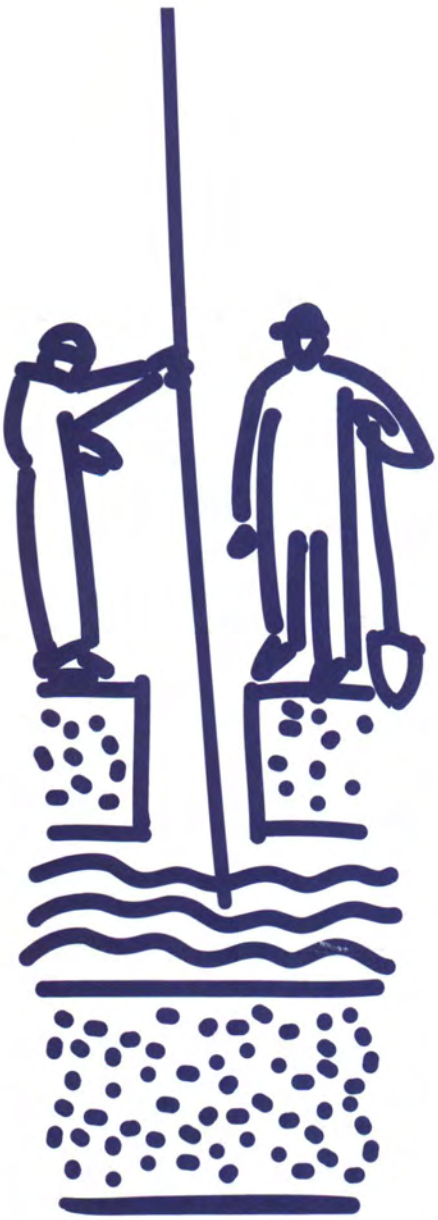
StormWater Operation & Maintenance

A Resource Guide



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Preface

As part of the Boise City Storm Water Management Program, Boise City produced this handbook to assist you in properly operating and maintaining your storm water system. This handbook will be updated as new information is available and as new technology is developed and tested.

This handbook should be used in conjunction with best professional judgment, sound engineering principles, the Boise City Storm Water On-site Detention Inspection Program (ODI) requirements and the Ada County Highway District Developmental Services Policy Manual. The handbook is divided into the following sections:

- Proper maintenance is important
- Developing an Operation and Maintenance Plan
- Inspecting your storm water system
- Performing maintenance on your storm water system
- Properly disposing of maintenance wastes
- Operation and Maintenance recordkeeping
- *Inspection and Maintenance* Forms

In addition, we have included examples of storm water system *Operation and Maintenance Plans* as well as *Inspection Forms and Maintenance Reports.*

Introduction

Whether you manage an apartment complex or own a commercial development or industrial facility, properly operating and maintaining your storm water systems is critical. Storm water systems that are properly operated and maintained not only function better and provide better storm water treatment, but also reduce maintenance costs and liability problems. This handbook provides information on properly operating and maintaining storm water systems for residential, commercial, and industrial developments.

In this handbook, you will find inspection and maintenance forms. These forms describe problems that could occur in a storm water system and provide recommendations for maintenance. These forms should be used as checklists during inspections and as records for identifying which system components require maintenance. In addition, these forms can be included in your Operation and Maintenance (O&M) Plan (described later in this handbook).

Proper maintenance is important

Every storm water system needs to be properly maintained to reduce or eliminate costly repair problems and to properly treat storm water. The lack of proper maintenance is the most common cause of storm water system failure. The following reasons explain why properly maintaining your storm water system is critical:

- It reduces the risk of flooding due to system failure. For example, detention systems are designed to detain sediments and store large amounts of storm water. Sediments trapped in the trapping area need to be removed regularly to reduce excessive sediment buildup. If the sediments accumulate beyond what the system is designed for, it could fail and cause storm water to backup and flood an area.
- It improves the level in which pollutants are effectively removed. For example, a vegetated swale is designed to remove sediment, oil, grease, and toxic chemicals by filtering out these pollutants. Storm water flows slowly through the swale filtering through the grass and infiltrating into the underground sand and rock layers. But, if the swale lacks a grass cover or has severely eroded, then the storm water will flow too quickly through the swale and the level in which these pollutants are removed will be significantly reduced.
- It reduces the likelihood that sediment or other debris will have to be disposed of as hazardous waste. For example, industrial sites can produce toxic chemicals which can end up in a storm water system. If the system is not maintained regularly, then the debris may characterize as hazardous

waste and will have to be disposed of as hazardous waste. This disposal process is quite costly; removing sediment or other debris on a regular basis is not.

- It reduces safety hazards on your site. First, a poorly functioning infiltration system may cause storm water runoff to pond. This runoff can freeze and become a safety hazard to site employees or the public. Second, keeping good inspection and maintenance records can help the owner or operator with liability issues should safety problems arise. Third, regularly inspecting your storm water system will alert the operator if hazardous materials (which may have been illegally dumped into the system) are present.
- It improves its visual appeal and preserves its value as an neighborhood amenity. For example, the detention pond at Roanoke and Shenandoah Streets in east Boise is attractive to not only wildlife, but also residents whose homes border the pond. Similarly, a well maintained natural area can act as a storm water collection area and as a neighborhood park. Because these storm water systems are considered amenities, the value of homes that are located near these systems can be higher than the value of home values located in other parts of a subdivision.
- It ensures that nuisance situations do not develop into big problems. For example, you can control mosquitos near ponds or constructed wetlands by installing inexpensive predacious bird and bat boxes and encouraging these wildlife species to live near the site. Similarly, regularly removing a few nuisance weeds is much more time and cost-efficient than controlling the weeds after they have invaded the entire area.

Developing an Operation and Maintenance Plan

This section describes the guidelines you should follow to develop your own Operation and Maintenance (O&M) plan. An O&M plan helps you coordinate inspection and maintenance activities for your type of system and track any problems that you may have observed when performing inspection and maintenance. You can develop an O&M plan for new or existing storm water systems. Examples of a completed O&M plans begin on page 47.

New systems

Having an O&M plan prepared at the time a new storm water system is being designed will make maintaining you 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.

You should work closely with your design professional when you develop an O&M Plan for a new system because the design professional can specify maintenance procedures, material specifications, and operation practices specifically for your system. Remember to discuss any design problems you encountered while inspecting or maintaining your system with your design professional. Your comments will help the design professional modify the design so that the same problem will not occur in the future.

Existing systems

Preparing an O&M Plan for an existing storm water system is also recommended, although the information may be harder to find. Still, the extra step you take 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 you are unable to locate the storm water systems original design plans onsite, contact the design professional who originally designed the system. The Boise City Public Works Department has copies of the original approved design plans for commercial and industrial storm water systems installed after 1989. The Ada County Highway District retains design plans for residential storm water systems.

The O&M Plan consists of the following items:

- site plans, design plans and material specifications for the storm water 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 Storm Water Best Management Practices (BMP) Guidebook), if applicable

Inspecting your storm water system

Frequent, thorough and consistent inspections are the key to the successful operation and maintenance of your storm water system. Inspections reveal the operational status of your system, identify needed maintenance actions and provide the information to update your O&M plan. We recommend that you inspect storm water 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 you are able to identify how often your system needs regular maintenance. The time interval in which you perform subsequent inspections should be determined by actual maintenance requirements. This section addresses inspection frequency, conducting inspections safely, and using the *Inspection and Maintenance* forms.

Inspection frequency

The frequency in which you inspect a storm water 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 storm water system determines how frequently you need to inspect your 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 your system than storms which occur at other times of the year. Therefore, you need to inspect your storm water system before and after the summer months when the system can experience its greatest use. For detention and evaporation ponds, you should 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. You may need to inspect your storm water system more frequently in drainage areas where construction is taking place and creating a large amount of sediment. Likewise, storm water 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 storm water system. Finally, sites which may generate more wastes, such as industrial and high vehicle-use areas, need to be inspected more frequently.

Inspecting storm water systems safely

The individual inspecting the storm water system should always consider safety as the first priority. The inspector should have the

proper safety equipment (heavy duty gloves, boots, first aid kits, for example) and training before conducting any inspections. 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 storm water system inspection reveals a safety problem, then you may have to modify your site activities to reduce or eliminate the safety risk. The following is a list of safety precautions an inspector should be aware of when inspecting storm water systems:

- Never enter a confined space unless you have 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. Avoid entering pipes or conduits without another individual present. If the structural strength of a pipe or conduit is questionable, then you should not enter the pipe or conduit at all.
- Check the ventilation in the storm water system before using any type of ignitable materials . Some storm water 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 storm water 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 manhole 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 you take a step in the water. The water may be deeper than you think or there may be steep slopes below the water line.
- Be aware that nails, broken glass, or other sharp debris may be in the storm water 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 storm water systems. Inform the individual who will perform maintenance on the system that these plants are present.
- Look where you walk. Rodent holes may be present around ponds or constructed wetlands. Some holes may be partially covered and not easily seen at first glance. Watching where you step will help you avoid having an accident.

Using the *Inspection and* Maintenance forms

Beginning on page 23, you will find the storm water system *Inspection and Maintenance* forms. These forms are organized by the type of system and include information on potential problems and maintenance recommendations.

To use the *Inspection and Maintenance* forms, identify the system components that compose your storm water system. Photocopy the applicable *Inspection and Maintenance* forms and the *Inspection Cover Sheet* (on page 19). Inspect each system design feature to determine if any of the conditions are present. If the current condition of the drainage system feature matches the description on the *Inspection and Maintenance* form, then place a checkmark in the appropriate column. The system design features that have been checked may need to be maintained based on the severity of the problem. Examples of completed inspection forms and maintenance reports begin on page 59.

Performing maintenance on your storm water system

Your storm water system may require either routine or non-routine maintenance. Routine maintenance is the maintenance an individual performs on a storm water system to ensure that the storm water system is functioning as designed and that the system aesthetics are well maintained. Non-routine maintenance is the maintenance an individual performs as a result of a catastrophic event, such as a hazardous chemical spill. This section discusses routine and non-routine maintenance, performing maintenance safely, and completing the Maintenance Report form.

Routine maintenance

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

You may need to obtain permits from federal, state or local agencies to conduct storm water maintenance activities. The following permits may be required:

- **404 permit and a Stream Channel Alteration permit**. A 404 (dredge and fill) permit is required if you 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 storm water 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 high water mark in water bodies classified as "waters of the State".

- **grading permit.** If you excavate more than 50 cubic yards of material within the City of Boise, you may need 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 you need to dewater a storm water system as part of your maintenance operations, you may be able to pump uncontaminated groundwater or storm water into the storm sewer system with the permission from the Ada County Highway District.
- **short term activity exemption**. If you will discharge storm water from storm water ponds to surface water, then you will need to obtain a short term activity exemption from the Idaho Division of Environmental Quality.
- **land application permit**. If you will discharge storm water collected from dewatering a storm water system to land, then you will need to obtain a land application permit from the Idaho Division of Environmental Quality.

Performing maintenance safely

The individual performing maintenance on the storm water system should always consider safety as the first priority. All maintenance work should be done in accordance with OSHA regulations Maintenance personnel should have the proper safety equipment (heavy duty gloves, steel-toed boots, first aid kits, for example) and training before performing any maintenance on a storm water system. Relevant safety information needs to be included into the O&M plan. The following is a list of safety precautions that maintenance personnel should be aware of when they perform maintenance on storm water systems.

- 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 begin 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 you will dispose of removed sediment or wastes prior to cleaning the storm water 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 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 storm water systems that, by design, have steep slopes.

Non-routine maintenance

In addition to routine maintenance, the storm water system may require non-routine maintenance. If illegal dumping into the system, accidental spills, or massive sediment and debris inflows occurs, you will need to perform non-routine maintenance. Inspect your 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 ground water). Check your storm water 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 storm water system is responsible for cleaning the spill and disposing of the waste properly. If the spill contains hazardous materials, then you may want to contact a qualified environmental consultant who specializes in spill containment, cleanup and disposal. These consultants are listed in the Yellow Pages of the Boise City telephone book under Environmental Services.

Maintenance Report

After you have maintained your storm water system, fill out a Maintenance Report. The Maintenance Report form is located on page 21. Describe the maintenance activities, including descriptions of the type of work, completion dates, contractors used, time needed, and costs. Documenting the maintenance performed on a storm water system will be 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.

Are these maintenance wastes hazardous?

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 your facility uses hazardous materials or generates hazardous waste as part of daily operations (for example, automotive repair shops or fueling stations), you must determine if the maintenance waste is a hazardous waste under federal and state law, regardless of where the storm water system is located on your property. You should determine if the sediment or debris is hazardous prior to cleaning out the system and disposing of the waste. You can determine if your 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, you can use process knowledge 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. You 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 processes 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. You must use the analytical testing method to determine if the waste is hazardous.

Analytical Testing

Analytical testing requires that a sample be taken from the sediment or liquids and tested to determine if any of the 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 your facility handles or uses pesticides.

Analytical testing can be done by yourself or by a consultant. You can contact consultants under the listing "Engineers - Environmental" in the Yellow Pages of the Boise telephone book. If you want to conduct your own sampling, then you must choose an analytical laboratory. Analytical laboratories are also listed in the Yellow Pages under " Laboratories - Testing". When you contact a laboratory, make sure 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 you have chosen a laboratory, explain to the lab representative you want to characterize storm water system waste. They will be able to provide the appropriate sampling bottles, explain how the samples should be taken, show you how to fill out the associated paper work, and provide the appropriate container for transporting the samples back to the lab for analysis.

Second, you must collect the samples from the lab and interpret the results. A lab representative or employee with the Hazardous Materials/Waste Group of the Idaho Division of Environmental Quality can assist you in understanding 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.

Sampling frequency

The Idaho Division of Environmental Quality recommends the following sampling frequencies:

- If there are no changes in the types of activities or processes AND you control access to the storm water system, you may be able to characterize the storm water system sediment only once.
- If your facility restricts access to the storm water system and

there are site activities which could result in the release of a hazardous substance, you may want to test on a yearly basis.

- If there is unrestricted access to your system, or site activities that could result in the release of a hazardous substance to the storm water systems, you will need to test system sediments every time you remove or dispose of sediment.

Non-hazardous and hazardous waste disposal

The following section discusses how to properly dispose of maintenance wastes once you have 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 8-15 and the adopted 2004 Boise City Non-Stormwater Disposal BMP Handbook.

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.

Idaho Waste Systems is a regional waste facility that is certified to receive non-hazardous liquid wastes.

Provide your solid waste hauler with documentation that your facility's storm water system sediment is not hazardous waste. If you have any questions concerning the disposal of sediment with solid waste, please call your solid waste hauler or the Environmental Division of Boise City Public Works Department.

Stormwater system maintenance wastes must be disposed in an authorized solid waste facility.

Hazardous waste disposal

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

Two general disposal options are available. The option you choose will depend on your facility's hazardous waste generator status. Under federal and state regulations, the amount of hazardous waste

your facility generates in a calendar month will determine your facility's generator status:

- A Conditionally Exempt Small Quantity Generator (CESQG) generates LESS THAN 220 pounds of hazardous waste in a calendar month.
- A Small Quantity Generator (SQG) generates between 220 and 2,200 pounds of hazardous waste in a calendar month.
- A Large Quantity Generator (LQG) generates 2,200 pounds or more of hazardous waste in a calendar month.

To calculate your generator status, you must add up ALL hazardous wastes that your facility generates and show the total number in units of pounds. The exceptions to this include: 1) used motor oil that is recycled or collected for fuel blending; 2) antifreeze that is recycled on-site or sent to a recycling facility; 3) automotive batteries that are returned to the distributor for recycling; and, 4) wastes that can be used "as is" (without any treatment) in a manufacturing process.

If you do not know your generator status or do not have a contractor to assist you, call the Idaho Division of Environmental Quality and request technical assistance from a hazardous materials/waste specialist. Based on your facility's generator status, disposal options for sediment that characterizes as hazardous waste are as follows:

- If your facility is conditionally exempt and is located in Ada County, you are eligible to participate in the small business hazardous waste disposal program. The program is associated with the Ada County Household Hazardous Materials Collection Program. To participate, you must preregister your wastes and call for an appointment to turn in your wastes. Although you will have to pay a disposal fee, the fee will be much less than the cost of hiring your own disposal contractor.
- If you are a small or large quantity generator, you must dispose of your facility's hazardous waste through a qualified hazardous waste management firm. To locate a qualified firm, look in the Yellow Pages of the Boise telephone book under "Waste Disposal - Hazardous".
- To avoid having storm water system sediment characterize as hazardous waste, maintain the facility's system regularly. Regular system maintenance reduces the potential that contaminated sediment will accumulate to a level where it will characterize as hazardous waste.

Operation and Maintenance Recordkeeping

Keeping adequate records on the operation and maintenance of your storm water system is important. Not only does proper recordkeeping provide a useful record of past operation and maintenance practices, but also provides the owner or operator documentation that the storm water system has been properly operated and maintained. In addition, proper recordkeeping 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 your O&M plan.
- It provides a central source of information to any federal, state, or local agency that may request information on your storm water system.

Required information include the O&M Plan, inspection and maintenance reports, invoices for materials or for contracted work, copies of authorizing permits, and laboratory analysis results to characterize maintenance wastes and collected sediment. Boise City Code 8-15-03.03 C requires maintenance records be retained for five years by the owners or other responsible party.

Inspection Cover Sheet

Date: _____

Facility Name: _____

Facility Address: _____

Facility Owner: _____

Inspector Name: _____

Inspector Phone Number: _____

Important Safety Information

- Never enter a confined space or trench unless you have proper Occupational Health and Safety (OSHA)training. Do not enter any confined space unless the atmosphere has been checked and proper safety equipment is worn or erected.
- Check the ventilation in the storm water system before using ignitable materials. Some storm water systems have poor ventilation and can pose a safety risk to the inspector if the vapor comes in contact with an open flame.
- Always cover or clearly mark excavated areas as potential safety risks if the areas cannot be filled in by the end of a work day.

Inspection comments:

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Maintenance Report Form

Date: _____

Facility Name: _____

Facility Address: _____

Name of Person Overseeing Maintenance: _____

Type of System: _____

Date of Last Inspection: _____

Describe maintenance activities, including type of work, completion dates, contractors, time needed to complete task, and cost.

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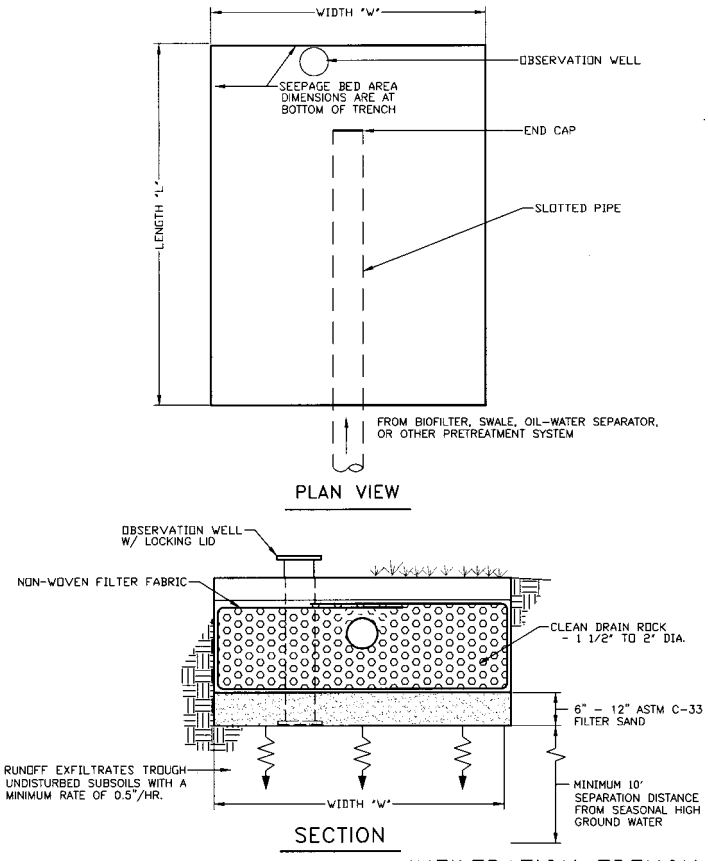
Inspection and Maintenance Forms

OM-1 Minimizing Directly Connected Impervious Areas (DCIAs)

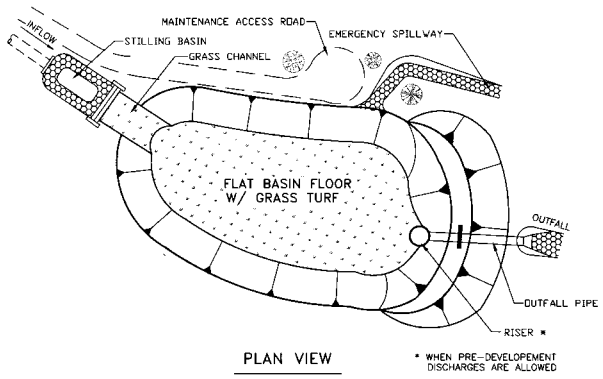
Stormwater system feature	✓	Are any of these conditions present	Problem	Recommendation
Landscaped or natural area		sediment accumulation exceeds 2" in depth	sediment buildup on vegetation	Remove sediment carefully to avoid damaging the existing vegetation. Dispose of sediment properly.
		grass becomes excessively tall or weeds invade the area	tall grass or weeds	Mow vegetation regulary. Grass should be mowed to a height between 4-9" for best storm water treatment. Remove weeds, if necessary. Call the University of Idaho Cooperative Extension System for information on eradicating weeds in storm water systems.
		trash and debris are present	trash and debris accumulation	Remove waste and dispose of properly.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you are unsure whether the substance is hazardous, take a sample or contact a qualified hazardous waste consultant for assistance.
		erosion or scouring is evident	excessive flows or flow channelization	Re-grade and re-seed area to eliminate high velocity or channelized flows. Overseed areas where bare spots are present.

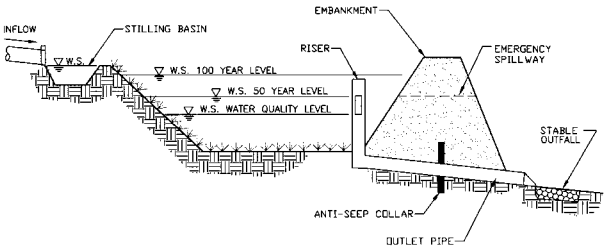
OM-2 Infiltration

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		standing water is present 24 hours after storm event	sediment buildup on bottom or sides of infiltration system	Excavate infiltration system and remove excess sediment. Dispose of sediment properly. An engineer or geotechnical consultant should examine drainrock and filter fabric to determine if replacement is needed. Re-install infiltration system 12" into free draining material.
		standing water is present 24 hours after storm event	infiltration system incorrectly designed or sited (high ground water area)	Review options for managing storm water as described in the Boise City Storm Water Management Design Manual. Infiltration may not be allowed. Contact the Boise Public Works Department for more information.
			infiltration system incorrectly constructed	Excavate infiltration system and re-install infiltration system 12" into free draining material. If good free draining material is not accessible, contact the design engineer to see if a more appropriate drainage system can be installed.
		offensive odor, color, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you do not know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		propane, oil, or gasoline odor or puddle is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for information on proper treatment and disposal of petroleum products.
		excessive debris, sediment, and oil buildup is present	pretreatment system not working properly	Clean out accumulated debris in pretreatment system and dispose of properly
			pretreatment system not installed	Install a pretreatment system upgradient from the infiltration system. The pretreatment system should be approved by Boise City Public Works.
Inlet/outlet pipes		standing water is present 24 hours after storm event	clogged pipes	Clean out sediment and debris from pipes. See OM-10, Pipes, for more information

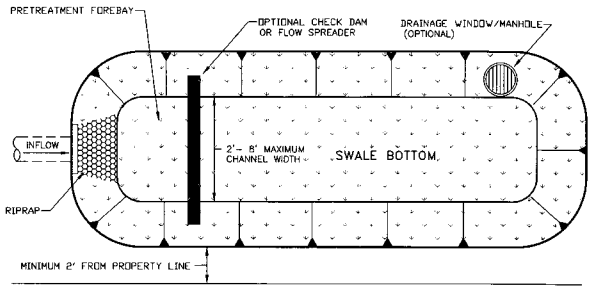


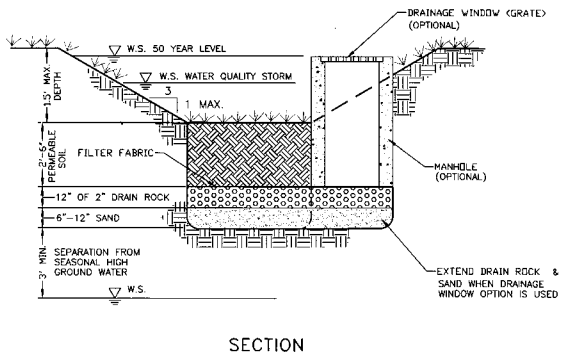
Infiltration Trench (Seepage Bed)





Infiltration Basin

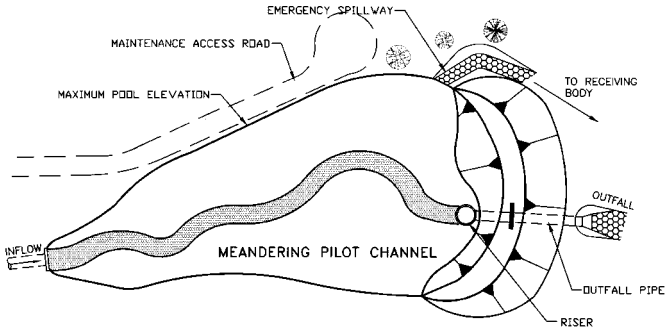




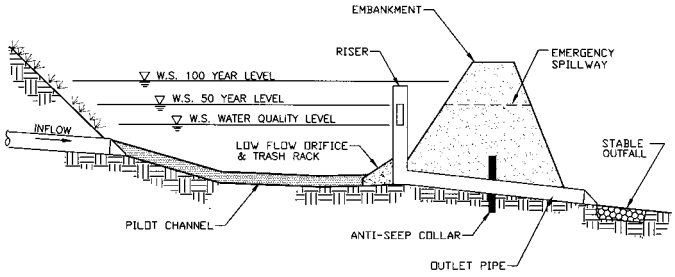
Infiltration Swale

OM-3 Ponds (Detention, Extended Detention, Evaporation)

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in pond	accumulation of trash and debris	Remove trash and debris and dispose of properly.
		undesireable vegetation is invading the pond	nuisance, poisonous, or noxious weeds	Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept. of Agriculture before applying pesticides. Certain perticides should not be used near waterbodies.
		propane, oil, or gasoline odor or surface film is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for more information.
		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 Agreculture regarding appropriate methods for controlling insects.
		grass is taller than 10"	overgrown vegetation	Mow grass regulary. Grass should be mowed to a height of 4-9" for best storm water control. Avoid over-applying fertilizers. Excessive fertilizer application may compound water quality problems.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		excessive mosquito population is present	mosquitos	Install predacious bird and bat nesting boxes to control insedts. Mosquito fish (Gambusia) can be used and are available locally.
		water flows through holes in dam or berm; holes are present around pond	rodents	Destroy 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.
Storage area		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. If the pond is designated as "waters of the U.S." or as a wetland by the U.S. Army Corps of Engineers (Corps), you must obtain a 404 (dredge and fill) permit. You must also obtain a Stream Channel Alteration permit from the Idaho Department of Water Resources (IDWR). Contact the Corps and IDWR for more information.
Pond dike/berm		dike or berm has settled 4" lower than design elevation	dike/berm settlement	Repair dike/berm to original design specifications. Re-seed or sod.
Overflow spillway		bare soil is visible at top of spillway or outside slope	inadequate rock layer	Add enough rock to cover up bare soil.
Trash rack		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.

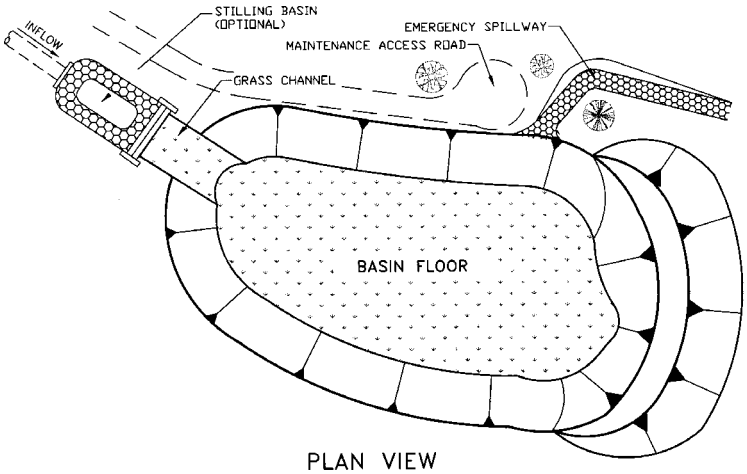


PLAN VIEW



SECTION

Detention Pond



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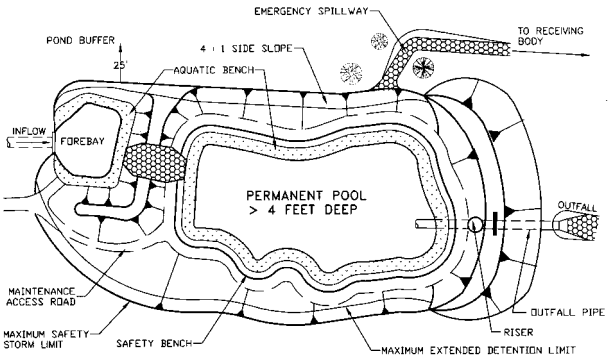

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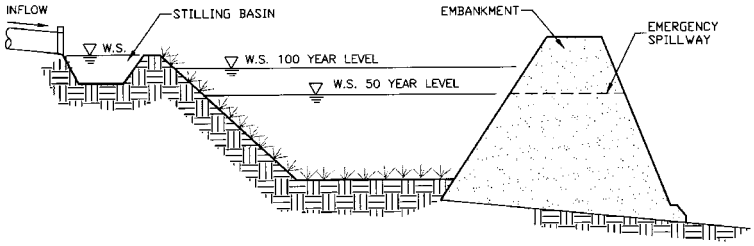
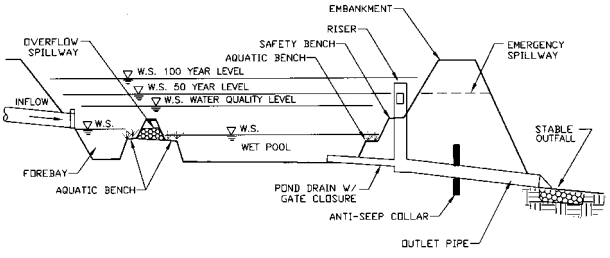


SECTION

Evaporation Pond

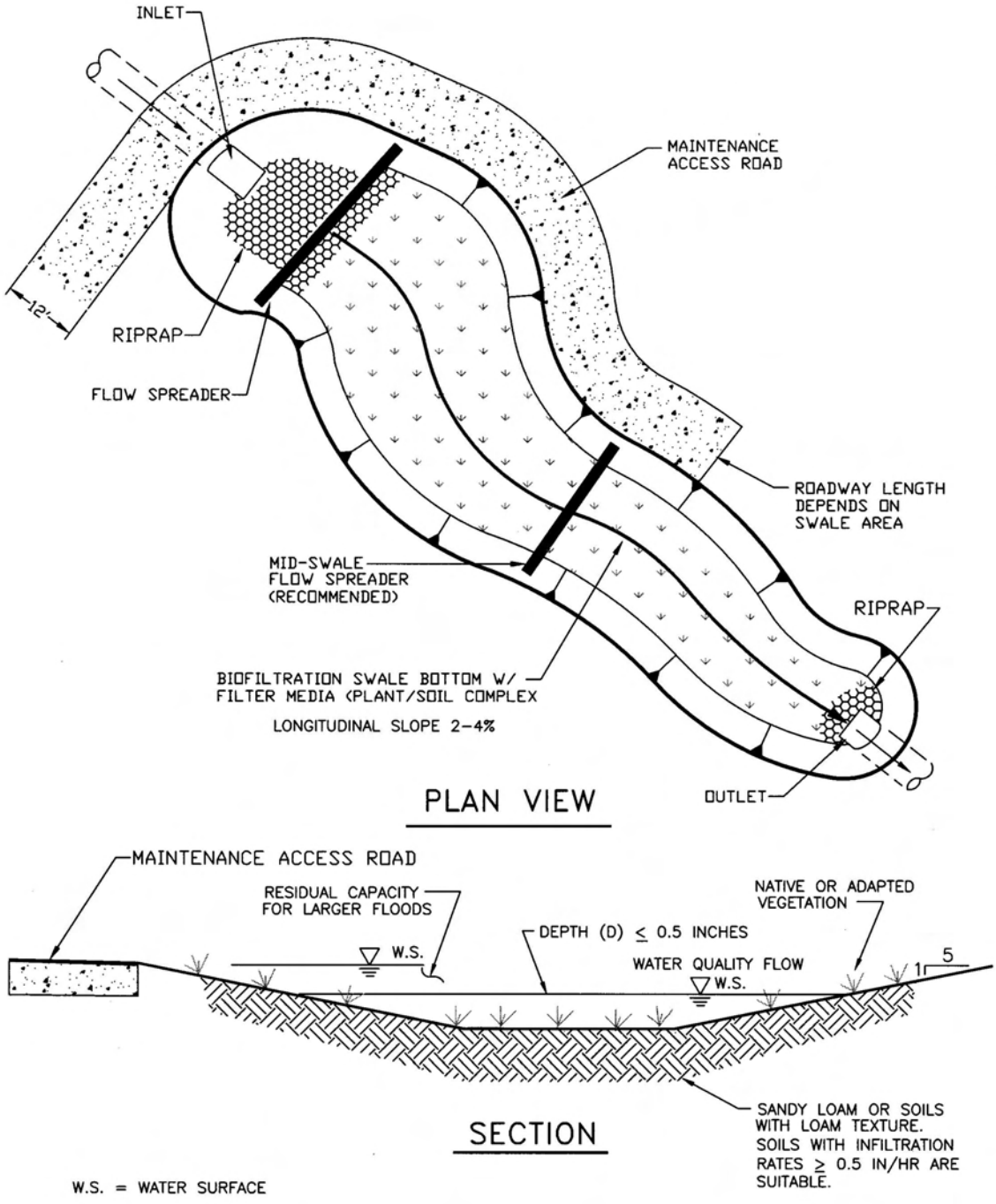


SECTION

Extended Detention Pond

OM-4 Vegetated Swales

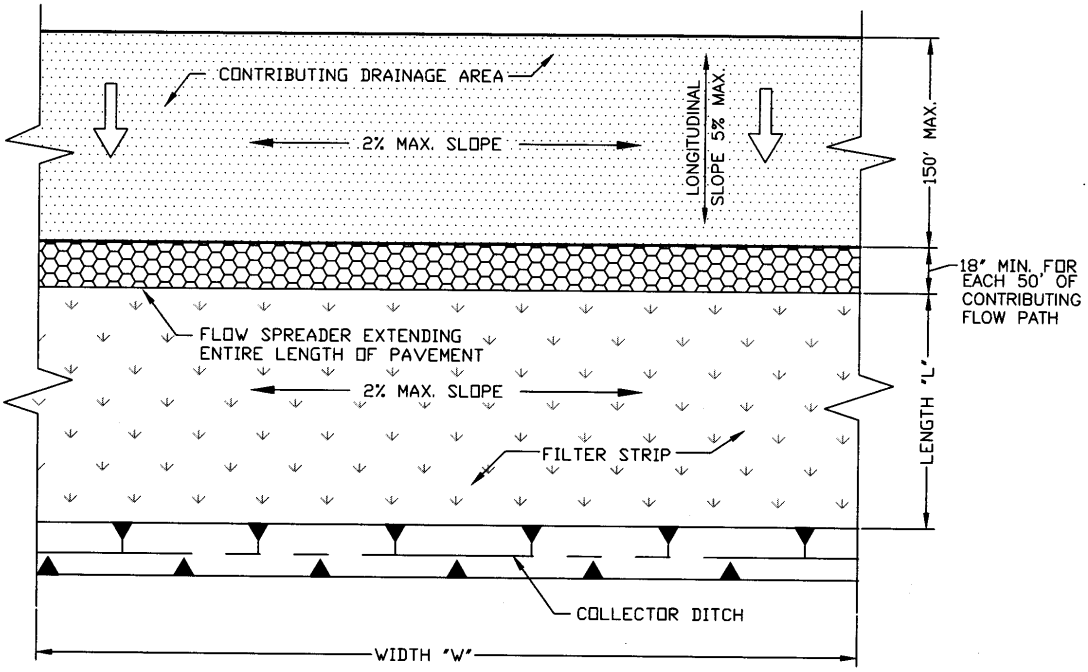
Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in pond	accumulation of trash and debris	Remove trash and debris and dispose of properly.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		propane, oil, or gasoline odor or surface film is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for more information.
		grass is taller than 10"	overgrown vegetation	Mow grass regularly. Grass should be mowed to a height of 4-9" for best storm water 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 Dept. 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.
Side slopes/bottom of swale		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 (BMPs) listed in the Boise Storm Water BMP Guidebook.
		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. Overseed bare spots.
Inlet/outlet pipe		storm water 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 , Pipes, for more information.



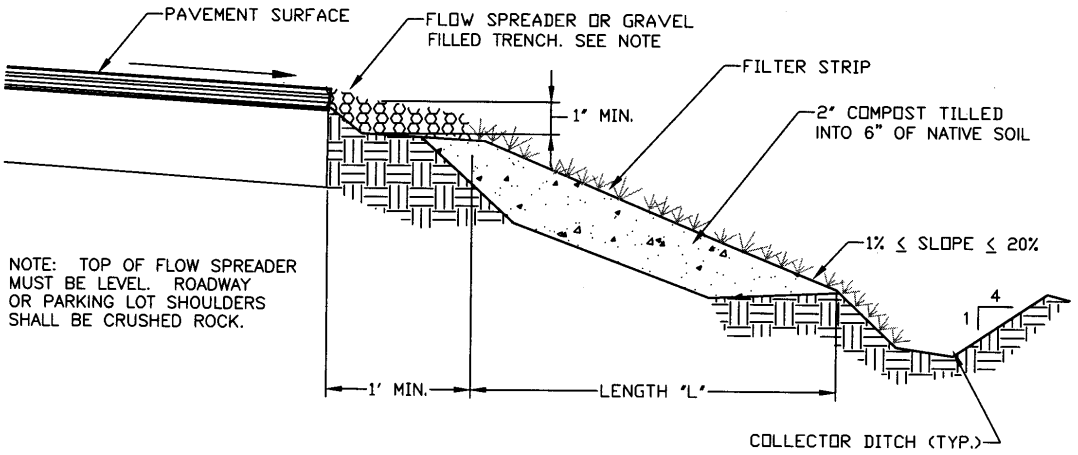
Vegetated Swale

OM-5 Irrigated Grass Buffer Strips

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in pond	accumulation of trash and debris	Remove trash and debris and dispose of properly.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		propane, oil, or gasoline odor or surface film is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for more information.
		grass is taller than 10"	overgrown vegetation	Mow grass regulary. Grass should be mowed to a height of 4-9" for best storm water 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 Dept. 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. Overseed bare spots. Provide other erosion protection as needed.



PLAN VIEW

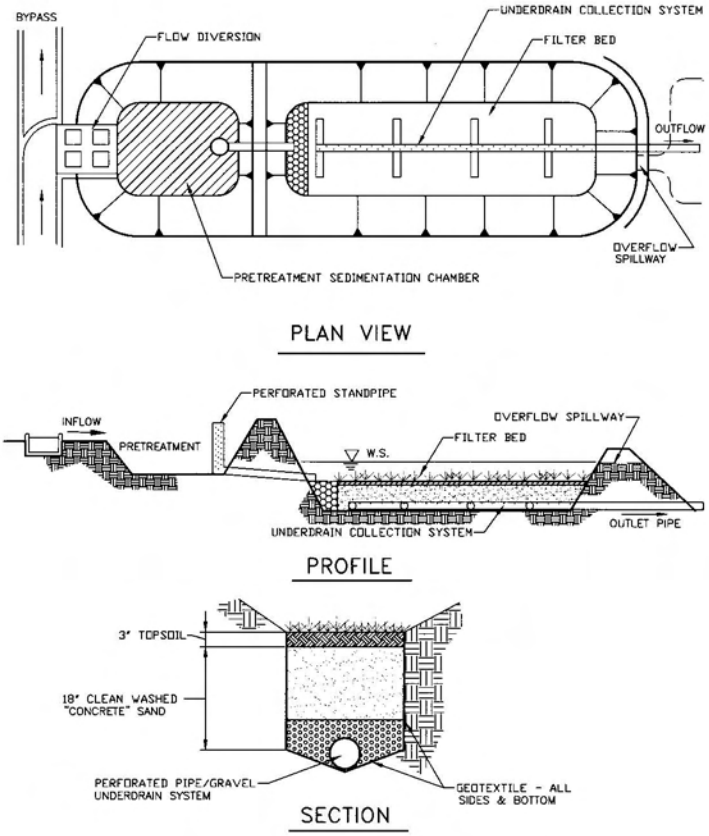


SECTION

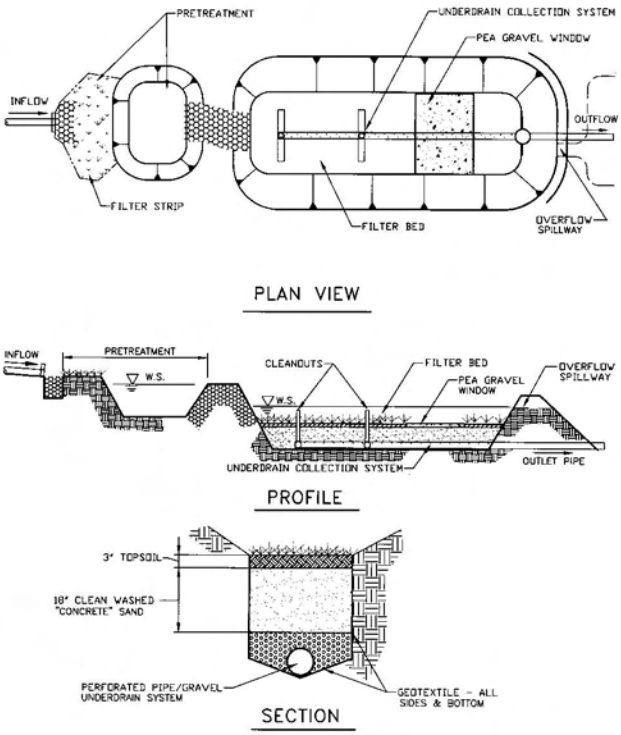
Irrigated Grass Buffer Strips

OM-6 Sand Filters

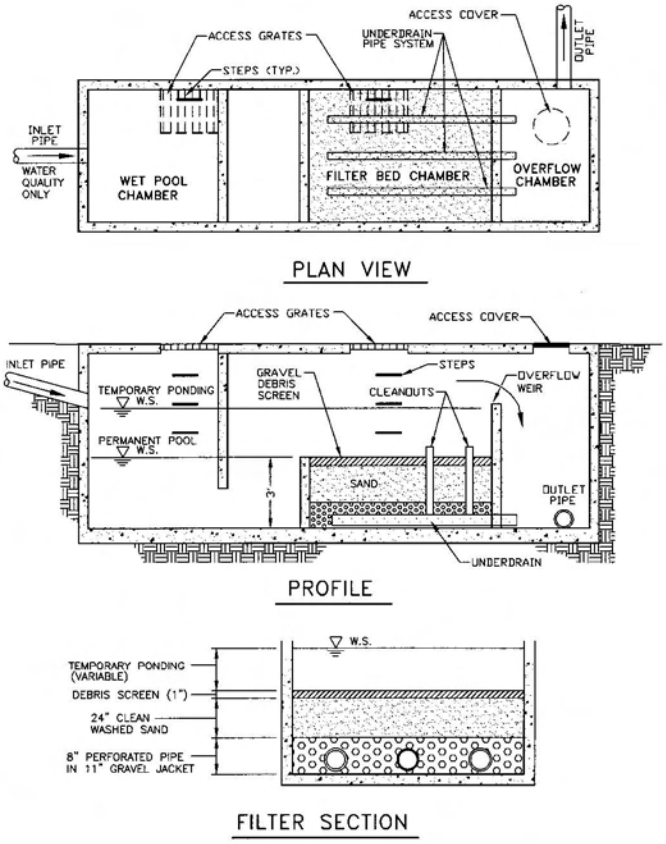
Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present on sand filter bed	accumulation of trash and debris	Remove trash and debris and dispose of properly.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		propane, oil, or gasoline odor or surface film is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for more information.
		sediment accumulation exceeds 1/2" in depth	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 to that water flow is uniform across the sand filter.
		grass is taller than 6"; weeds begin to invade the filter	overgrown vegetation or nuisance weeds	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 (BMPs) listed in the Boise Storm Water BMP Guidebook.
Sand filter media		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.
Below ground vault (if applicable)		sediment accumulation exceeds 1/2" in depth on sand media section	excessive sediment	Vactor or shovel out sediment deposits on sand filter. Dispose of sediment properly.
		sediment accumulation exceeds 6" in depth in vault	excessive sediment	Vactor or shovel out sediment deposits in the first chamber of the vault and dispose of properly.
		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in the vault.	accumulation of trash and debris	Remove trash and debris from vault and inlet/outlet piping. Dispose of wastes properly.
Inlet/outlet pipe		drain pipes become clogged with sediment or debris	excessive sediment	Vactor or shovel out sediment or debris. You can also use a high pressure hose to clean out sediment or debris. See OM-10, Pipes, for more information.
Underdrain pipe		pipe is damaged, broken, cracked, or corroded	defective pipe	See OM-10, Pipes, for more information.
		sediment accumulation impedes water flow	excessive sediment	Remove sediment from pipe and dispose of properly. Repair or replace pipe to design specifications.
Trash rack		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		cover crop appears very dry or dead	cover crop lack water	Irrigate cover crop regularly during dry seasons or periods of drought.



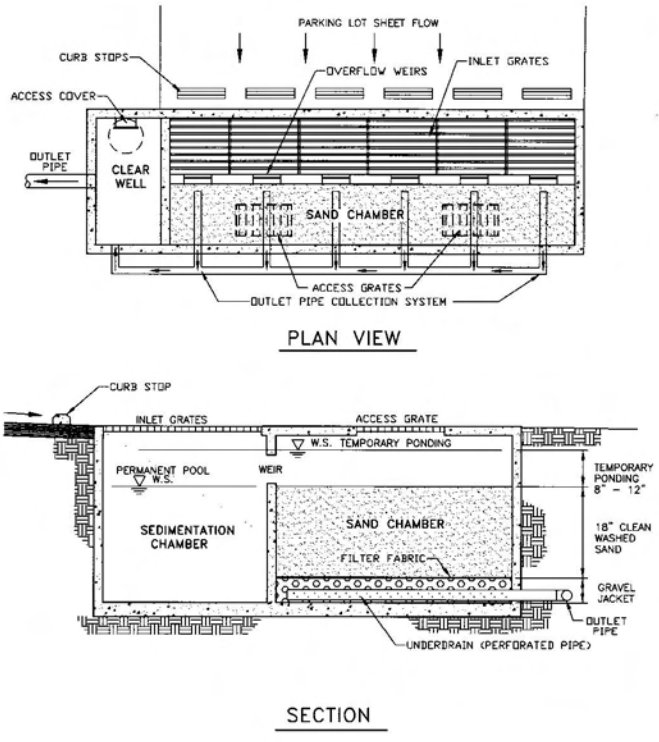
Austin Sand Filter



Pocket Sand Filter



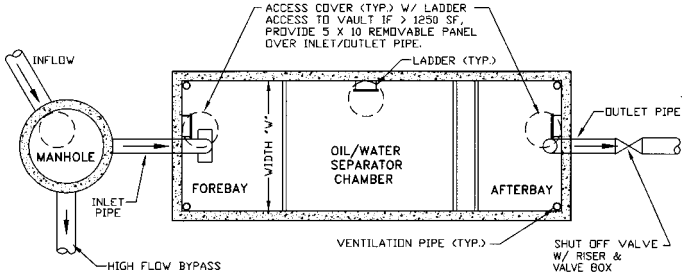
Underground Sand Filter



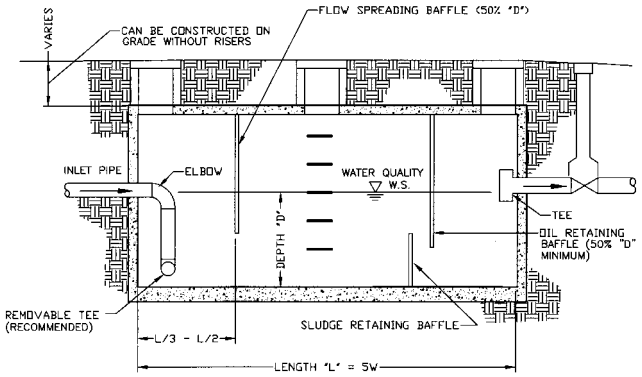
Delaware Sand Filter

OM-7 Oil/Water Separator

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
Conventional gravity separator		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.
		sediment accumulation exceeds 1' in bottom of vault	excessive sediment	Vactor or shovel out sediment. Dispose of sediment properly.
		standing water is present 24 hours after storm event	sediment buildup blocks flow through separator	Vactor or shovel out sediment. Dispose of sediment properly.
		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in the vault or inlet/outlet pipes	accumulation of trash and debris	Remove trash and debris from vault and inlet/outlet pipes. Dispose of wastes properly.
		oil accumulation exceeds 1" at water surface	excessive oil accumulation	Vactor or manually remove oil from water surface. Dispose of waste properly.
		pipes broken or damage; cracks in pipe are wider than 1/4" at the joint	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
Coalescing plate separator		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 coalescing plate	Check coalescing plate integrity. If damaged, repair or replace to design specifications.
		sediment accumulation exceeds 1' in depth in vault	excessive sediment	Vactor or shovel out sediment deposits on vault bottom. Dispose of sediment properly.
		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in the vault.	accumulation of trash and debris	Remove trash and debris from vault and inlet/outlet piping. Dispose of wastes properly.
		oil accumulation exceeds 1" at water surface	excessive oil accumulation	Vactor or manually remove oil from water surface. Dispose of waste properly.
		pipes are broken or damaged; pipe has cracks wider than 1/4" at the joint	damaged inlet/outlet pipe	Replace or repair pipe to original specifications.
		standing water is present 24 hours after storm event	sediment buildup blocks flow through separator	Vactor or shovel out sediment. Dispose of sediment properly.
		baffles are cracked, warped, or corroded	defective baffles	Repair or replace baffles 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.

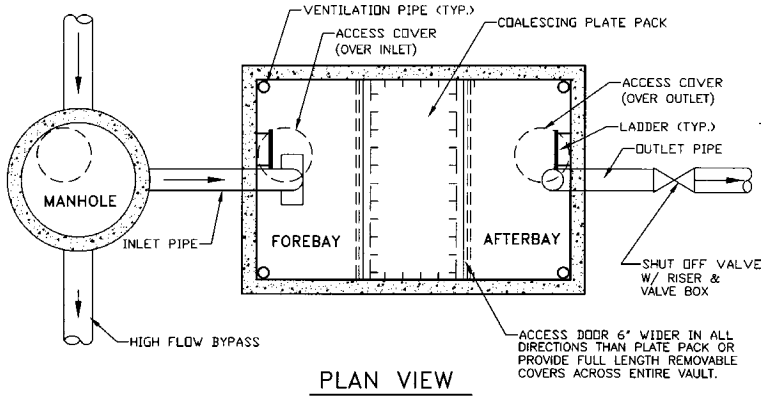


PLAN VIEW



SECTION

Oil/Water Separator



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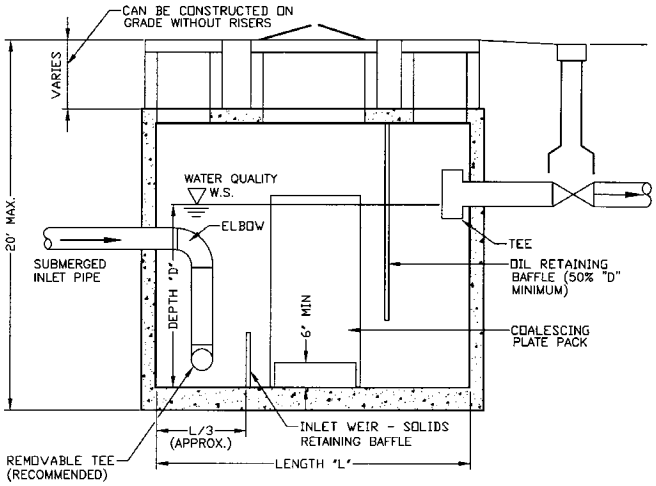


SECTION

Coalescing Oil/Water Separator

OM-8 Constructed Wetlands

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in pond	accumulation of trash and debris	Remove trash and debris and dispose of properly.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		propane, oil, or gasoline odor or surface film is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for more information.
		wetland vegetation grows into areas designated for other uses	overgrown wetland vegetation	Remove any vegetation which has grown outside the design boundaries as indiciated 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." you must obtain a 404 (dredge and fill) permit from the U.S. Army Corps of Engineers (Corps). You must also obtain a Stream Channel Alteration permit from the Idaho Department of Water Resources (IDWR). Contact the Corps and IDWR for more information.
		excessive mosquito popultation	mosquitos	Install predacious bird and bat nesting boxes to control insects. Mosquito fish (Gambusia) can be used are available locally.
		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 slopes/bottom of wetland		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 (BMPs) listed in the Boise Storm Water BMP Guidebook.
Trash rack		debris covers at least 25% of the bar screen or bar screen is missing	trash rack is plugged or missing	Replace screen, if needed. Remove trash and debris. Dispose of waste properly.
Pond dike/berm		dike or berm has settled 4" lower than design elevation	dike/berm settlement	Repair dike/berm to original design specifications.
Inlet/outlet pipe		storm water is not flowing into or out of the wetland; puddles are present near the pipe	clogged pipe	Clean sediment and debris from inlet or outlet pipe. See OM-10 , Pipes, for more information.
Overflow spillway		bare soil is visible at top of spillway or outside slope	inadequate rock layer	Add enough rock to cover up bare soil.

OM-9 Catch Basins

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are blocking the front of the catch basin or grate by 10%	accumulation of trash and debris	Remove trash and debris from front of catch basin opening or grate. Dispose of waste properly.
		frame has separated more than 3/4" from the top slab	frame separation	Reset frame even with top of slab.
		propane, oil, gasoline odor, offensive color or odor, or sludge is present	accumulation of petroleum products or unknown or uncharacteristic substances	Contact a qualified hazardous waste consultant for more information.
		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" top slab past curb face into the street	structural damage to frame or top of slab	Reset frame even 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 settle more than1' or has moved more than 2" out of alignment	basin settlement/alignment	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.
Inlet/outlet pipes		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 1' 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

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		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. You can use a high pressure hose, vacuum suction, or other appropriate cleaning method. Contact the design engineer for information on appropriate cleaning methods for your type of drainage system.
		vegetation is impeding water flow	overgrown vegetation	Clean out sediment and trash from pipe. You can use a high pressure hose, vacuum suction, or other appropriate cleaning method. Contact the design engineer for infomation on appropriate cleaning methods for your type of drainage system.
		pipe is rusted; protected 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.

OM-11 Ditches and Gates

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
Ditches		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in the ditch	accumulation of trash and debris	Remove trash and debris from ditch. Dispose of waste properly.
		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 impede water flow. Preserve grass to control erosion.
		slope has areas where erosion is 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 best management practices (BMPs) as listed in the Boise Storm Water BMP Guidebook.
		bare soil is visible beneath the rock lining	inadequate rock layer	Add enough rock to meet design specifications.
Gates		gate or gate parts are missing	missing gate or gate parts	Replace gate or missing parts
		gate cannot be opened or closed	missing or defective gate hinges	Replace and lube hinges.
		gate moved out of vertical alignment by more than 6" or more than 1' out of design alignment	misaligned gate	Reset gate to original design specifications.

Operation and Maintenance (O&M) Plans

The following two examples demonstrate how to develop an Operation and Maintenance (O&M) Plan. Example #1 is a plan for a small commercial site. Example #2 is a plan for a residential development. O&M Plans are specific to a system and may not necessarily contain all components. For example, a development that does not have any landscaping will not have a landscape design plan.

The purpose of an O&M Plan is twofold. First, an O&M Plan will help you coordinate inspection and maintenance activities and track any problems you may have observed during inspection and maintenance. Second, an O&M Plan will make operating and maintaining your system easier and more cost-effective than if you didn't have a plan because all of your system information is in one place where it can be easily found if problems or questions arise.

EXAMPLE#1
Operation and Maintenance (O&M) Plan

JOE'S MARKET O&M PLAN

The O&M plan for Joe's Market consists of the following items:

- site plans and design plans (material specifications for the storm water system are referenced in the design plans) (Not included in this example)
- inspection frequency information
- Inspection and Maintenance forms (Not included in this example)
- safety information
- Industrial Operations Best Management Practices for the site
- scope of work, responsible personnel, waste disposal, and maintenance budget, if known.

Joe's Market does not have any landscaping. Therefore, this O&M plan does not contain landscape maintenance BMP's.

Inspection Frequency

The storm water system at Joe's Market consists of a below ground double baffled oil/water separator upstream of an infiltration trench built as shown on the design plans. The location of the oil/water separator manhole covers in the parking lot and the orientation of the underground oil water separator and infiltration trench is denoted on the site grading design plan. The manhole cover on the inlet chamber is slotted to inlet the storm water runoff. The inlet manhole cover represents the area of lowest elevation on the site and should be inspected after storm events to ensure storm water is not ponding and that the system is functioning properly.

Additionally, a complete and thorough system inspection using the inspection and maintenance forms provided in this plan will be done in April and September. This inspection frequency has been determined to be sufficient upon review of past inspection results which show very limited accumulation of sediment or oil in a 6 month period.

Activities in the parking area are limited to vehicle traffic and the loading of groceries into customers cars. The loading dock area is canopied and does not contribute to the storm water system.

Safety Information

1. Inspections

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. If the storm water system inspection reveals a safety problem, you may have to modify the site activities to reduce or eliminate the safety risk. The following is a list of safety precautions an inspector should be aware of when conducting storm water system inspections.

- Never enter a confined space unless you have proper Occupational Health and Safety Administration (OSHA) training. Do not enter any confined space until the atmosphere has been checked and proper safety equipment is worn or erected.
- Avoid entering pipes or conduits without another individual present. If the structural strength of a pipe or conduit is questionable, do not enter the pipe or conduit.
- Check the ventilation in the storm water system before using any ignitable materials. Some storm water 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 storm water system to vent for a period of time if a peculiar odor is present.
- Wear gloves if any mechanical parts or structure 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 manhole covers or other structural covers (trash racks, access covers, etc.) carefully. These items can be very heavy and if wet, can be slippery. Also, learn the correct way to lift heavy items to avoid back injury.
- Check the water depth of the system before you take a step in the water. The water may be deeper than you think or there may be steep slopes below the water line.
- Be aware that nails, broken glass, or other sharp debris may be in the storm water system and can cause injury. Wearing the proper safety clothing will reduce the safety risk associated with these objects.

2. Maintenance

All maintenance work should be done in accordance with OSHA regulations. Maintenance personnel will have the proper safety equipment (heavy duty gloves, steel-toed boots, first aid kits, for example) and training before performing any maintenance on a storm water system. The following is a list of safety precautions maintenance personnel should be aware of when they perform maintenance on storm water systems.

- 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 before 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 you will dispose of removed sediment or wastes prior to cleaning the storm water system. Use shovels, trowels or a high-suction vacuum to remove wastes. Do not clean out sediment or waste with bare hands. The sediment or waste may be hazardous. Place the sediment or waste in an area where it can not be washed into a storm drain or water body.
- 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.

Industrial Operations Best Management Practices (BMP's) for Joe's Market

The following industrial operations BMPs will keep pollutants out of the storm water runoff at Joe's Market. These BMPs are also known as source controls and were selected from the Boise Storm Water BMP Guidebook. Ensuring the source controls are followed is the responsibility of the maintenance supervisor, Sean Byrne. These include the following:

- The parking lot is to be kept clean and free of trash and debris. Joe's Market has contracted a mechanical street sweeper to seep the lot monthly. Stock Boys have been instructed to inspect the parking area when returning carts and properly disposing of the spilled materials. All employee's have been notified that only storm water should go into the storm water system.
- All material loading and unloading is to be done in the canopied loading dock area that is isolated from storm water runoff.
- All storm drains have been stenciled with a "DO NOT DUMP WASTE" message.
- Sale merchandise that is stored outdoors will be covered with tarps during storms or when items will remain outdoors overnight.
- Drop cloths will be used when performing maintenance work, such as painting, scraping, or sand blasting. The collected material will be disposed of daily.
- A ground cloth or oversized tub will be used to catch spills when paint is mixed.
- Filter fabric will be used to cover storm drain inlets if pollutants, such as dust, grit, or paint chips are blown outside the building maintenance area and near storm drains.

Scope of Work

Sean Byrne, Maintenance Supervisor at Joe's Market, is responsible for inspecting and maintaining the storm water facility. Typical maintenance of the oil/water separator and infiltration trench system at Joe's Market involves the clean out of the oil water separator for sediments and accumulated oil at least once a year or as needed based on past inspection results. The cleaning out of the oil/water separator vault is contracted out to *ACME Waste Disposal Company.* The non-routine maintenance would be contracted out in the case of a large storm event or system failure. Inspection and maintenance activities reports will be filed immediately upon task completion.

Mr. Byrne is also responsible for ensuring that maintenance wastes are properly disposed of in compliance with federal, state and local laws. The sediments trapped in the oil /water separator at the Joe's Market site have been sampled and analyzed. The analysis determined the sediments to be nonhazardous. There have been no changes in the processes or activities at the site and Joe's Market controls access to the storm water system therefore, the sediments can be considered non-hazardous and disposed of as non-hazardous waste.

Sean Byrne will track the time spent performing inspection and maintenance duties as well as materials and equipment rental costs so that the Storm Water O&M budget can be accurately estimated for next fiscal year. He will also keep the Storm Water O&M file onsite.

EXAMPLE #2
Operation and Maintenance (O&M) Plan

THE WESTLAND SUBDIVISION O&M PLAN

The O&M plan for the Westland Subdivision consists of the following items:

- Site plans and design plans (material specifications for the storm water system are referenced in the design plans) (Not included in this example)
- inspection frequency information
- Inspection and Maintenance forms (Not included in this example)
- safety information
- Industrial Operations Best Management Practices for the site
- scope of work, responsible personnel, waste disposal, and maintenance budget, if known.

Inspection Frequency

The storm water system at Westland Subdivision consists of six catch basins piped to a main 12" storm water line. The line discharges into a 1/2 acre detention pond. The pond has a 12" overflow outlet pipe protected with a trash rack. The outlet pipe connects to a 24" storm sewer line that outfalls to the Boise River.

A complete and thorough system inspection using the inspection and maintenance forms will be done in April and September and after storm events that produce more than 1/2" of rainfall. This inspection frequency has been determined to be sufficient upon review of past inspection results.

Safety Information

1. Inspections

The inspector should have the proper safety equipment (heavy duty gloves, boots, first aid kits, for example) and training before conducting any inspections. If the storm water system inspection reveals a safety problem, then you may have to modify the site activities to reduce or eliminate the safety risk. The following is a list of safety precautions an inspector should be aware of when conducting storm water system inspections.

- Never enter a confined space unless you have proper Occupational Health and Safety Administration (OSHA) training. Do not enter any confined space until the atmosphere has been checked and proper safety equipment is worn and/or erected.
- Avoid entering pipes or conduits without another individual present. If the structural strength of a pipe or conduit is questionable, you should not enter the pipe or conduit at all.
- Check the ventilation in the storm water system before using any type of ignitable materials. Some storm water 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
- 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 manhole covers or other structural covers (trash racks, access covers, etc.) carefully. These items can be very heavy and can be slippery if wet. Also, learn the correct way to lift heavy items to avoid back injury.
- Check the water depth of the system before you take a step in the water. The water may be deeper than you think or there may be steep slopes below the water line.
- Check for poison ivy, poison oak, or other poisonous plants when inspecting ponds or other large storm water systems. Inform the individual who will perform maintenance on the system that these plants are present.

2. Maintenance

All maintenance work needs to be done in accordance with OSHA regulations. Maintenance personnel will have the proper safety equipment (heavy duty gloves, steeltoed boots, first aid kits, for example) and training before performing any maintenance on a storm water system. The following is a list of safety precautions maintenance personnel should be aware of when they perform maintenance on storm water systems:

- Equipment should be operated safely and in accordance with manufacturers specifications. Equipment operators should be aware of site personnel at all times to avoid causing injury to others.
- Utility companies should be contacted before excavating a site. Underground utility wires may be present. Excavated areas that cannot be fined in at the end of the day should be covered or clearly marked to alert site employees of the potential risk.
- Areas where removed sediment or wastes will be disposed should be identified prior to cleaning the storm water system. Use shovels, trowels or a high-suction vacuum to remove wastes.
- Sediment or waste should not be cleaned out with bare hands. The sediment or waste may be hazardous. Place the sediment or waste in an area where it can not be washed into a storm drain or water body.
- Gloves should be worn 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.
- Caution should be taken when mowing any areas, that by design, have steep slopes.

Best Management Practices (BMPs)
for the Westland Subdivision

The following Best Management Practices (BMPs) will keep pollutants out of the storm water runoff at the Westland Subdivision. These BMPs are also known as source controls and were selected from the Boise Storm Water BMP Guidebook. Ensuring these source controls are followed is the responsibility of the Westland Homeowners Association. These BMPs include the following:

- The private streets will be swept by a vacuum street sweeper. Acme Property Management Company is responsible for the contract for the street sweeper.
- Lawn chemicals, such as fertilizers and pesticides, will be used in accordance with manufacturer's recommendations and will be used only when less toxic ways to control insects or weeds are not effective.
- Storm drains will be stenciled with the message "DO NOT DUMP WASTE."
- Dirt, grass, and other materials will be kept out of the street so they do not wash into a storm drain when it rains. Materials stored outdoors will be covered.
- Leaves and other yard debris will be kept out of the street to avoid clogging storm drains.
- Homeowners will be responsible for the proper handling and disposal of home and vehicle maintenance products so that these products will not enter the storm drain system.
- A spill response plan is developed for the detention pond in case of an accidental spill into the Westland Subdivision storm drain system. Spill prevention materials are located in the pond maintenance shed.

Scope of Work

The Westland Homeowners Association is responsible for the operation and maintenance of the Westland Subdivision storm water system. The three streets in the subdivision are private. Inspection, maintenance and landscaping has been contracted out to the Acme Property Management Company. Any capital improvements or expenditures associated with maintenance that are greater that $500 will need to be approved by the Homeowners Association.

The Acme Property Management Company is also responsible for the analysis and proper disposal of sediments from pond maintenance operations. Records of all operation and maintenance activities will be kept on file by Acme. Acme will update the O&M Plan as necessary.

Inspection Forms and Maintenance Report

The following two examples demonstrate how to complete the Inspection Forms and the Maintenance Report. Example #1 is for a storm water system in a small commercial site. Example #2 is for a storm water system in a residential development.

To use the *Inspection and Maintenance* forms, identify the system components that compose your storm water system. Photocopy the applicable *Inspection and Maintenance* forms and the *Inspection Cover Sheet* (on page19). Inspect each system design feature to determine if any of the conditions are present. If the current condition of the drainage system feature matches the description on the *Inspection and Maintenance* form, place a checkmark in the appropriate column. The system design features that have been checked will need maintenance if you determine a problem exists.

To use the Maintenance Report form, first complete any maintenance activities that were required for you storm water system. Second, after you have maintained your storm water system, fill out a Maintenance Report. The Maintenance Report form is located on page 21. Describe the maintenance activities, including descriptions of the type of work, completion dates, contractors used, time needed, and costs. Documenting the maintenance performed on a storm water system will be useful in planning future maintenance activities.

Inspection Cover Sheet

Date: 10/6/99

Facility Name: Joe's Market

Facility Address: 220 S. Main

Facility Owner: Christine Harrington

Inspector Name: Sean Byrne

Inspector Phone Number: 384-1000

Important Safety Information

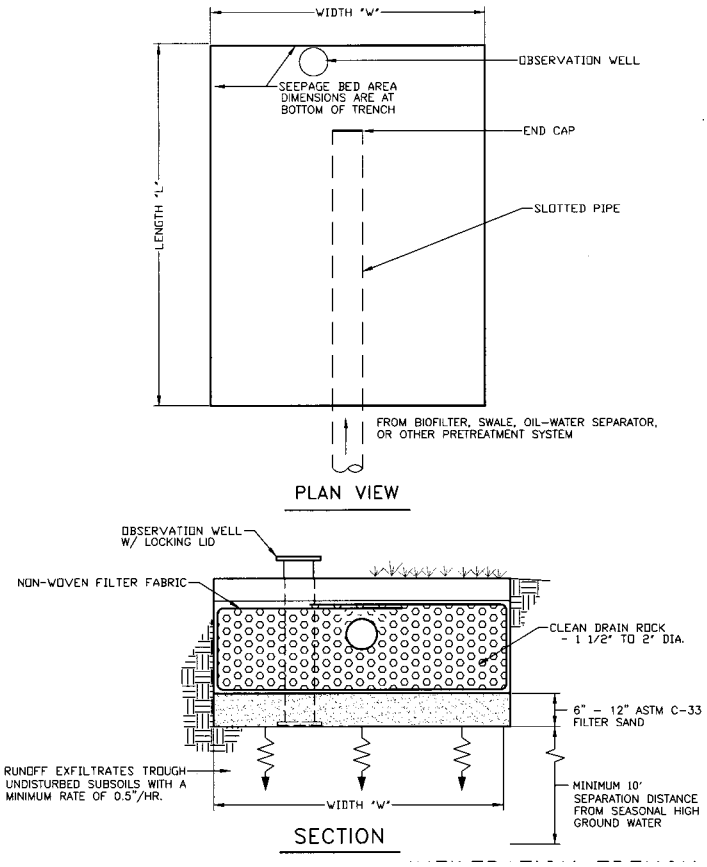
- Never enter a confined space or trench unless you have proper Occupational Health and Safety (OSHA) training. Do not enter any confined space unless the atmosphere has been checked and proper safety equipment is worn or erected.
- Check the ventilation in the storm water system before using ignitable materials. Some storm water systems have poor ventilation and can pose a safety risk to the inspector if the vapor comes in contact with an open flame.
- Always cover or clearly mark excavated areas as potential safety risks if the areas cannot be filled in by the end of a work day.

Inspection comments:

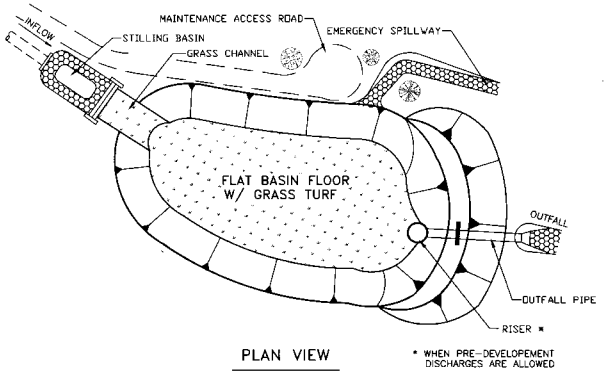
When I inspected the storm water system at Joe's Market, I found that there was standing water. It has been at least 24 hours since yesterday's storm. I reviewed the inspection and maintenance forms for the two components that compose the storm water system (an oil/water separator and infiltration trench). I placed 4 checkmarks next to the system design features that listed the 24-hour stand water criteria. I tried to identify which of the 4 checkmarked drainage features caused the system to fail. When I inspected the oil/water separator, I found only a 1" layer of sediment. I determined that the oil/water separator did not have excessive sediment buildup and cause the standing water problem or system failure. When I inspected the inside of the outlet side of the oil/water separator vault with a flashlight, I found an obstruction in the inlet pipe of the infiltration trench. At this point, I determined that maintenance was required to remove the obstruction (see attached maintenance report).

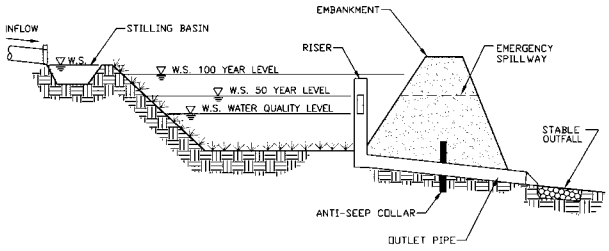
OM-2 Infiltration

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		standing water is present 24 hours after storm event	sediment buildup on bottom or sides of infiltration system	Excavate infiltration system and remove excess sediment. Dispose of sediment properly. An engineer or geotechnical consultant should examine drainrock and filter fabric to determine if replacement is needed. Re-install infiltration system 12" into free draining material.
		standing water is present 24 hours after storm event	infiltration system incorrectly designed or sited (high ground water area)	Review options for managing storm water as described in the Boise City Storm Water Management Design Manual. Infiltration may not be allowed. Contact the Boise Public Works Department for more information.
			infiltration system incorrectly constructed	Excavate infiltration system and re-install infiltration system 12" into free draining material. If good free draining material is not accessible, contact the design engineer to see if a more appropriate drainage system can be installed.
		offensive odor, color, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you do not know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		propane, oil, or gasoline odor or puddle is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for information on proper treatment and disposal of petroleum products.
		excessive debris, sediment, and oil buildup is present	pretreatment system not working properly	Clean out accumulated debris in pretreatment system and dispose of properly
			pretreatment system not installed	Install a pretreatment system upgradient from the infiltration system. The pretreatment system should be approved by Boise City Public Works.
Inlet/outlet pipes		standing water is present 24 hours after storm event	clogged pipes	Clean out sediment and debris from pipes. See OM-10, Pipes, for more information

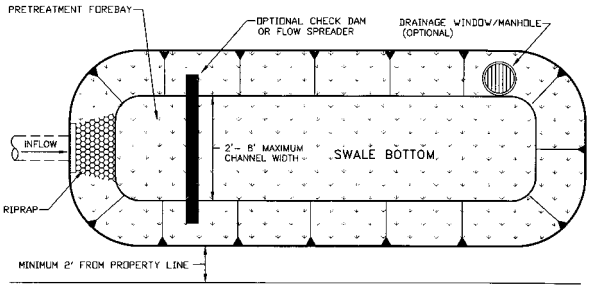


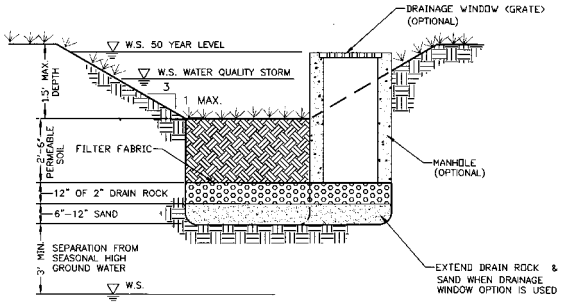
Infiltration Trench (Seepage Bed)





Infiltration Basin

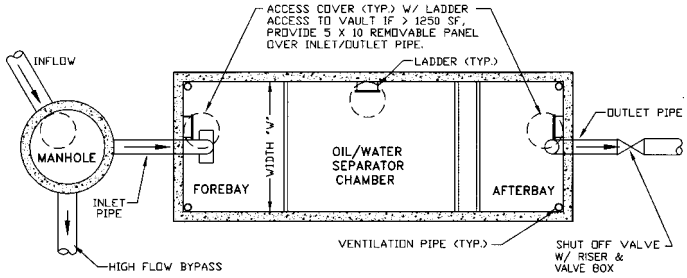




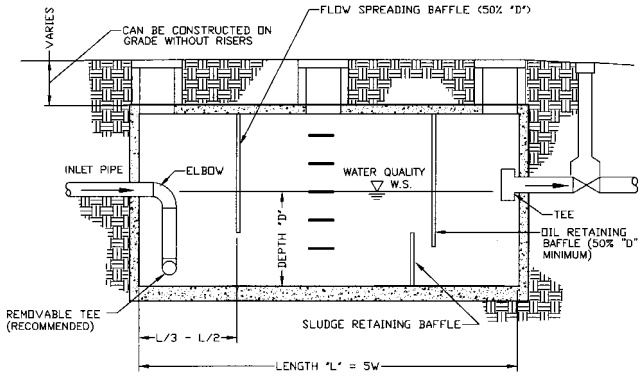
Infiltration Swale

OM-7 Oil/Water Separator

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
Conventional gravity separator		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.
		sediment accumulation exceeds 1' in bottom of vault	excessive sediment	Vactor or shovel out sediment. Dispose of sediment properly.
		standing water is present 24 hours after storm event	sediment buildup blocks flow through separator	Vactor or shovel out sediment. Dispose of sediment properly.
		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in the vault or inlet/outlet pipes	accumulation of trash and debris	Remove trash and debris from vault and inlet/outlet pipes. Dispose of wastes properly.
		oil accumulation exceeds 1" at water surface	excessive oil accumulation	Vactor or manually remove oil from water surface. Dispose of waste properly.
		pipes broken or damage; cracks in pipe are wider than 1/4" at the joint	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
Coalescing plate separator		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 coalescing plate	Check coalescing plate integrity. If damaged, repair or replace to design specifications.
		sediment accumulation exceeds 1' in depth in vault	excessive sediment	Vactor or shovel out sediment deposits on vault bottom. Dispose of sediment properly.
		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in the vault.	accumulation of trash and debris	Remove trash and debris from vault and inlet/outlet piping. Dispose of wastes properly.
		oil accumulation exceeds 1" at water surface	excessive oil accumulation	Vactor or manually remove oil from water surface. Dispose of waste properly.
		pipes are broken or damaged; pipe has cracks wider than 1/4" at the joint	damaged inlet/outlet pipe	Replace or repair pipe to original specifications.
		standing water is present 24 hours after storm event	sediment buildup blocks flow through separator	Vactor or shovel out sediment. Dispose of sediment properly.
		baffles are cracked, warped, or corroded	defective baffles	Repair or replace baffles 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.

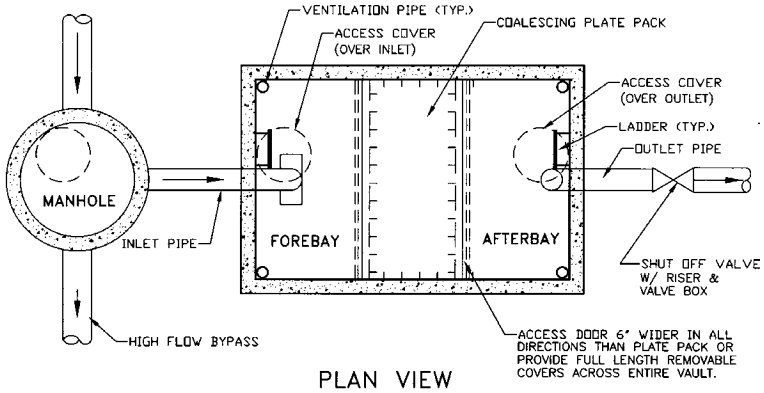


PLAN VIEW



SECTION

Oil/Water Separator



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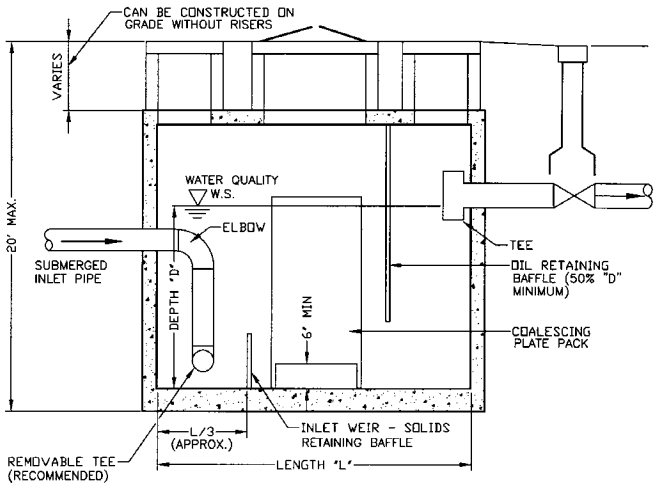


SECTION

Coalescing Oil/Water Separator

Maintenance Report Form

Date: 10/7/99

Facility Name: Joe's Market

Facility Address: 220 S. Main

Name of Person Overseeing Maintenance: Sean Byrne

Type of System: Infiltration trench with oil/water separator

Date of Last Inspection: 5/7/99

Describe maintenance activities, including type of work, completion dates, contractors, time needed to complete task, and cost.

The storm water systems at Joe's Market consists of two components: an oil/water separator and an infiltration trench. Standing water was present in the trench for 24 hours after a storm event, covering the sand and grease trap manholes in the parking lot. The standing water was pumped with rented gas-powered pump onto an adjacent landscaped area. Only 1" of sediment was found on the bottom of the oil/water separator. The inlet pipe of the infiltration trench was checked for sediment and other debris that would clog the pipe. I found plastic sheet wrapping and decorative wood chips lodged in the inlet pipe. One this obstruction was removed, the system was tested by flushing water into the oil/water separator. The water moved quickly through the separator and into the trench. No standing water was evident. The entire operation took 6.5 hours. I determine that no further inspection or maintenance of the system was necessary as the system was functioning properly. The total cost, including pump rental, was $325.

Example #2
Inspection Forms and Maintenance Report

Inspection Cover Sheet

Date: 9/10/99

Facility Name: Westland Subdivision

Facility Address: Lot 3 Block 6 Westland Subdivision

Facility Owner: Westland Homeowners Assoc.

Inspector Name: Liam Jones

Inspector Phone Number: 678-1000

Important Safety Information

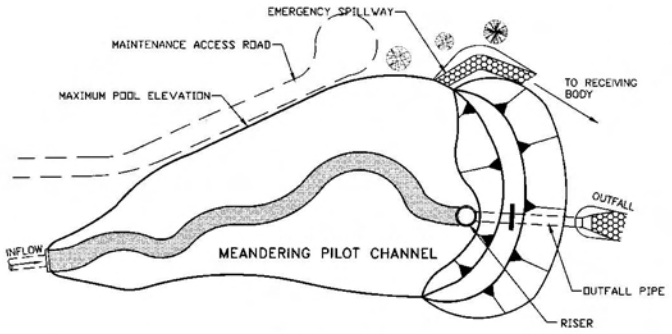
- Never enter a confined space or trench unless you have proper Occupational Health and Safety (OSHA) training. Do not enter any confined space unless the atmosphere has been checked and proper safety equipment is worn or erected.
- Check the ventilation in the storm water system before using ignitable materials. Some storm water systems have poor ventilation and can pose a safety risk to the inspector if the vapor comes in contact with an open flame.
- Always cover or clearly mark excavated areas as potential safety risks if the areas cannot be filled in by the end of a work day.

Inspection comments:

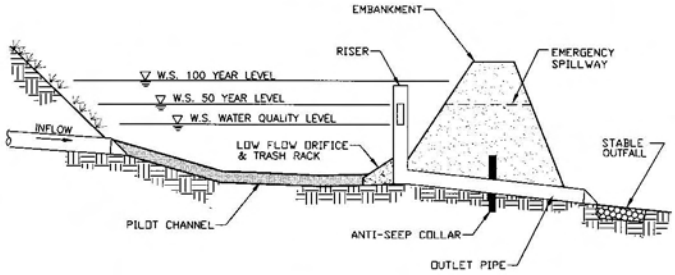
On 9/10/99, I conducted thorough inspection of the Westland Subdivision storm water system. Using the inspection and maintenance forms for ponds, catch basins, and pipes, I inspected the drainage features. Two of the drainage features had conditions that will require maintenance: the inlet pipe to the pond had accumulated sediments of greater than 20% of the pipe diameter and the trash rack in the detention pond had debris that covered more than 25% of the bar screen.

OM-3 Ponds (Detention, Extended Detention, Evaporation)

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		dumped yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are present in pond	accumulation of trash and debris	Remove trash and debris and dispose of properly.
		undesireable vegetation is invading the pond	nuisance, poisonous, or noxious weeds	Seek advice from the University of Idaho Cooperative Extension System (Ada County) or the Idaho Dept. of Agriculture before applying pesticides. Certain perticides should not be used near waterbodies.
		propane, oil, or gasoline odor or surface film is present	accumulation of petroleum products	Contact a qualified hazardous waste consultant for more information.
		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 Agreculture regarding appropriate methods for controlling insects.
		grass is taller than 10"	overgrown vegetation	Mow grass regulary. Grass should be mowed to a height of 4-9" for best storm water control. Avoid over-applying fertilizers. Excessive fertilizer application may compound water quality problems.
		offensive color, odor, or sludge is present	unknown or uncharacteristic substance	Remove substance and eliminate its source. If you don't know if the substance is hazardous, either take a sample or contact a qualified hazardous waste consultant for more information.
		excessive mosquito population is present	mosquitos	Install predacious bird and bat nesting boxes to control insedts. Mosquito fish (Gambusia) can be used and are available locally.
		water flows through holes in dam or berm; holes are present around pond	rodents	Destroy 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.
Storage area		accumulated sediment exceeds 10% of the designed pond depth	excessive sediment	Clean out sediemtn to original shape and depth of the pond. Re-seed pond, if necessary, to control erosion. If the pond is designated as "waters of the U.S." or as a wetland by the U.S. Army Corps of Engineers (Corps), you must obtain a 404 (dredge and fill) permit. You must also obtain a Stream Channel Alteration permit from the Idaho Department of Water Resources (IDWR). Contact the Corps and IDWR for more information.
Pond dike/berm		dike or berm has settled 4" lower than design elevation	dike/berm settlement	Repair dike/berm to original design specifications. Re-seed or sod.
Overflow spillway		bare soil is visible at top of spillway or outside slope	inadequate rock layer	Add enough rock to cover up bare soil.
Trash rack		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.

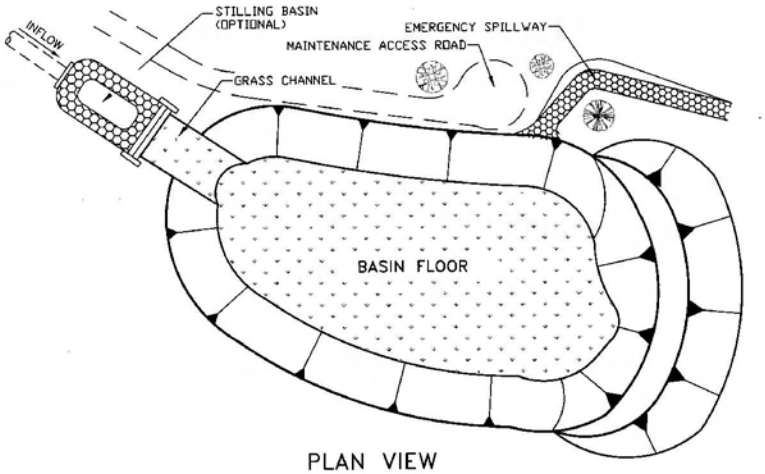


PLAN VIEW

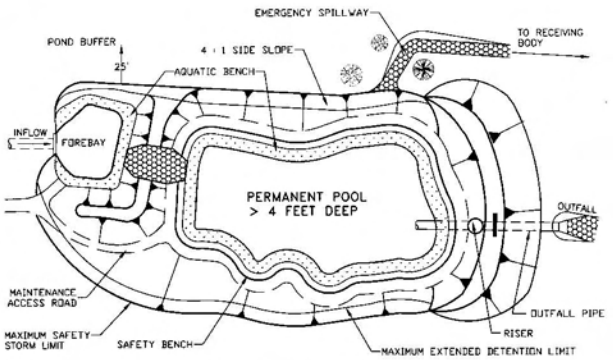


SECTION

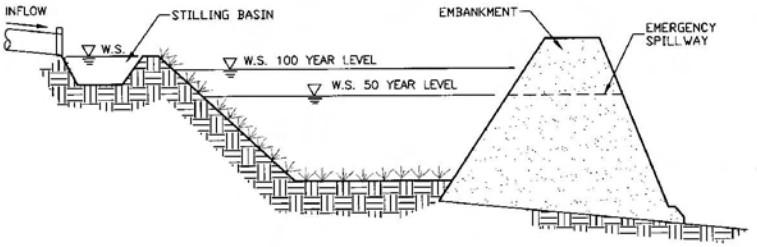
Detention Pond



PLAN VIEW

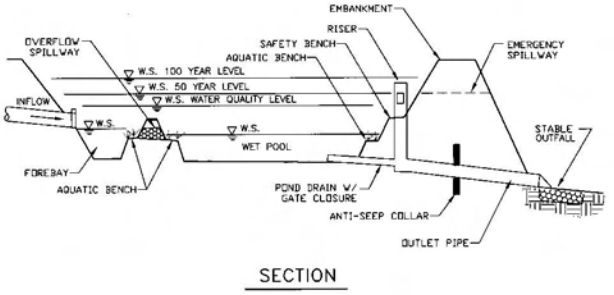


PLAN VIEW



SECTION

Evaporation Pond



SECTION

Extended Detention Pond

OM-9 Catch Basins

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		yard wastes or non-degradable materials (glass, plastic, styrofoam, etc.) are blocking the front of the catch basin or grate by 10%	accumulation of trash and debris	Remove trash and debris from front of catch basin opening or grate. Dispose of waste properly.
		frame has separated more than 3/4" from the top slab	frame separation	Reset frame even with top of slab.
		propane, oil, gasoline odor, offensive color or odor, or sludge is present	accumulation of petroleum products or unknown or uncharacteristic substances	Contact a qualified hazardous waste consultant for more information.
		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" top slab past curb face into the street	structural damage to frame or top of slab	Reset frame even 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 settle more than1′ or has moved more than 2" out of alignment	basin settlement/alignment	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.
Inlet/outlet pipes		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 1′ 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

Stormwater system feature	✓	Are any of these conditions present?	Problem	Recommendation
General		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. You can use a high pressure hose, vacuum suction, or other appropriate cleaning method. Contact the design engineer for information on appropriate cleaning methods for your type of drainage system.
		vegetation is impeding water flow	overgrown vegetation	Clean out sediment and trash from pipe. You can use a high pressure hose, vacuum suction, or other appropriate cleaning method. Contact the design engineer for infomation on appropriate cleaning methods for your type of drainage system.
		pipe is rusted; protected 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.

Maintenance Report Form

Date: 9/11/99

Facility Name: Westland Subdivision

Facility Address: Lot 3 Block 6 Westland Subdivision

Name of Person Overseeing Maintenance: Westland Homeowners Assoc.

Type of System: Detention Pond

Date of Last Inspection: 9/10/99

Describe maintenance activities, including type of work, completion dates, contractors, time needed to complete task, and cost.

Inspection on the previous day had identified two drainage system features in which maintenance was required: the removal of accumulated sediments from the inlet pipe to the pond and the cleaning of debris from the trash rack. I cleaned the trash rack of debris and put the trash into large garbage bags for proper disposal . The task took about 15 minutes to complete. The high pressure water truck, contracted by Acme Property Management, started at he upstream catch basin and flushed sediments out of the inlet pipe and into the pond. I determined that the small amount of sediment flushed into the pond was not enough to require cleaning out the pond No further inspection or maintenance of the system was necessary as the system was functioning properly. This task took about 45 minutes. The cost of the high pressure water truck was $175.

Glossary

Best Management Practice (BMP): Physical, structural, and/or managerial and educational practices that, when used, singly or in combination, reduce the quantity of eroded material, chemical, and biological contaminants in storm water runoff.

Detention: The temporary storage of storm runoff in a BMP, which is used to control the peak discharge rates and which promotes the treatment of pollutants.

Detention Structures: Water holding structures which control the rate at which storm water drains after a storm event, allowing for sedimentation of suspended solids, and treatment of other pollutants.

Detention Time: The amount of time a parcel of water actually is present in a BMP.

Discharge: A release or flow of storm water or other substance from a conveyance or storage container.

Drainage Swale: A channel with a lining of vegetation, riprap, asphalt, concrete or other material used to convey runoff without causing erosion by intercepting and diverting the flow to a suitable outlet. It is constructed by excavating a channel and applying the appropriate stabilization.

Erosion: The wearing away of soil by wind and water. Erosion occurs naturally from weather or runoff, but can be intensified by land-clearing practices related to farming, residential or industrial development, road building, or timber-cutting.

Excavation: The process of removing earth, stone, or other material.

Forebay: An extra storage area provided near the inlet of a BMP to trap incoming sediments before they accumulate in a pond BMP.

General Permit: A permit issued under the NPDES program to cover a certain class or category of storm water discharges. These permits reduce the administrative burden associated with permitting storm water discharges associated with industrial activities.

Good Housekeeping: Keeping a clean site, including neat and orderly storage of chemicals, pesticides, fertilizers, fuels, etc., that are being stored at the site; regular garbage, rubbish, construction waste and sanitary waste disposal; prompt clean up of any spills that have occurred of liquid or dry materials; and clean up of sediments that have been tracked by vehicles or have been transported by wind or storm water about the site or onto nearby roadways.

Hazardous Waste: By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (flammable, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Illicit Connection: Any physical connection to a publicly maintained storm drain system composed of non-storm water which has not been permitted by the public entity responsible for the operation and maintenance of the system.

Illicit Discharge: Any discharge to the storm drain system that is not composed entirely of storm water except discharges pursuant to a NPDES permit, discharges resulting from fire fighting activities, and discharges further exempted by the Boise City Storm Water Ordinance.

Individual Permit: A permit issued under the NPDES program for a specific facility, whereby the unique characteristics of that facility may be addressed through the imposition of special conditions or requirements.

Infiltration: The penetration of water through the ground surface into subsurface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections or manhole walls OR Any excavation or artificial opening into the ground which meets the following three criteria: (a) it is a bored, drilled, or dug hole, or is a driven mine shaft or driven well points; and (b) it is deeper than its largest straight line surface dimension; and (c) it is used for or intended to be used for injection.

NPDES (National Pollutant Discharge Elimination System): EPA's program to control the discharge of pollutants to waters of the United States from point sources.

NPDES Permit: An authorization, license, or equivalent control document issued by EPA or an approved state agency to implement the requirements of the NPDES program.

Operator: The party or parties that either individually or taken together meet the following two criteria: 1) They have operational control over the site specifications (including the ability to make modifications in specifications); and 2) they have day to day operational control of site activities necessary to ensure compliance with plan requirements and permit conditions.

Outfall: The point, location, or structure where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

Permeability: The quality of a soil that enables water or air to move through it. Usually expressed in inches/hour or inches/day.

Permit: An authorization, license, or equivalent control document issued by EPA or an approved government agency to implement the requirements of an environmental regulation.

Permit Issuing Authority (or Permitting Authority): The EPA Regional office which issues environmental permits to regulated facilities.

Pollutant: Any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

Receiving Waters: Bodies of water or surface water systems receiving water from upstream constructed (or natural) systems.

Riser: A vertical pipe extending from the bottom of a pond BMP that is used to control the discharge rate from a BMP for a specified design storm.

Runon: Storm water surface flow or other surface flow which enters property other than that where it originated.

Runoff: That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into the receiving waters.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by flowing water.

Sediments: Soil, sand, and minerals washed from land into water. The sediments pile up in reservoirs, rivers, and other waterbodies, destroying fish-nesting areas and clouding the water so that needed sunlight does not reach aquatic plants.

Source Control: A practice or structural measure to prevent pollutants from entering storm water runoff.

Treatment Control BMP: A BMP that is intended to remove pollutants from storm water.

Vactor: To remove solids or liquids by way of siphoning or drawing out.

Waters of the United States:"(a) All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate "wetlands,"

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

1. Which are or could be used by interstate or foreign travelers for recreation or other purposes;

2. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

3. Which are used or could be used for industrial purposes by industries in interstate commerce.

(d) All impoundments of water otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (d) of this definition.

Waterway: A channel for the passage of flow of water.

Weir: A small structure across a sand filter that is used to regulate or divert the water.

Wetlands: An area that is regularly saturated by surface or ground water and subsequently characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include swamps, bogs, marches, fens, and estuaries.