INTRODUCTION

This document describes Sarasota County’s Structural Controls Inspection and Maintenance of the stormwater collection system. Descriptions of the various types of structural controls are contained within to provide a common definition and understanding of the controls. The minimum inspection frequencies, possible inspection and maintenance checklist items and documentation requirements are included. These requirements are also listed in Table II.A.1 of our MS4 Permit. The goal is to reduce pollutants, including floatables, in discharges from the MS4. The activities in this plan address implementation requirements described in:

- PART III.A.1 STRUCTURAL CONTROLS AND STORMWATER COLLECTION SYSTEMS OPERATION

The County Stormwater Operations and Maintenance Department is an integral part of program and supports the requirements and procedures for the effective inspection and maintenance of our MS4. Unless otherwise stated inspection and maintenance activities are scheduled and tracked through the MAXIMO Asset Management System. Should an issue be identified during inspection that requires maintenance a Work Order shall be created in the MAXIMO System.

Dry Retention – Inspection

Dry Retention Systems (basins) are infiltration systems that are excavated into the ground. Typically they are vegetated to minimize erosion and the roots help maintain the permeability of the soils.

Inspection Frequency: Annually the first two years of operation, once every three years without chronic problems, annually with chronic problems until they are corrected.

- Inspect the system for storage volume recovery within the permitted time, generally less than 72 hours. Dead or dying grass on the bottom and/or standing water following three or more days of dry weather is an indication of potential clogging and reduced infiltration capacity.

- Inspect and monitor sediment accumulation on the bottom or inflow/outflow to prevent loss of storage volume, clogging of the system or the inflow/outflow pipes.
Inspect vegetation of bottom and side slopes to assure it is healthy, maintaining coverage, and that no erosion is occurring within the system.

Inspect inflow and outflow structures, trash racks, and other components for signs of undercutting or piping, settling, or damage, and for accumulation of debris and trash that would cause clogging and adversely impact operation of the system.

Inspect the system for potential mosquito breeding areas such as where standing water occurs after 72 hours or where cattails or other invasive vegetation becomes established.

Note any signs of excessive petroleum hydrocarbon contamination and handle appropriately.

**Dry Retention – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- If needed, restore the infiltration capacity of the system by scraping, discing or otherwise aerating the bottom so that it meets the permitted recovery time for the required treatment volume.

- Remove accumulated sediment from the bottom and inflow and outflow pipes and dispose of properly. If possible, sediment removal should be done when the system is dry and when the sediments are cracking.

- Maintain healthy vegetative cover to prevent erosion in the bottom, side slopes or around inflow and outflow structures. Vegetation roots also help to maintain soil permeability. Mow as needed.

- Conduct repairs to prevent undercutting or piping. Remove trash and debris from inflow and outflow structures, trash racks, and other system components to prevent clogging or impeding flow.

- Eliminate mosquito breeding habitats.

**Underdrain Filter Systems – Inspection**

**Underdrain Systems** consist of a dry basin underlain with perforated drainage pipe that collects and conveys stormwater following percolation from the basin through suitable soil. Underdrain systems are generally used where high water table conditions dictate that recovery of the stormwater treatment volume cannot be achieved by natural percolation (i.e., retention systems) and suitable outfall conditions exist to convey flows from the underdrain system to receiving waters.

**Inspection Frequency:** Annually the first two years of operation, once every 18 months without chronic problems, annually with chronic problems until they are corrected.
- Inspect the system for storage volume recovery within the permitted time, generally less than 36 hours. Dead or dying grass on the bottom and/or standing water following three or more days of dry weather is an indication of potential clogging and reduced infiltration or filtration capacity. Inspect filter system outflow to assure it is operating as designed and is not clogged.

- Inspect and monitor sediment accumulation on the bottom or inflow/outflow to prevent loss of storage volume, clogging of the system or the inflow/outflow pipes.

- Inspect vegetation of bottom and side slopes to assure it is healthy, maintaining coverage, and that no erosion is occurring within the system.

- Inspect inflow and outflow structures, trash racks, and other components for signs of undercutting or piping, settling, or damage, and for accumulation of debris and trash that would cause clogging and adversely impact operation of the system.

- Inspect the system for potential mosquito breeding areas such as where standing water occurs after 72 hours or where cattails or other invasive vegetation becomes established.

**Underdrain Filter Systems – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- If needed, restore the infiltration or filtration capacity of the system by scraping, discing or otherwise aerating the bottom and/or by conducting appropriate maintenance of the filter system so that it meets the permitted recovery time for the required treatment volume.

- Remove accumulated sediment from the bottom and inflow and outflow pipes and dispose of properly. If possible, sediment removal should be done when the system is dry and when the sediments are cracking.

- Maintain healthy vegetative cover to prevent erosion in the bottom, side slopes or around inflow and outflow structures. Vegetation roots also help to maintain soil permeability. Mow as needed.

- Conduct repairs to prevent undercutting or piping. Remove trash and debris from inflow and outflow structures, trash racks, and other system components to prevent clogging or impeding flow. Eliminate mosquito breeding habitats.

**Exfiltration Trench / French Drains – Inspection**

*Exfiltration Trenches / French Drains* are shallow, excavated trenches in which stormwater is stored in perforated or slotted pipes and percolates out through the surrounding gravel envelope and filter fabric into the soil. In South Florida, these systems are called French drains.
**Inspection Frequency:** Annually the first two years of operation, once every three years without chronic problems, annually with chronic problems until they are corrected.

- Inspect facility for sediment accumulation in the pipe (when used) and for storage volume recovery (i.e., drawdown capacity). If present, observation wells and inspection ports should be checked following 3 days minimum dry weather. Failure to percolate stored runoff to the design treatment volume level within 72 hours indicates binding of soil in the trench walls and/or clogging of geotextile wrap with fine solids.

- Inspect appurtenances such as sedimentation and oil and grit separation traps or catch basins as well as diversion devices and overflow weirs when used. Diversion facilities and overflow weirs should be free of debris and ready for service. Sedimentation and oil / grit separators should be scheduled for cleaning when sediment depth approaches cleanout level. Cleanout levels should be established not less than 1 foot below the invert elevation of the chamber.

**Exfiltration Trench / French Drains – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- Conduct minor maintenance measures to restore infiltration rates to acceptable levels. This may include removal of accumulated sediments by mechanical or manual means.

- Major maintenance (total rehabilitation) is required to remove accumulated sediment in most cases or to restore recovery rate when minor measures are no longer effective or cannot be performed due to design configuration.

- Remove trash and debris from diversion facilities and overflow weirs. Clean out sedimentation and oil / grit separators when sediment depth approaches cleanout level and dispose of properly. Remove debris from the outfall.

**Grass Treatment Swales / Bioswale – Inspection**

“Swale” means a manmade trench which: (1). Has a top width to depth ratio of the cross-section equal to or greater than 6:1, or side slopes equal to or flatter than 3 feet horizontal to 1-foot vertical; (2). Contains contiguous areas of standing or flowing water only following a rainfall event; (3). Is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake; and (4). Is designed to take into account the soil erodibility, soil percolation, slope, slope length, and drainage area so as to prevent erosion and reduce pollutant concentration of any discharge.

**Inspection Frequency:** Annually the first two years of operation, once every three years without chronic problems, annually with chronic problems until they are corrected.

- Inspect the system for storage volume recovery within the permitted time, generally less than 36 hours. Dead or dying grass on the bottom and/or standing water following three
or more days of dry weather is an indication of potential clogging and reduced infiltration or filtration capacity. Inspect filter system outflow to assure it is operating as designed and is not clogged.

☐ Inspect and monitor sediment accumulation on the bottom or inflow / outflow to prevent loss of storage volume, clogging of the system or the inflow / outflow pipes.

☐ Inspect vegetation of bottom and side slopes to assure it is healthy, maintaining coverage, and that no erosion is occurring within the system.

☐ Inspect inflow and outflow structures, trash racks, and other components for signs of undercutting or piping, settling, or damage, and for accumulation of debris and trash that would cause clogging and adversely impact operation of the system.

☐ Inspect the system for potential mosquito breeding areas such as where standing water occurs after 72 hours or where cattails or other invasive vegetation becomes established.

**Grass Treatment Swales Bioswale – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

☐ If needed, restore the infiltration capacity of the swale system by scraping, discing or otherwise aerating the bottom so that it meets the permitted recovery time for the required treatment volume.

☐ Remove trash and debris, especially from inflow or outflow structures, to prevent clogging or impeding flow. Repair any damages to structures within the swale system as needed to maintain proper operation.

☐ Remove accumulated sediment from the swale and inflow or outflows and dispose of properly. If possible, sediment removal should be done when the swale is dry and when the sediments are cracking.

☐ Maintain healthy vegetative cover to prevent erosion of the swale bottom or side slopes. Mow grass as needed.

☐ Eliminate mosquito breeding habitats.

☐ Repair any damage to the swale system and remove fences or other obstructions that may have been built in the swale system.

**Wet Detention – Inspection**

**Wet Detention Systems** are permanently wet ponds that are designed to slowly release a portion of the collected stormwater runoff through an outlet structure. Wet detention systems are the recommended BMP for sites with moderate to high water table conditions. Wet detention
systems provide removal of both dissolved and suspended pollutants by taking advantage of physical, chemical, and biological processes within the pond. They also create “lakefront” property and provide a source of fill.

**Inspection Frequency:** Annually the first two years of operation, once every three years without chronic problems, annually with chronic problems until they are corrected.

- Inspect the system for storage volume recovery within the permitted time frame.
- Inspect the system for excessive sediment accumulations that cause a 20% or more decrease in the wet detention system’s permitted storage volume.
- Inspect inflow and outflow structures, trash racks, and other system components for signs of undercutting, piping, settling, or damage, and for accumulation of debris and trash that would cause clogging and adversely impact proper operation.
- Inspect vegetation on side slopes to assure it is healthy and maintaining coverage, and that no erosion is occurring.
- Inspect the wet detention system and, if applicable, littoral zone to assure that cattails or other invasive vegetation are not becoming established.

**Wet Detention – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- If required, take actions to assure that storage volume is recovered within the permitted time frame.
- Remove accumulated sediments to restore permitted storage volume and dispose of properly.
- Conduct repairs to prevent undercutting, piping, or damage. Remove trash and debris from inflow and outflow structures, trash racks, and other system components to prevent clogging or impeding flow.
- Maintain healthy vegetative cover to prevent erosion of side slopes or around inflow and outflow structures. Remove any trees or shrubs that may have become established on the discharge structure embankment, if applicable.
- Remove cattails and other exotic vegetation from the littoral zone, if applicable, and replant appropriate vegetation if needed to meet littoral zone requirements.

**Dry Detention – Inspection**
**Dry Detention Systems** are designed to store a defined quantity of runoff and slowly release the collected runoff through an outlet structure to adjacent surface waters. After drawdown of the stored runoff is completed, the storage basin does not hold any water, thus the system is normally "dry." Dry detention basins are similar to retention systems in that the basins are normally dry. They are used in areas where the soil infiltration properties or seasonal high water table elevation will not allow the use of a retention basin. The main difference between the two systems is that retention systems are designed to percolate the stored runoff into the ground while dry detention systems are designed to discharge the runoff through an outlet structure to adjacent surface waters.

**Inspection Frequency:** Annually the first two years of operation, once every three years without chronic problems, annually with chronic problems until they are corrected.

- Inspect the system for storage volume recovery within the permitted time, generally less than 36 hours by assuring that filter system is flowing as designed.
- Inspect and monitor sediment accumulation in the detention system or inflow / outflow points to prevent loss of storage volume, clogging of the filter system or the inflow / outflow pipes.
- Inspect inflow and outflow structures, trash racks, and other components for signs of undercutting or piping, settling, or damage, and for accumulation of debris and trash that would cause clogging and adversely impact operation of the system.
- Inspect the system for potential mosquito breeding areas such as where cattails or other invasive vegetation becomes established.

**Dry Detention – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- If needed, restore the filtration capacity of the system by conducting appropriate maintenance of the filter system so that it meets the permitted recovery time for the required treatment volume.
- Remove accumulated sediment from the system and from inflow and outflow pipes and dispose of properly.
- Conduct repairs to prevent undercutting or piping. Remove trash and debris from inflow and outflow structures, trash racks, and other system components to prevent clogging or impeding flow.
- Eliminate mosquito breeding habitats

**Pollution Control Boxes – Inspection**
**Pollution Control Boxes** are a group of BMPs that usually are installed underground and are contained within some type of housing, such as a box or vault. They typically are used in areas without much land and they provide removal of particles, litter, and sometimes nutrients. Includes Baffle Boxes, CDS Units, Hydrodynamic Separators, Catch Basin Inserts.

**Inspection Frequency:** Quarterly, unless historic clean out operation records demonstrate that a more or less frequent schedule is appropriate.

- Inspect inlets, outlets, and other system components for damage that would prevent proper flow conditions and operation.
- Inspect and monitor sediment accumulation in the pollution control box and at the inflow / outflow to prevent loss of storage volume, clogging of the inflow / outfall pipes.
- If applicable, inspect and monitor vegetation and debris accumulation in the pollution control box screens to prevent loss of storage volume or clogging of the system.
- If applicable, inspect absorbent materials used to trap hydrocarbons or bacteria to determine if they need replacement.

**Pollution Control Boxes – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- Repair any damage to assure proper flow conditions and operation.
- Remove accumulated sediment and dispose of properly.
- Remove accumulated vegetation and debris and dispose of properly.
- Replace absorbent materials as required for proper operation.
- Follow all manufacture’s recommended maintenance schedule and activities.

**Stormwater Pump Stations – Inspection**

*Stormwater Pump Stations* are necessary for the removal of stormwater from areas where gravity drainage is impossible or impractical, such as in South Florida.

**Inspection Frequency:** Semi-annually and more frequently as needed.

- Inspect pump for proper operation.
- Inspect inlets, bar screens (if used) and other associated components for debris or litter to assure that pump operates properly.
Stormwater Pump Stations – Maintenance

Maintenance as needed based on inspection to assure proper operation.

- Maintain or repair pump as needed to assure proper operations.
- Remove debris, litter, and sediments as needed to assure proper operations. Properly dispose of the litter and debris collected. Properly dispose of sediment collected.

Major Outfall – Inspection

Major Outfalls are municipal separate storm sewer outfalls that discharge from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for municipal separate storm sewers that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Inspection Frequency: Annually unless historic operation records demonstrate that a more or less frequent schedule is appropriate.

- Inspect outfalls to assure they are not clogged with litter, debris, or sediment and they are flowing properly.
- Inspect for damaged headwalls, seepage around pipe, erosion of bank around outfall, erosion or sedimentation at outfall discharge point, and damage or clogged riprap.

Documentation: Initial inventory inspection to be completed by Stormwater Compliance Specialist in 2014. Subsequent scheduling, documentation and tracking will move to the MAXIMO Database.

Major Outfall – Maintenance

Maintenance as needed based on inspection to assure proper operation.

- Remove debris, litter, and sediments as needed to assure proper operations. Properly dispose of the litter and debris collected. Properly dispose of sediment collected.
- Repair any structural damage to assure proper operation.
- Maintain healthy vegetative cover to prevent erosion of banks or areas near outfalls. Assure that discharges from outfalls are not causing erosion and sedimentation.

Weirs & Channel Control Structures – Inspection
Weirs, Channel Control Structures and Other Control Structures are structural components of a stormwater system that detain stormwater and allow its controlled release. Weirs and other control structures are common components of most of the traditional structural controls discussed above. They also are found within conveyance systems, such as ditches or secondary / tertiary canals.

**Inspection Frequency:** Same as specified in this column for the type of stormwater control with which it is associated.

- Inspect weirs / control structures for damage that would prevent proper flow conditions and operation.
- Inspect and monitor sediment accumulation behind weirs / control structures to prevent loss of storage volume and adverse impacts on flow and operation.
- Inspect and monitor litter / debris accumulation behind weirs / control structures to prevent loss of storage volume and adverse impacts on flow and operation.

**Weirs & Channel Control Structures – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- Repair any damages to weirs / control structures as needed to assure proper flow conditions and operation.
- Remove accumulated sediments to restore permitted storage volume and dispose of properly.
- Remove litter / debris as needed to assure proper flow conditions and operation and dispose of properly.

**Pipes / Culvert – Inspection**

Pipes and Culverts are major components of the MS4 and serve as the backbone of the stormwater conveyance system. As such, assuring that flow is not impeded because of clogging by accumulated sediments or debris is crucial to their effective operation. Cracks and breaks may also cause inflow of groundwater and sedimentation in pipes and at outfalls.

**Inspection Frequency:** Inspect a minimum of 10% of the total number of structures each year. All of the structures shall be inspected at least once over two consecutive permit cycles (every 10 years).

- Inspect pipes and culverts for structural deficiencies or damage that would prevent proper flow conditions and operation.
Inspect pipes and culverts to monitor sediment accumulation to prevent loss of storage volume and adverse impacts on flow and operation.

Inspect pipes and culverts to monitor vegetation and litter/debris accumulation to prevent loss of storage volume and adverse impacts on flow and operation.

Inspections of pipes and culverts can be done through a variety of methods, such as visual observations during normal operating conditions, TVing, mirroring, or other appropriate methods.

**Documentation:** Initial inventory and inspection to be completed by Repair and Replacement Program. Current scheduling, documentation and tracking is done using in “IT Pipes” Database Software.

**Inlets / Catch Basins / Grates / Ditches / Conveyance Swales – Inspection**

**Storm Sewer Inlets, Catch Basins, Grates, Ditches, Conveyance Swales and Other Stormwater Conveyances** also are major components of the MS4 that serve an important function in safely conveying stormwater. Stormwater in urban areas typically enters the MS4 through storm sewer inlets that may or may not have a catch basin that can provide a small area for settling of sediments. To minimize entry of debris or to provide safety for the public, grates often cover storm sewer inlets or outlets. Ditches, conveyance swales (which are not designed for stormwater treatment) and other stormwater conveyances, such as inverted crowned roads, help to safely convey stormwater.

**Inspection Frequency:** Inspect a minimum of 10% of the total number of structures each year. All of the structures shall be inspected at least once over two consecutive permit cycles (every 10 years).

- Inspect for damage that would prevent proper flow conditions and operation.
- Inspect and monitor sediment accumulation to prevent loss of storage volume and adverse impacts on flow and operation.
- Inspect and monitor litter/debris accumulation to prevent loss of storage volume and adverse impacts on flow and operation.
- Inspect vegetation on bottom and side slopes of conveyances to assure it is healthy, maintaining coverage, and that no erosion is occurring within the conveyance system.

**Inlets / Catch Basins / Grates / Ditches / Conveyance Swales – Maintenance**

*Maintenance as needed based on inspection to assure proper operation.*

- Repair any damages to weirs/control structures as needed to assure proper flow conditions and operation.
☐ Remove accumulated sediments to restore permitted storage volume and dispose of properly.

☐ Remove litter / debris as needed to assure proper flow conditions and operation and dispose of properly.

☐ Maintain healthy vegetative cover to prevent erosion of the conveyance bottom or side slopes.