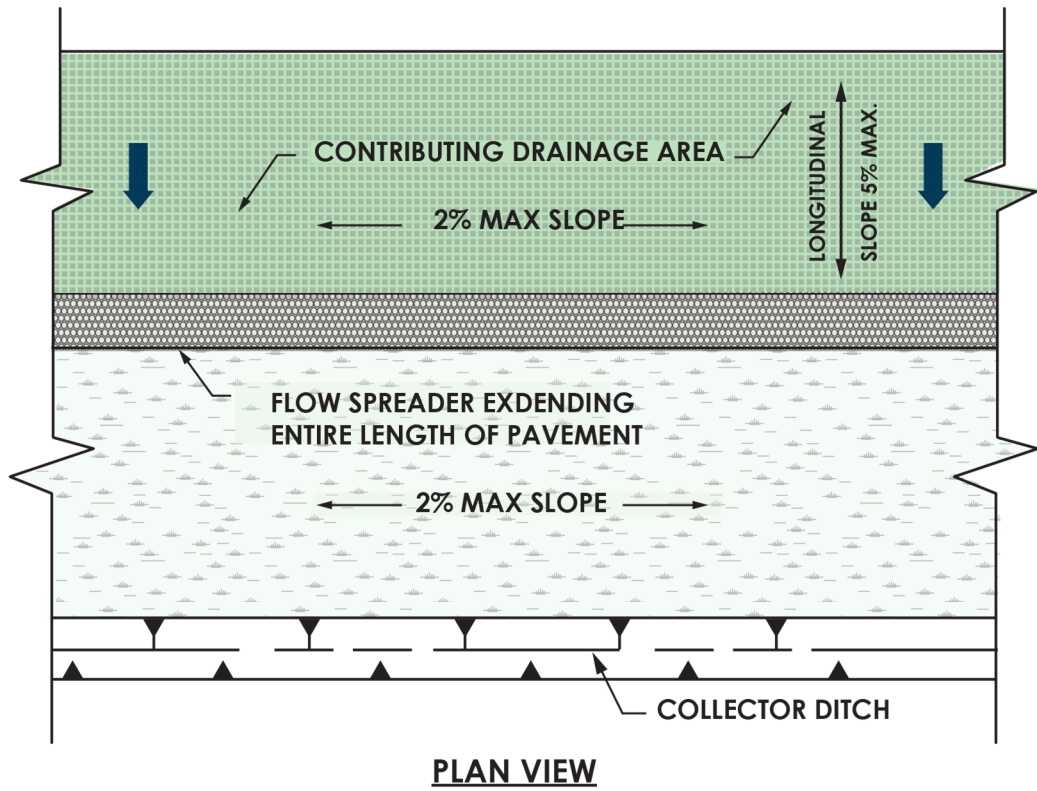


W.S. = WATER SURFACE

Vegetated Swale

OM-6 Irrigated Grass Buffer Strips

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Grass is taller than 10"	Overgrown vegetation	Mow grass regularly. Grass should be mowed to a height of 4-9" for best stormwater control. Avoid over-applying fertilizers. Excessive fertilizer application may compound water quality problems.
Accumulated sediment exceeds 2" in depth	Sediment buildup on grass	Remove sediment so that no deposits remain on the buffer strip. Dispose of sediment properly.
Poisonous or noxious vegetation that is a potential hazard to the public is present	Poisonous or noxious weed infestations	Remove poisonous or noxious vegetation either by digging up or hand-pulling the weeds. Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Department of Agriculture regarding appropriate methods for controlling weeds. Re-seed to original design specifications.
Buffer strip shows signs of active erosion	High flow velocity; flow channelization	Re-grade and re-seed buffer strip to original design specification. Over-seed bare spots. Provide other erosion protection as needed.



Irrigated Grass Buffer Strips

OM-7 Constructed Wetlands

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Wetland vegetation grows into areas designated for other uses	Overgrown wetland vegetation	Remove any vegetation which has grown outside the design boundaries as indicated in the landscape plan. Remove trees and bushes that interfere with maintenance activities.
Accumulated sediment exceeds the designated pond bottom elevation by 6-12"	Excess sediment accumulation	Clean out sediment to original shape, depth, and elevation of the wetland. Dispose of sediment properly. If the wetland is constructed in jurisdictional "Waters of the U.S." a 404 (dredge and fill) permit must be obtained from the U.S. Army Corps of Engineers (Corps). A Stream Channel Alteration permit from the Idaho Department of Water Resources (IDWR) must also be obtained. Contact the Corps and IDWR for more information.
Excessive debris, sediment, or oil buildup	Pretreatment system not installed	Install a pretreatment system upgradient from the wetland. The pretreatment system should be approved by Boise City Public Works.
Side slope or bottom has areas where erosion is at least 2" deep and there is potential for further erosion	Soil erosion	Eliminate causes of erosion, if possible. If it isn't possible, use erosion and sedimentation control BMPs listed in the Boise City's stormwater design manual.
Debris covers at least 25% of the bar screen or bar screen is missing of trash rack	Trash rack is plugged or missing	Replace screen, if necessary. Remove trash and debris and dispose of waste properly.
Pond dike or berm has settled 4" lower than design elevation	Dike/berm settlement	Repair dike/berm to original design specifications.
Stormwater is not flowing into or out of the wetland; puddles are present near the inlet/outlet pipe	Clogged pipe	Clean sediment and debris from inlet or outlet pipe. See OM-10 for more information.
Bare soil is visible at top of overflow spillway or outside slope	Inadequate rock layer	Add enough rock to cover up bare soil.

OM-8 Oil/Water Separators

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Discharge water is discolored, turbid, or has an oil sheen.	Excessive sediment or oil accumulation	Check if separator has excess sediment or oil accumulation. If so, remove oil or sediment and dispose of properly.
	Damaged baffle	Check baffle integrity. If damaged, repair or replace to design specifications.
	Incorrectly designed	Contact the design engineer to check if the system is appropriately sized for the drainage basin. If it isn't, then upgrade system with an additional or larger separator.
	Damaged coalescing plate (if present)	Check coalescing plate integrity. If damaged, repair or replace to design specifications.
Sediment accumulation exceeds 12" in bottom of vault	Excessive sediment	Remove sediment with a vacuum truck or shovel. Dispose of sediment properly.
Flooding occurs at inlet.	Sediment buildup blocks flow through separator	Remove sediment with a vacuum truck or shovel. Dispose of sediment properly.
Oil accumulation exceeds 1" at water surface	Excessive oil accumulation	Use a vacuum truck, or oil absorbing pads or booms to remove oil from water surface. Dispose of waste properly.
Pipes broken or damaged; cracks in pipe are wider than 1/4" at joints.	Damaged inlet/outlet pipes	Replace pipe or repair to original design specifications.
Cover cannot be opened; cover is corroded or damaged.	Defective access cover	Repair or replace cover to original design specifications.
Cracks in vault are wider than 1/2"; soil enters the vault through the cracks	Structural damage to vault	Replace or rebuild the vault to design specifications.
Baffles are cracked, warped, or corroded	Defective baffles	Repair or replace baffles to original design specifications.

OM-9 Catch Basins

ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Frame has separated more than 3/4" from the top slab	Frame separation	Reset frame even with top of slab.
Top slab has cracks wider than 1/4" or holes larger than 2"	Defective top slab	Replace or repair slab to design specifications.
Corner of frame extends more than 3/4" past curb face into the street.	Structural damage to frame or top slab	Reset frame with curb. Replace slab, if necessary.
Catch basin has cracks wider than 1/2" and longer than 3"; soil is entering the catch basin through the cracks.	Defective catch basin	Replace or repair catch basin to original design specifications. You may need to contact the design engineer to evaluate the structural integrity of the catch basin.
Catch basin has settled more than 12" or has moved more than 2" out of alignment	Catch basin settlement/misalignment	Replace or repair catch basin to original design specifications. You may need to contact the design engineer to evaluate the structural integrity of the catch basin.
Grate bars are broken, or grate is missing.	Grate is damaged or missing	Replace or repair grate to design specifications.
Trash or sediment in the inlet/outlet pipe is blocking more than 1/3 of the diameter of the pipe	Trash or sediment accumulation	Remove trash and sediment from pipes Dispose of wastes properly.
Piping has cracks wider than 1/2" and longer than 12" at the joint; soil is entering the catch basin through the cracks.	Cracked pipes	Replace or repair pipe to original design specifications.
Vegetation is growing in inlet/outlet pipe joints	Overgrown vegetation	Remove vegetation from pipe joints.

OM-10 Pipes and Surface Conveyance

SYSTEM FEATURE	ARE ANY OF THESE PRESENT?	POTENTIAL CAUSE	RECOMMENDATION
Pipes	Accumulated sediment or trash exceeds 20% of the diameter of the pipe	Excess accumulation of sediment or trash	Clean out sediment and trash from pipe. Use a high-pressure hose, vacuum suction, or other appropriate cleaning method. Contact the design engineer for information on the appropriate cleaning methods for your type of drainage system.
	Vegetation is impeding water flow	Overgrown vegetation	Clean out sediment and trash from pipe. Use a high-pressure hose, vacuum suction, or other appropriate cleaning method. Contact the design engineer for information on the appropriate cleaning methods for your type of drainage system.
	Pipe is rusted; protective coating is damaged	Corroded pipe	Replace or repair pipe to original design specifications.
	Dent in pipe has reduced the pipe diameter by 20%; water flow is impeded; pipe is broken.	Defective pipe	Replace or repair pipe to original design specifications.
	Water is leaking from pipe	Cracked pipe	Replace or repair pipe to original design specifications.
Ditches	Accumulated sediment exceeds 20% of the designed ditch depth.	Excess sediment accumulation	Clean out sediment to original shape and depth of the ditch. Dispose of sediment properly.
	Vegetation reduces water movement through ditch	Overgrown vegetation	Remove any weedy shrubs or saplings that impeded water flow. Preserve grass to control erosion.
	Slope of ditch has areas where erosion at least 2" deep and there is a potential for further erosion	Soil erosion	Check around inlets and outlets for erosion. Eliminate causes of erosion, if possible. If it isn't possible, use erosion and sedimentation control BMPs as listing in the Boise City's stormwater design manual.
	Bare soil is visible beneath the rock lining.	Inadequate rock layer	Add enough rock to meet design specifications.