Maintenance Guide for Stormwater Assets

Office of Maintenance

May 2023

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1.0 Introduction

The Florida Department of Transportation (FDOT) currently owns and operates more than 10,000 stormwater treatment facilities throughout the state. These facilities vary in size, function, and design. Facilities include wet detention ponds, dry detention ponds, dry retention ponds, treatment swales, and underground exfiltration systems. They are designed to attenuate flow, reduce flooding, and treat stormwater runoff from the state highway system to reduce pollutant loading to receiving waters.

To manage stormwater and minimize impacts to our natural systems, Florida was the first state in the country to adopt rules requiring the treatment of stormwater for all new development. Florida's original stormwater rule was adopted in 1981 and went into effect in February 1982. It has continued to evolve since that time. Stormwater treatment facilities are currently regulated by state environmental resource permits (ERPs) and/or National Pollutant Discharge Elimination System (NPDES) permits. These permits have established inspection and maintenance criteria that help ensure stormwater treatment facilities continue to function as designed and permitted.

This Maintenance Guide for Stormwater Assets (SWAM) has been developed to establish minimum statewide standards for the routine maintenance of FDOT's stormwater treatment and conveyance systems. These minimum standards are not intended to replace or supersede existing Maintenance Rating Program (MRP) criteria. These standards should be used to fill gaps in existing criteria and to enhance and support existing programs related to the routine maintenance of FDOT's stormwater management systems.

2.0 Scope and Intent of this Guide

This guide has been developed through close coordination with maintenance staff and NPDES coordinators from each District and Florida's Turnpike Enterprise. The intended users of this guide include FDOT maintenance staff, maintenance contractors, NPDES program coordinators, field inspection staff, and consultants who perform compliance inspections.

This document does not represent every possible situation that may occur. It is intended to provide general guidance, define the desired maintenance conditions, and provide examples for many of the routine and common needs. The guide has been organized to cover three main stormwater asset categories at this time. They include:

1. Treatment Ponds
2. Linear Treatment and Conveyance Systems
3. Outfalls

A detailed narrative description has been provided for each stormwater asset category, along with aerial imagery, cross-sectional graphics, 3-dimensional structure graphics, and example photographs. The aerial images, graphics, and photos are intended to provide typical examples and are not intended to represent every situation or configuration.

A rating table is provided for each stormwater asset category and includes a rating for each asset component and associated sub-components. The asset components were designed to be consistent with the statewide Stormwater Asset Management System (SAMS) inspection software application and may include **Structural Condition, Water Condition, Erosion Condition, Aesthetics Condition, Hydraulic Recovery Condition, and Vegetation Condition**. These six rating categories will be the same for each stormwater asset. However, each asset component may have several sub-components. These sub-components vary and may not be present in all situations. For example:

*Control Structure, Orifice, Skimmer, and Inflow/Outflow Pipes are example sub-components associated with the **Structural Condition** asset component category.*

Depending upon the system being reviewed, there may or may not be a sub-component to review. It is important that when conducting reviews that the reviewer has a complete understanding of the system and features they should expect to see, how they work together, and the expected maintenance condition (as defined in the rating table of this guide). The rating tables use an inspection scoring approach of "Good, Fair, or Poor" for each stormwater asset component and associated sub-components.

This scoring approach is consistent with the inspection procedures developed for the SAMS inspection application. For each asset component or sub-component, the rating table includes a link to example photographs and provides a detailed list of criteria applicable to that rating condition. The list of criteria is intended to assist users with determining the appropriate rating for a given asset component. Note that not all criteria listed under the Condition Description column must be observed to provide the respective rating. For example:

A missing or broken skimmer on a control structure would result in a Poor rating for Structural Condition even if all other elements of the control structure are acceptable. These criteria are largely based on existing MRP, ERP, and NPDES conditions and criteria. A summary of recommended maintenance needs is also provided for each asset component and/or sub-component based on its rating condition.

This guide is being developed concurrently with the development of SAMS. An overview of SAMS, including links to the public viewer and instructional videos, is available at FDOT E-Maintenance - SAMS. In addition, Appendix A includes examples of inspection and maintenance needs reports that SAMS generates using inspection data entered in the field. The rating tables and metrics covered in this guide are consistent with the rating parameters used in SAMS.

The guide is intended to be a “living document,” and will be updated as better information becomes available.

3.0 Definitions

Anti-Clog Device – Component of the control structure used to prevent clogging by trash and debris.

Baffle – Components used to reduce runoff velocities and/or to redirect stormwater inside a structure.

Control Device or Bleed-Down Devices – The element of a discharge structure that allows the gradual release of water under controlled conditions. Examples may include an orifice, "V" or square notch weir.

Control Elevation – The lowest elevation at which water can be released through the control device or withdrawn by a stormwater harvesting system.

Detention – A system designed to collect and temporarily store water with a controlled release of the stormwater. Detention systems can be dry or permanently wet impoundments and provide treatment through physical, chemical, and biological processes.

Excess Vegetation – Vegetation that exceeds MRP criteria, impedes or slows the flow of water through a structure, or otherwise impacts the proper functioning of the stormwater facility. Removal of excess vegetation to restore proper function and intended design condition may also require removal of sediment.

Functioning as Designed – The status of critical components of a stormwater treatment facility. A system is "Functioning as Designed" if it is performing as intended and meeting applicable permit requirements.

Hydraulic Recovery within Permitted Timeframe – An evaluation of the performance of a stormwater treatment facility and its ability to recover its designed treatment volume over a given period of time.

Littoral Zone – In reference to stormwater management systems, that portion of the stormwater pond that is designed to contain submerged and emergent aquatic vegetation.

Maintenance Rating Program (MRP) – A uniform evaluation system for maintenance features on the State Highway System. It is defined as a method of conducting a visual and mechanical evaluation of routine highway maintenance conditions. The purpose of this evaluation is to provide information that should be used to schedule and prioritize routine maintenance activities and provide uniform maintenance conditions that meet established FDOT objectives.

Nuisance Vegetation – Vegetative growth of any plant species (terrestrial or aquatic) that impedes the proper functioning of the stormwater facility as designed. Nuisance vegetation also includes undesired or unwanted vegetation as identified in the MRP manual and Category I and Category II invasive plant species as identified by the Florida Invasive Species Council. Category I species are invasive species that are altering native plant communities by displacing native species, changing community structures or ecological function, or hybridizing with native species. Examples include tropical soda apple, hydrilla, cogongrass, water-hyacinth, and Brazilian pepper. Category II invasive species have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. Examples include elephant ear, castorbean, and Chinaberry. Nuisance vegetation does not include littoral plantings that are part of a pond's design.

Orifice – The opening in the control structure that allows the gradual release of stormwater. Orifices are typically a polyvinyl chloride (PVC) pipe, but can also be drilled or cast holes.

Permanent Pool – That portion of a wet detention pond that normally holds water (e.g., between the normal water level and the pond bottom).

Retention – A system designed to prevent the discharge of a given volume of stormwater runoff into surface waters of the state by complete onsite storage. Examples may include excavated or natural depression storage areas, pervious pavement with subgrade, or above-ground storage areas.

Seasonal High Ground Water Table Elevation – The highest level of the saturated zone in the soil in a year with normal rainfall.

Sedimentation – The settling out of soil particles transported by water and wind.

Skimmer – Skimmers are components typically found on the control structure and serve to keep floatable material, debris, and oils from discharging through the control structure. The skimmer also serves to prevent debris from obstructing flow through the control structure.

Stormwater Asset Management System (SAMS) – FDOT's geographic information system (GIS) based statewide Stormwater Asset Management System. The system provides for electronic data entry during field inspections, as well as inventory of new or existing facilities, using mobile devices such as smart phones and tablets.

Treatment Volume – The volume of stormwater runoff that must be retained or detained and treated prior to discharge pursuant to design criteria.

4.0 Facility Descriptions and Rating Tables

4.1 Treatment Ponds

This section will discuss the common types of treatment ponds found within FDOT ROW. They include:

1. Detention Ponds
    a. Wet Detention
    b. Dry Detention without filtration
    c. Dry Detention with underdrain or side bank filter
2. Retention Ponds

The ponds can typically be differentiated by the purpose of the facility and the type and placement of the control structure as discussed below.

This section of the guidance document includes separate rating tables for each of the basic types of ponds. Typical plan view, cross-sections, and detailed graphics for each type of pond are included in the section specific to that pond type.

4.1.1 Detention Ponds

4.1.1.1 Wet Detention

Wet detention systems are permanently wet ponds that are designed to slowly release collected stormwater runoff through a control structure. A typical wet detention pond schematic is shown in Figure 4-1.

The design of the control structure for wet detention ponds usually includes the following (Figure 4-2; Figure 4-3):

1. A drawdown device designed to slowly release the treatment volume following a rainfall event.
2. The drawdown device is typically an orifice or small weir (“V” or square notch in shape) with a control elevation set at the normal water level.
3. A broader, usually rectangular, weir opening is often located above the drawdown device. This weir opening is generally referred to as the overflow weir and regulates peak discharge of stormwater runoff associated with major rainfall events.

4. A grate located at the top of the control structure serves as the emergency outfall.
5. A permanent pool volume is provided in a wet detention system to assist with pollutant removal through physical, chemical, and biological processes. The permanent pool volume is the quantity of water in a wet detention pond that exists below the control elevation (i.e., weir notch or orifice). The treatment volume is the quantity of stormwater runoff that exists between the drawdown device and larger overflow weir.
6. An oil and trash skimmer that helps prevent the discharge of accumulated floatables, debris, and oils and prevents clogging of the orifice or weir.
7. A vertical, underflow baffle may also be installed inside the structure that performs the same function as a skimmer.

Though control structures may vary in configuration from the typical description and graphics provided in this document, the basic function of the control structure, i.e., to provide for the slow release of treated stormwater and to prevent trash and debris from entering the storm sewer system or receiving water, does not change. The inspector will find it useful to review the as-built drawings to confirm the intended design of the system.

Additionally, wet detention systems may include a littoral zone (Figure 4-4), which is the portion of a wet detention pond designed to contain rooted aquatic plants. These plants help remove nutrients and other pollutants from stormwater runoff. Aerial views of wet ponds without littoral zone and with a partial littoral zone are shown in Figure 4-5 and Figure 4-6, respectively. Figure 4-7 includes photos of typical wet detention ponds in good condition.

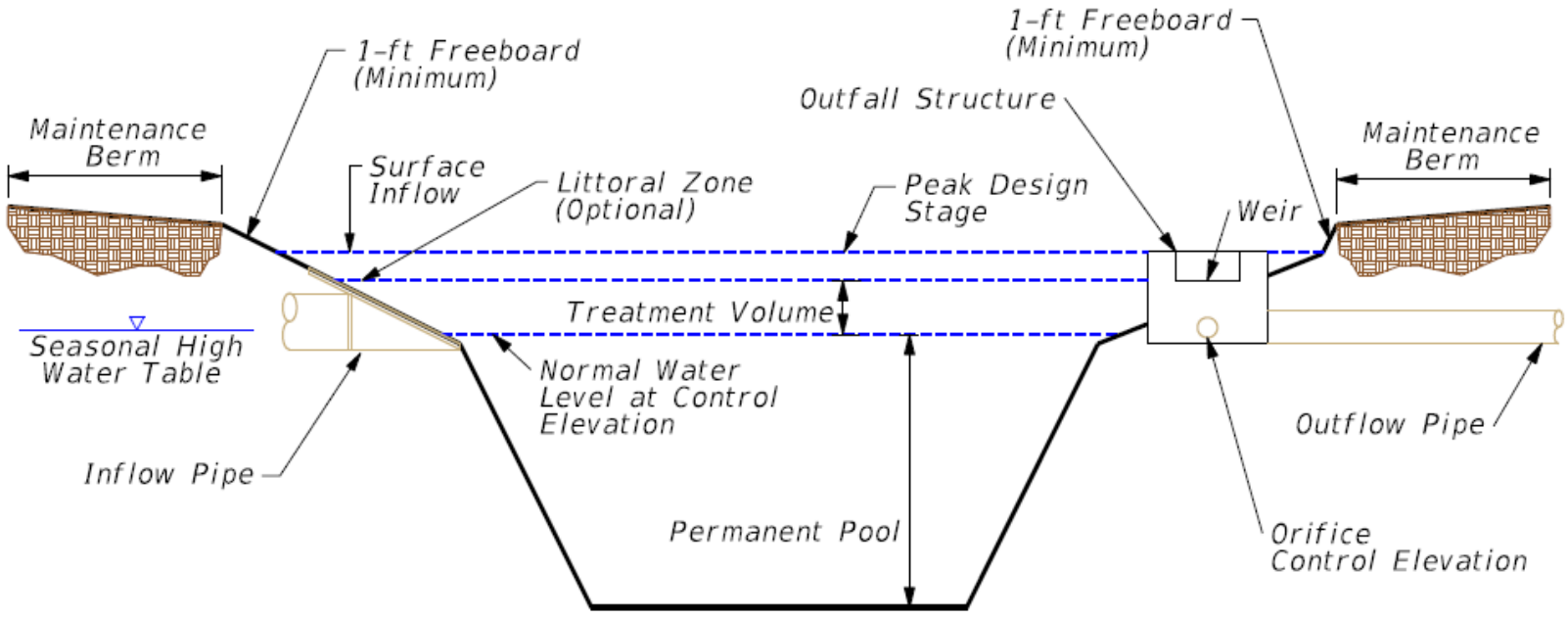


Figure 4-1. Typical Wet Detention System Schematic (Not to scale) Return to List of Figures

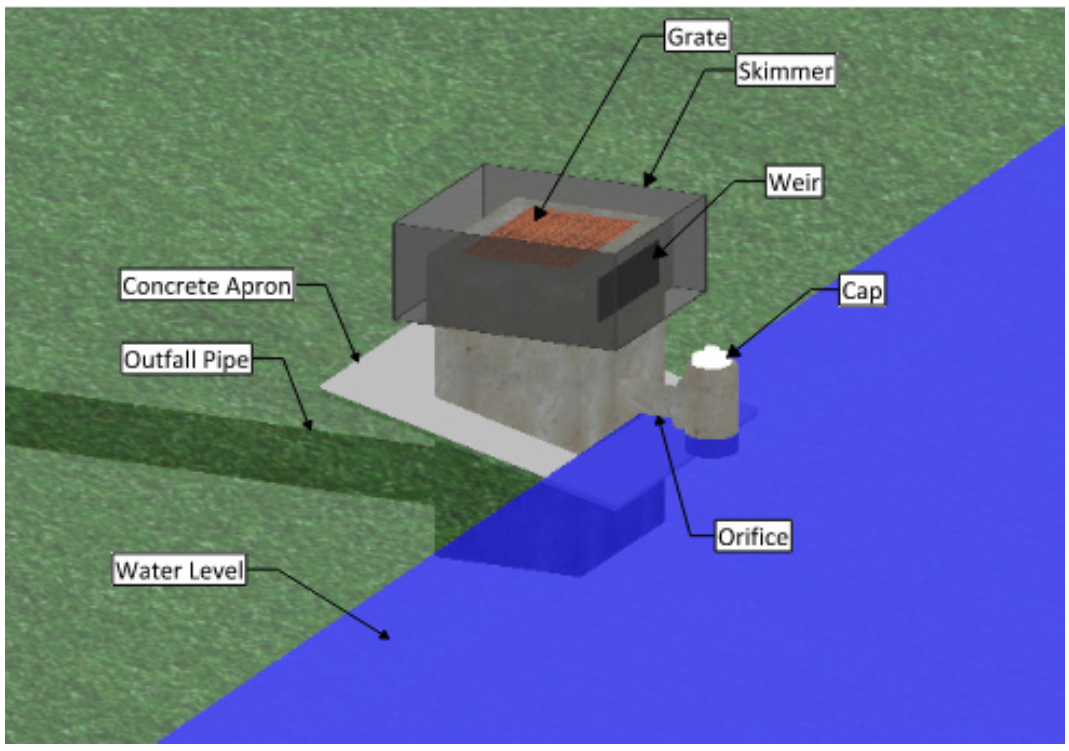


Figure 4-2. Typical Wet Detention System Control Structure – Isometric View (Not to scale) Return to List of Figures

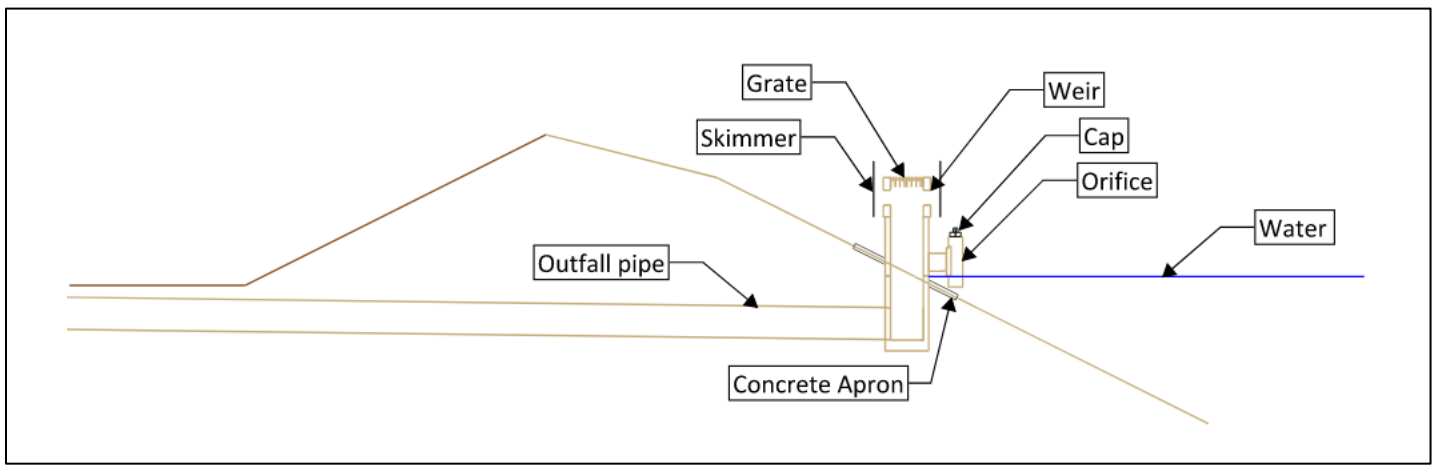
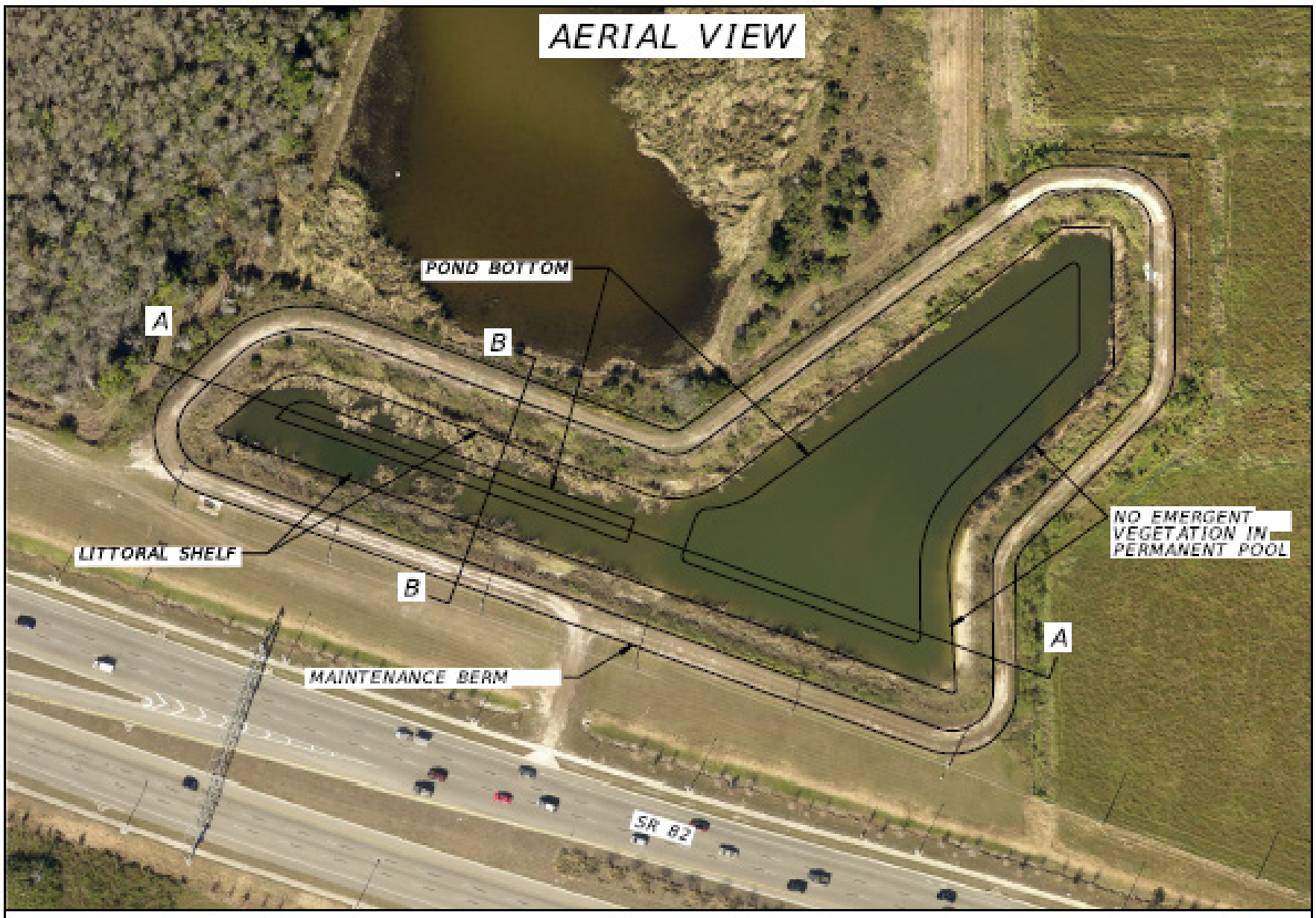


Figure 4-3. Typical Wet Detention System Control Structure – Section view (Not to scale) Return to List of Figures



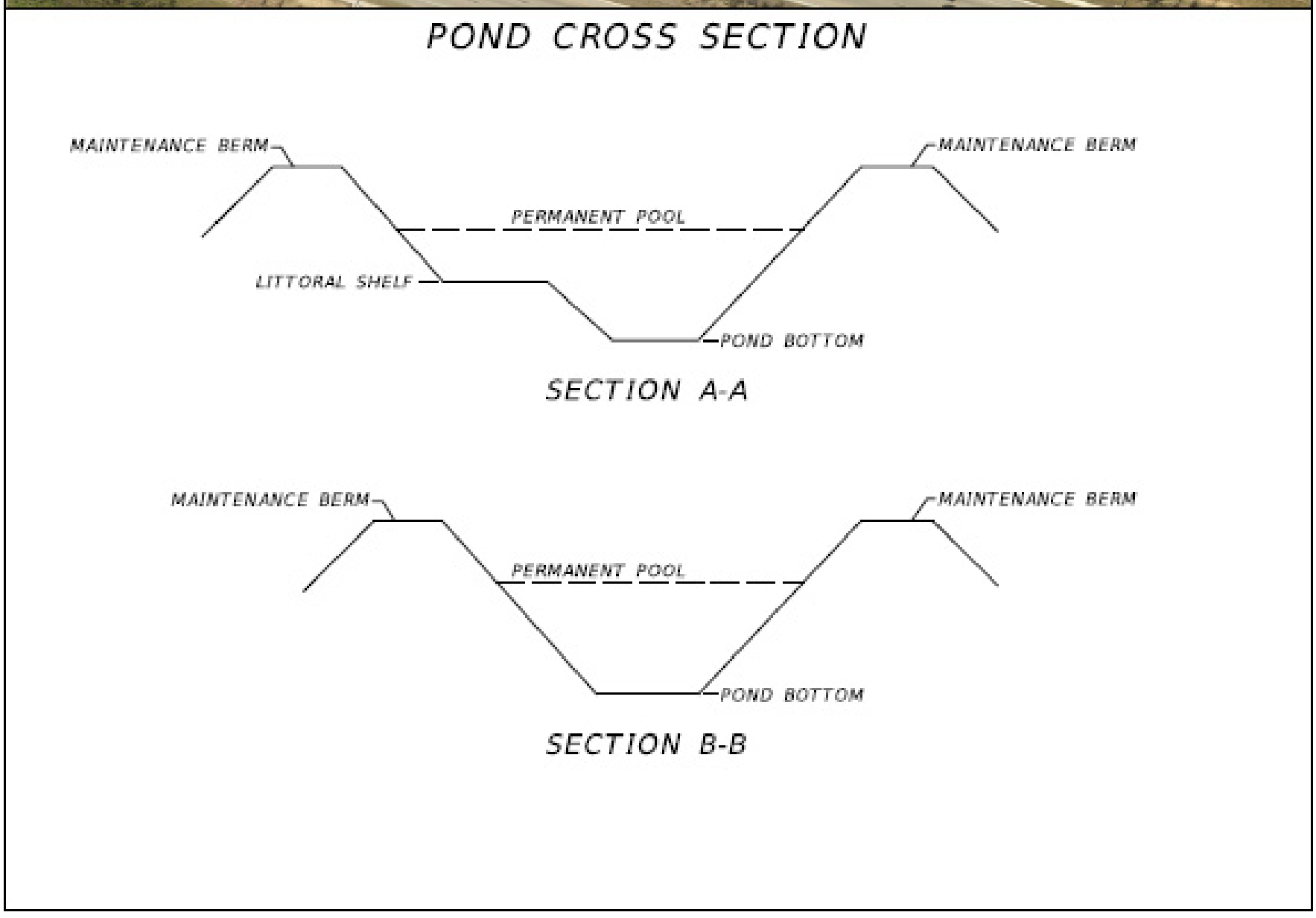


Figure 4-4. Typical Wet Detention System with Littoral Shelf Return to List of Figures

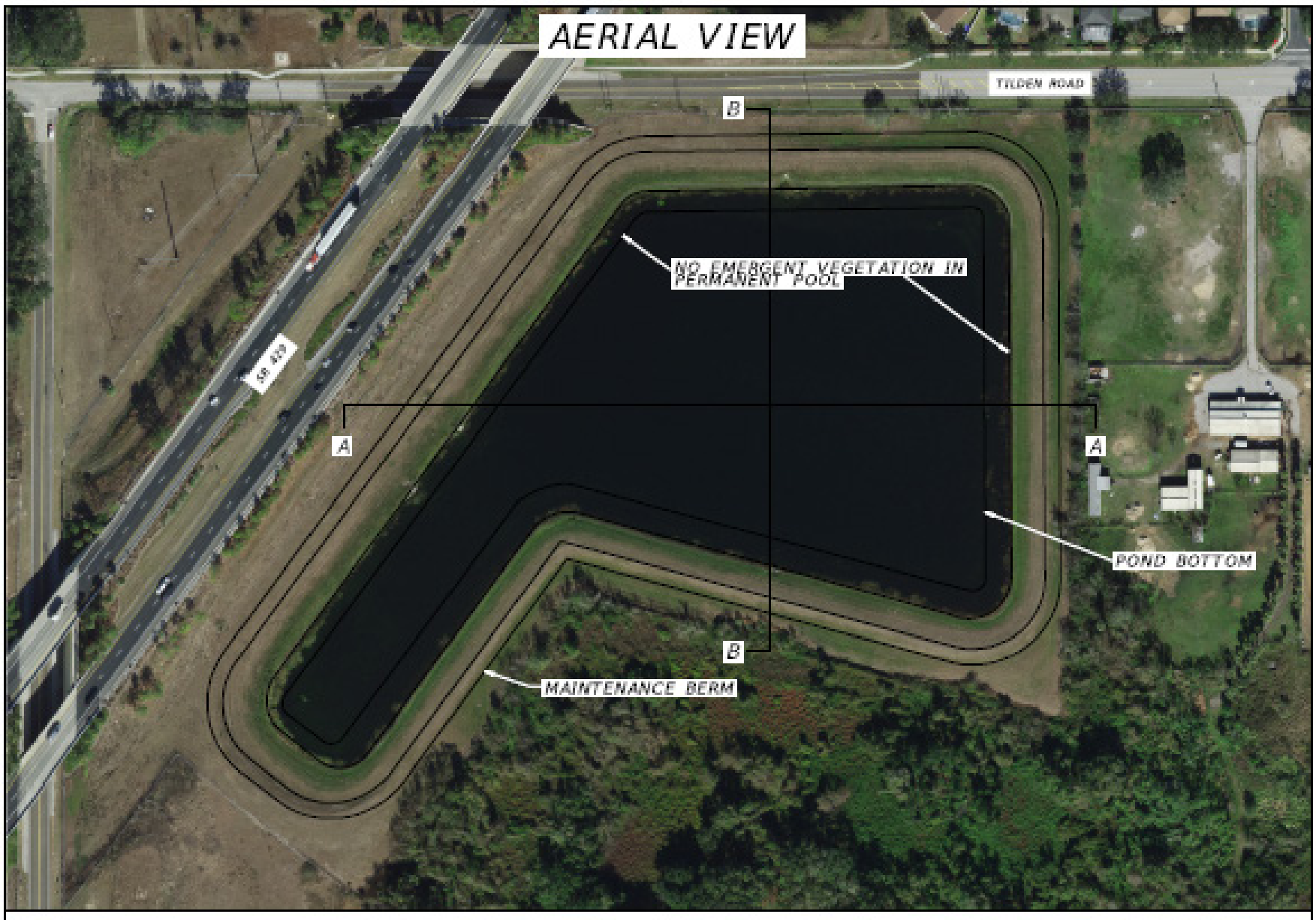
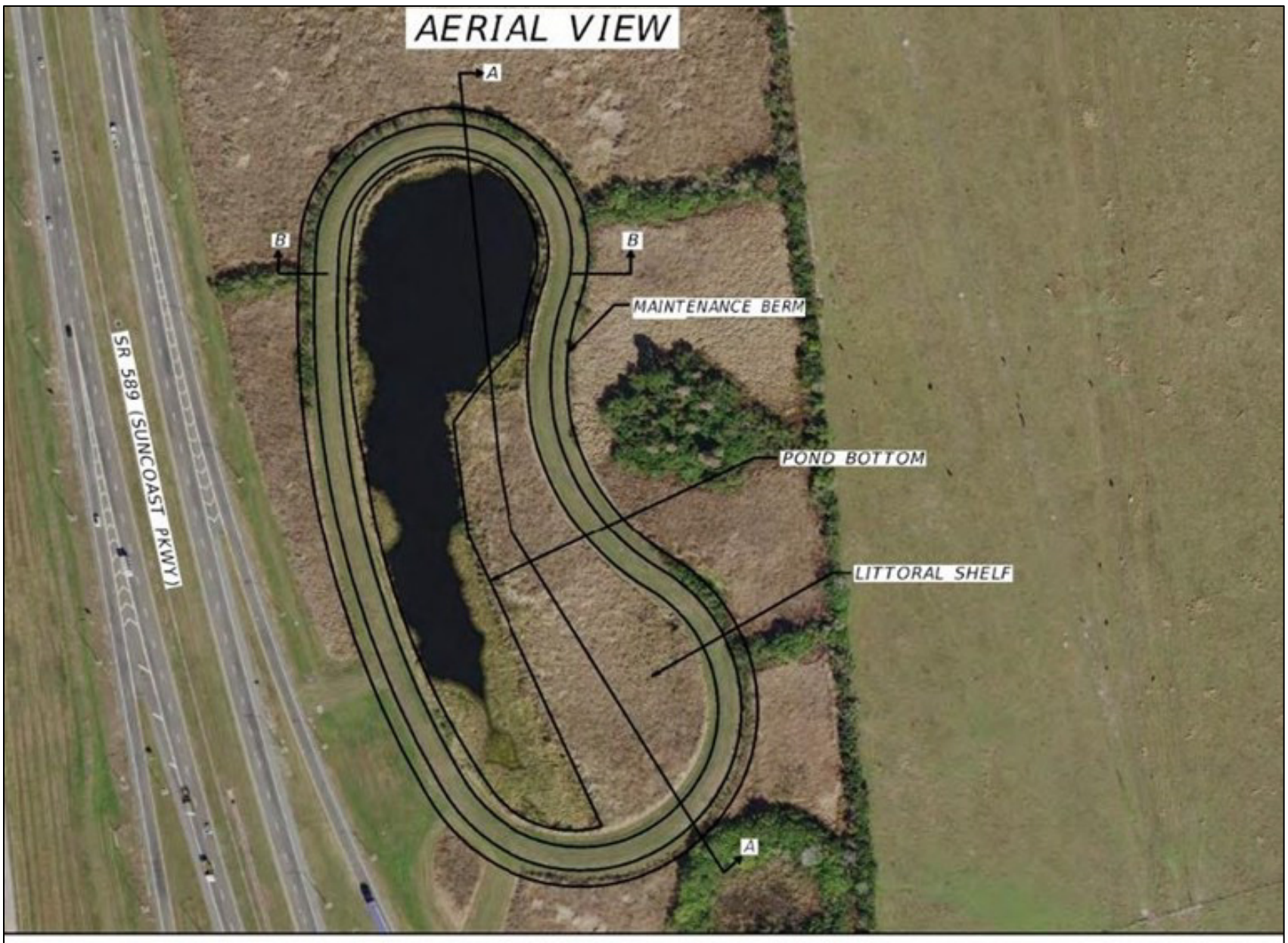


Figure 4-5. Typical Wet Detention System without Littoral Shelf Return to List of Figures



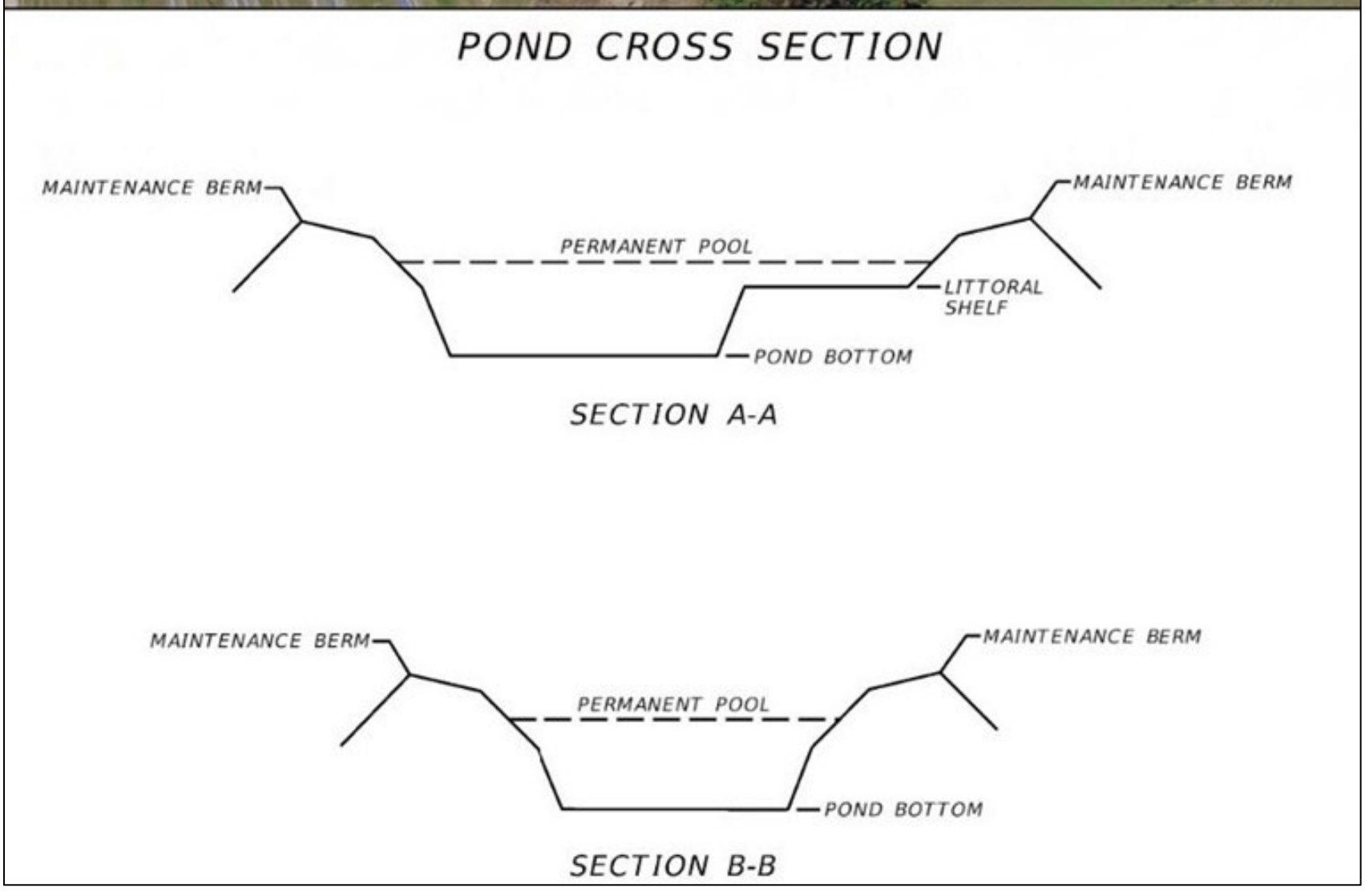


Figure 4-6. Typical Wet Detention System with Partial Littoral Shelf Return to List of Figures

Figure 4-7. Typical Wet Detention Ponds in Good Condition *Return to List of Figures*

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
Overall Appearance	Good A-9 A-51 A-52	✓ Side slopes are well maintained, mowed regularly ✓ Free of trash, debris, and graffiti in and around pond ✓ Signage in place	✓ None
	Fair A-11 A-23 A-57	✓ Side slopes need to be mowed ✓ Small amounts of trash or debris in and around the pond ✓ Vegetation present within pond	✓ Proactive maintenance recommended ○ Mow side slopes ○ Remove trash and debris ○ Remove vegetation in pond
	Poor A-15 A-17 A-19	✓ Side slopes are not being routinely maintained ✓ Excessive trash and debris present in and around pond ✓ Excessive vegetation within pond ✓ Any form of unauthorized graffiti is present	✓ Remove vegetation, trash, graffiti, and debris ✓ Other maintenance as needed to correct deficiencies
Fence	Good A-10 A-60	✓ Fence and lock in like-new condition ✓ Fence is closed and locked ✓ No holes or sagging of fence fabric ✓ No gaps in gate or fence greater than 6 inches ✓ Gate is closed and locked ✓ All fence posts present and intact ✓ No detached fence fabric ✓ All barbed wire strands on top of fence are in place, continuous, and unbroken	✓ None
	Fair A-11	✓ Gate loose ✓ Fence sagging, but amount of sagging is less than one-third of original height ✓ Holes in fence fabric, but individual holes less than 2 square feet ✓ Non-consecutive fence post(s) missing or broken ✓ Non-consecutive post(s) have fabric not attached ✓ At least one continuous strand of barbed wire is in place on top of fence, if originally installed and part of original design	✓ Proactive maintenance recommended ○ Repair cut and sagging fence sections ○ Replace missing or broken fence posts ○ Reattach fabric ○ Replace broken strand(s) of barbed wire ○ Repair fence to design condition

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Fence	Poor A-12 A-53 A-56	✓ Gate open, lock missing, broken, or damaged ✓ Top of fence sagging more than one-third its original height ✓ Gap(s) in gate or fence greater than 6 inches ✓ Holes in fence fabric greater than 2 square feet ✓ Two consecutive fence post(s) missing or broken ✓ Two consecutive fence post(s) have fabric not attached ✓ Less than one continuous strand of barbed wire on top of fence, if part of original design or installation ✓ Any other condition not meeting MRP standards	✓ Secure immediately ✓ Repair or replace lock ✓ Repair cut and sagging fence sections ✓ Repair gate or fence gaps ✓ Replace missing or broken fence posts ✓ Reattach fabric ✓ Replace broken strand(s) of barbed wire ✓ Other maintenance as needed to meet MRP standards
Hydraulic Recovery Condition			
Overall Recovery	Good A-1 A-3	✓ System appears to recover its treatment volume within the regulatory timeframe ✓ Permanent pool level is at or below the control elevation (e.g., weir notch or orifice elevation) within the regulatory timeframe ✓ No blockage of bleed-down device evident	✓ None
	Fair	✓ System appears to be recovering more slowly than required ✓ Partial blockage of bleed-down device slowing recovery	✓ Proactive maintenance recommended ○ Remove blockage from bleed-down device
	Poor A-14 APP-1	✓ System appears to not recover within the regulatory timeframe ✓ Permanent pool level remains above the control elevation (e.g., weir notch or orifice) longer than regulatory timeframe allowed following a storm event ✓ Bleed-down device is blocked	✓ Identify and correct problems preventing pond from recovering ✓ Other maintenance as needed to correct deficiencies
Sedimentation	Good	✓ No evidence of sedimentation problem observed ✓ No emergent vegetation other than planted littoral vegetation	✓ None
	Fair A-11 A-19	✓ Sediment and/or vegetation at inlet pipes indicative of sedimentation of pond bottom at inlet pipes, but pond is functioning as designed	✓ Proactive maintenance recommended ○ Clear sedimentation/vegetation at pipe opening ○ Find/eliminate source of sedimentation if possible

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Sedimentation	Poor	✓ Sediment accumulation is evident at or near the inflow pipes throughout pond, with accumulation inside and around pipes indicating excessive sedimentation on pond bottom and reduced pool volume ✓ If pipes are below water surface and not visible, excessive emergent vegetation may be an indication of sedimentation	✓ Remove sediment and re-establish pond bottom to original design grade
Vegetation Condition			
	Good A-9 A-24 A-52	✓ The vegetative cover is in good condition and well maintained ✓ Pond side slopes mowed regularly ✓ No nuisance or invasive species present ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair A-19 A-22 A-23	✓ The vegetative cover is in fair condition or requires minor attention ✓ Side slopes need to be mowed ✓ Some invasive or nuisance species are present, but coverage is less than 25% of area ✓ Some vegetation around structures or on water surface, but pond is functioning as designed ✓ Some emergent vegetation in pond but pond is functioning as designed	✓ Proactive maintenance recommended ○ Mow side slopes ○ Harvest vegetation
	Poor A-11 A-15 A-38	✓ The vegetative cover is in poor condition and/or not being maintained ✓ Woody vegetation growing in berms ✓ Vegetation and the side slopes have become destabilized ✓ Large portions of side slopes have little to no vegetative cover ✓ Invasive or nuisance species are present and covering more than 25% of area ✓ Excessive vegetation present in and around structural controls or on water surface such that recovery of hydraulic function is inhibited ✓ Excessive emergent vegetation such that pool volume is reduced and pond not functioning as designed	✓ Remove invasive and nuisance vegetation ✓ Remove vegetation from around structural controls and from water surface to restore hydraulic function ✓ Re-establish vegetation where needed ✓ Stabilize side slopes ✓ Other maintenance as needed to correct deficiencies

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Structural Condition			
Control Structure	Good A-1 A-2	✓ Like new and functioning as designed ✓ Structure intact with no visible damage ✓ Accumulation of debris or sediment is less than 25% of the depth of the chamber ✓ Grates present and properly placed with little to no damage ✓ Safety chain present	✓ None
	Fair A-3 A-5 A-59	✓ Accumulation of debris or sediment is more than 25% but less than 50% of the chamber depth ✓ Less than 25% of structure is blocked by vegetation and/or debris ✓ Safety chain missing ✓ Minor damage to structure or grates ✓ Sediment or debris accumulation under skimmer bottom blocks 25 to 50% of flow area under skimmer	✓ Proactive maintenance recommended ○ Replace safety chain ○ Remove obstructions
	Poor A-4 A-14 A-15	✓ Not functioning as designed ✓ Collapsed or severely damaged structure ✓ Accumulation of trash and debris is greater than 50% of chamber depth ✓ Grates missing or significantly damaged ✓ Excessive leakage at joints ✓ Sediment or debris accumulation under skimmer bottom blocks more than 50% of flow area under skimmer	✓ Repair structure ✓ Remove trash and debris ✓ Replace grates ✓ Remove sediment under skimmer to design clearance ✓ Other maintenance as needed to correct deficiencies
Orifice	Good A-1 A-3	✓ Orifice is undamaged ✓ Anti-clog device present and undamaged ✓ No obstructions	✓ None
	Fair A-5 A-59	✓ Minor obstruction or damage but still allowing for full recovery ✓ Anti-clog device present with minor damage not affecting function	✓ Proactive maintenance recommended ○ Repair damage ○ Remove obstructions
	Poor A-14	✓ Orifice blocked or clogged ✓ Anti-clog device missing or damaged and affecting function	✓ Unclog orifice ✓ Replace anti-clog device ✓ Other maintenance as needed to correct deficiencies

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Weir	Good A-1 A-5	✓ No obstructions or debris preventing flow ✓ Structurally sound	✓ None
	Fair A-11	✓ Minor damage to structure ✓ Less than 25% of weir opening is blocked and pond recovery rate is acceptable	✓ Proactive maintenance recommended ○ Remove weir blockages ○ Repair damage
	Poor A-15	✓ Debris, vegetation, or other obstruction is present and inhibiting flow over the weir ✓ More than 25% of weir opening is blocked	✓ Remove weir blockages ✓ Other maintenance as needed to correct deficiencies
Skimmer/Baffle	Good A-1 A-2 A-3	✓ Like new with little or no deterioration ✓ Structurally sound and functioning as designed. Minor damage, e.g., cracks, is acceptable provided function is maintained. ✓ Less than 25% of opening is obstructed by vegetation/debris	✓ None
	Fair A-5 A-14 A-22	✓ May have minor damage and some deterioration, but structurally sound and functionally adequate ✓ Between 25% and 50% of opening is obstructed by vegetation/debris	✓ Proactive maintenance recommended ○ Repair damage ○ Remove blockages
	Poor A-4 A-11	✓ Missing, detached, or collapsed ✓ Not functioning as designed ✓ More than 50% of opening is blocked by vegetation/debris	✓ Replace skimmer ✓ Other maintenance as needed to correct deficiencies
Inflow and Outflow Pipes	Good A-1 A-43 APP-7	✓ Like new with little or no deterioration and functioning as designed ✓ Flap gates present and functioning properly ✓ Up to 25% of pipe opening is obstructed but providing adequate conveyance	✓ None
	Fair APP-8	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function	✓ Proactive maintenance recommended ○ Remove pipe obstructions ○ Repair structural damage ○ Repair or replace flap gates

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Inflow and Outflow Pipes	Poor A-19	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as intended	✓ Repair or replace damaged components ✓ Other maintenance as needed to correct deficiencies
Water Condition			
	Good A-9 A-23 A-24	✓ Water clear ✓ Small amount of floatables ✓ Water is odor free ✓ No evidence of illicit discharges	✓ None
	Fair	✓ Some turbidity ✓ Moderate amount of floatables/trash ✓ Water is odor free	✓ Proactive maintenance recommended o Remove floatables/trash
	Poor A-16 A-17	✓ Significant turbidity ✓ Excessive floatables ✓ Foul odor present ✓ Evidence of illicit discharge.	✓ Remove floatables/trash ✓ Identify and remove sources of odor and/or illicit discharges ✓ Contact District NPDES Coordinator if there is evidence of an illicit discharge ✓ Other maintenance as needed to correct deficiencies

Wet Detention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Erosion Condition			
	Good A-9 A-51 A-52	✓ Some surficial erosion with minor rills present ✓ Vegetation on slope generally intact with minimal bare areas, low erosion potential, stable slope ✓ Minimal to no undermining is apparent	✓ None
	Fair A-18	✓ Minor erosion on pond slopes or berms ✓ Minor undermining around headwall, mitered end sections, or control structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion o Repair undermining
	Poor A-19 APP-2	✓ Substantial erosion compromising slope and/or berm stability ✓ Substantial undermining compromising structures ✓ Large rills and gullies present along slope ✓ Large areas of vegetation on slope have become dislodged and slope is unstable ✓ Undermining of structures is evident	✓ Stabilize structures, slopes, and berm ✓ Re-establish vegetation ✓ Other maintenance as needed to correct deficiencies

4.1.1.2 Dry Detention

Dry detention systems are dry storage areas that are designed to temporarily store a defined quantity of stormwater runoff and slowly release the collected runoff through a control structure (Figure 4-8). After drawdown of the stored runoff is completed, the storage basin does not hold any water, thus the system is normally dry.

The control structure is typically located within a dry detention pond, sometimes in a recessed sediment sump (Figure 4-9; Figure 4-10). This structure usually has:

1. A drawdown device designed to slowly release the treatment volume following a rainfall event.
2. The drawdown device is typically an orifice or small weir ("V" or square notch in shape) with a control elevation set at or below the pond bottom, typically at least 1 foot above the seasonal high groundwater table elevation. The maximum groundwater level measured during a year with normal rainfall is considered the seasonal high groundwater table elevation.
3. A broader, usually rectangular, weir opening is often located above the drawdown device within a control structure. This weir opening is the overflow weir and regulates discharge of stormwater runoff associated with major rainfall events.
4. The grate located at the top of the control structure serves as the emergency outfall for a dry detention system.
5. The treatment volume is the quantity of stormwater runoff that exists between the drawdown device and overflow weir.
6. The control structure usually includes an oil and trash skimmer that helps prevent the discharge of accumulated sediment, floatables, and oils and prevents clogging of the drawdown device or overflow weir.
7. A vertical, underflow baffle may also be installed within the control structure and performs the same function as a skimmer.

These systems are typically found within the jurisdiction of the South Florida Water Management District and Southwest Florida Water Management District. An aerial view

of a dry detention system is shown in Figure 4-11, and photos of typical dry detention ponds in good condition are shown in Figure 4-12.

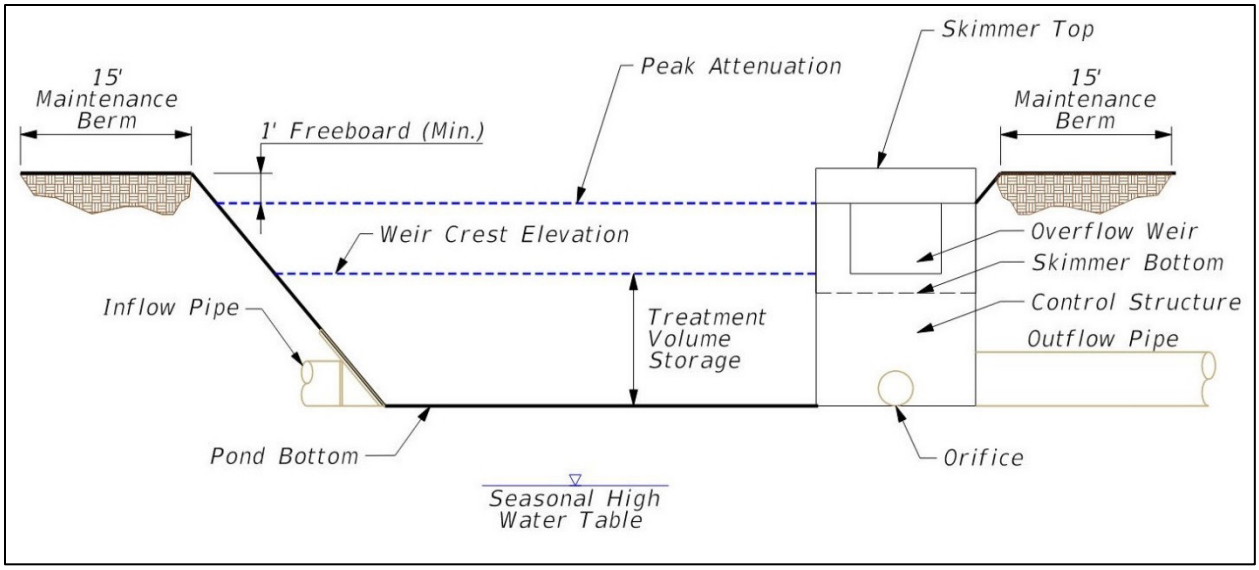


Figure 4-8. Typical Dry Detention Pond without Filtration Schematic (Not to scale)
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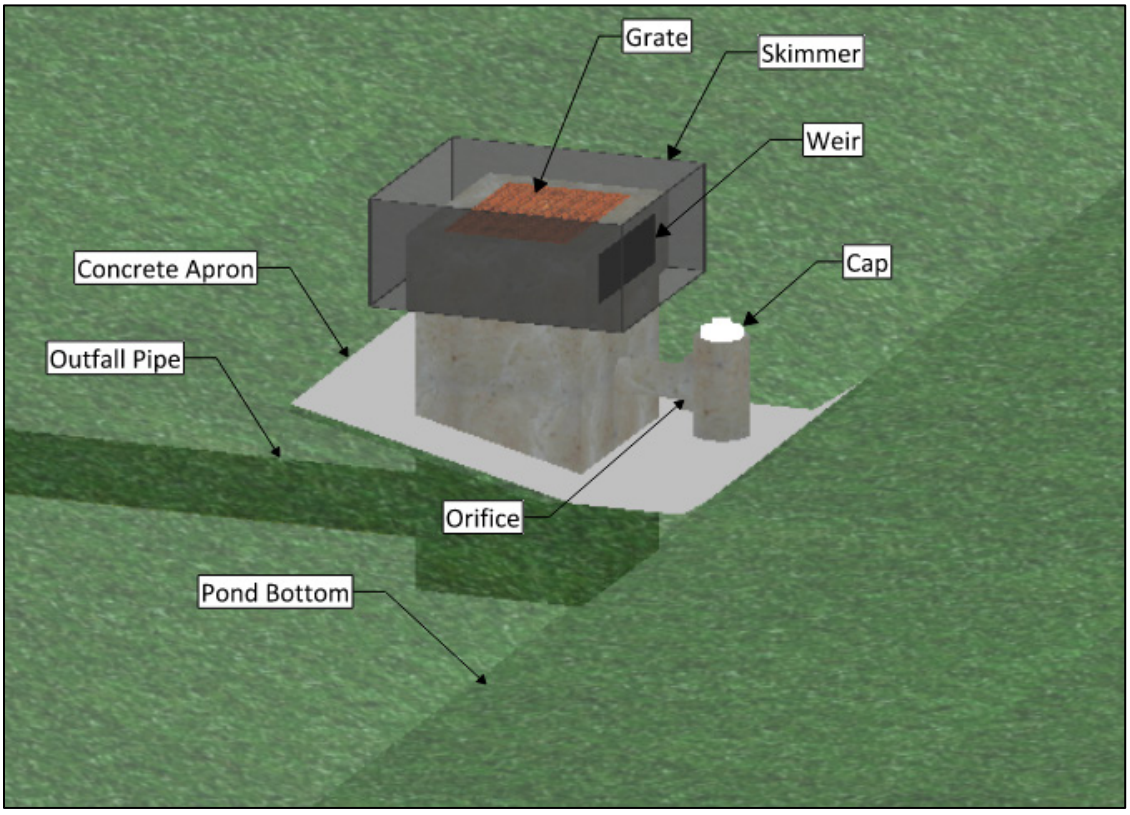

Figure 4-9. Typical Dry Detention Pond without Filtration Control Structure – Isometric View (Not to scale) Return to List of Figures

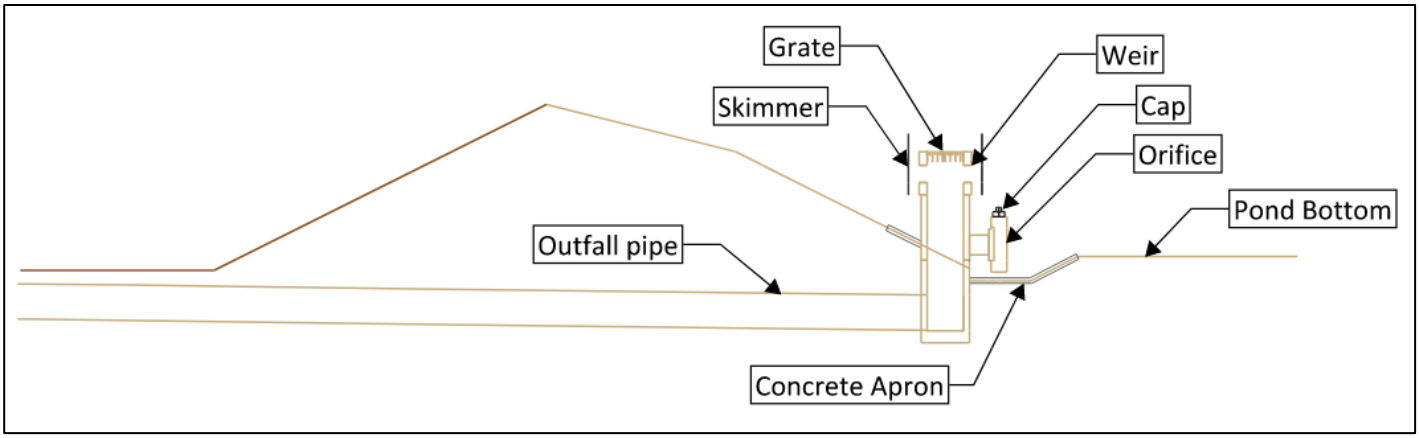

Figure 4-10. Typical Dry Detention Pond without Filtration Control Structure – Section view (Not to scale) Return to List of Figures

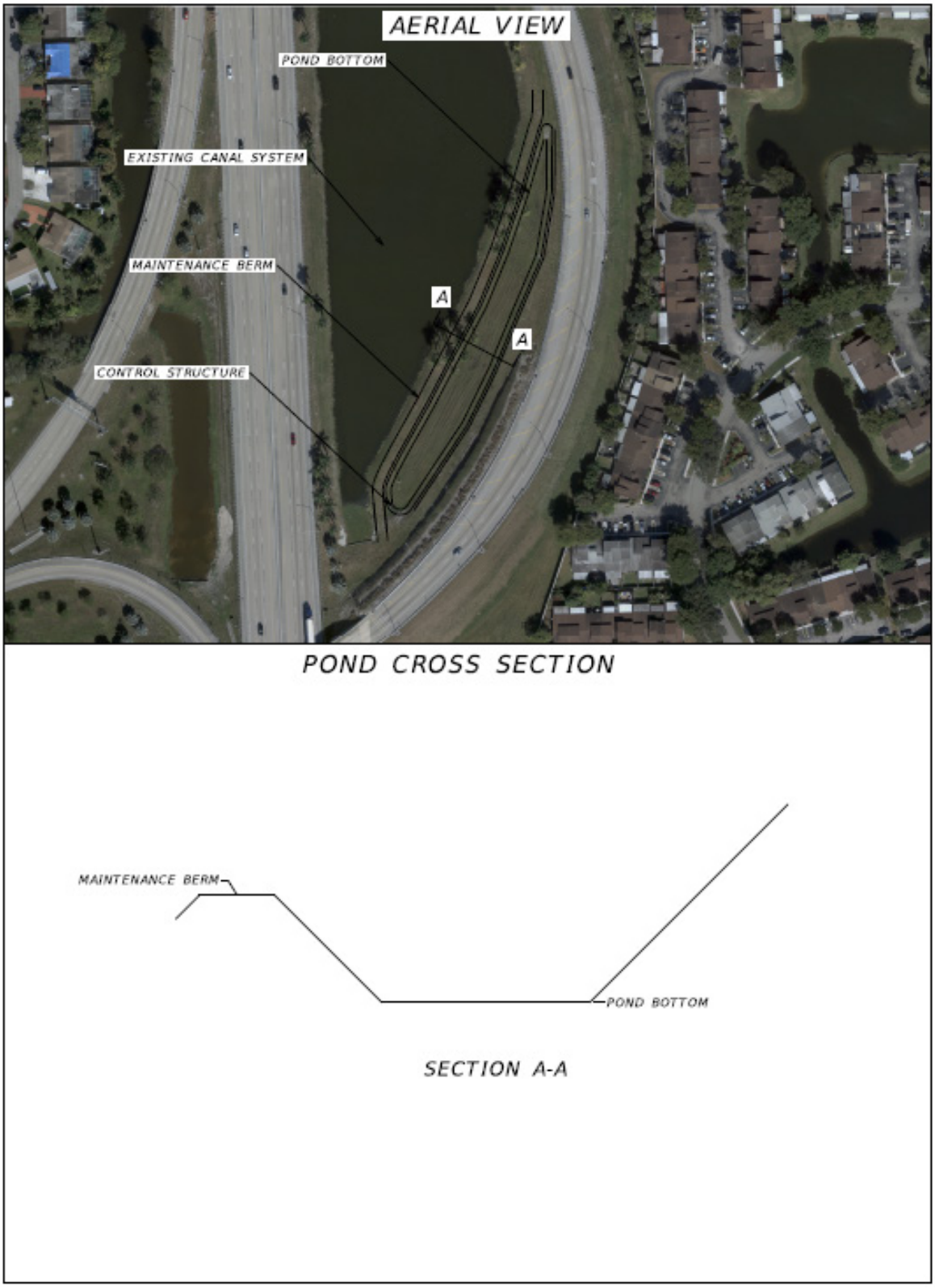

Figure 4-11. Typical Dry Detention Pond without Filtration Return to List of Figures

Figure 4-12. Typical Dry Detention Ponds without Filtration in Good Condition

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Dry Detention Pond without Filtration Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
Overall Appearance	Good A-33 A-34 A-46	✓ Side slopes are well maintained, mowed regularly ✓ Free of trash, debris, and graffiti in and around pond ✓ Signage in place	✓ None
	Fair A-18 A-20 A-25	✓ Small amounts of trash or debris in and around the pond	✓ Proactive maintenance recommended ○ Remove trash and debris
	Poor A-29 A-39 A-48	✓ Side slopes are not being routinely maintained ✓ Excessive trash and debris present in and around pond ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Other maintenance as needed to correct deficiencies
Fence	Good A-10 A-60	✓ Fence and lock in like-new condition ✓ Fence is closed and locked ✓ No holes or sagging of fence fabric ✓ No gaps in gate or fence greater than 6 inches ✓ Gate is closed and locked ✓ All fence posts present and intact ✓ No detached fence fabric ✓ All barbed wire strands on top of fence are in place, continuous, and unbroken	✓ None
	Fair A-11	✓ Gate loose ✓ Fence sagging, but amount of sagging is less than one-third of original height ✓ Holes in fence fabric, but individual holes less than 2 square feet ✓ Non-consecutive fence post(s) missing or broken ✓ Non-consecutive post(s) have fabric not attached ✓ At least one continuous strand of barbed wire is in place on top of fence, if originally installed and part of original design	✓ Proactive maintenance recommended ○ Repair cut and sagging fence sections ○ Replace missing or broken fence posts ○ Reattach fabric ○ Replace broken strand(s) of barbed wire ○ Repair fence to design condition

Dry Detention Pond without Filtration Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Fence	Poor A-37 A-54 A-56	✓ Gate open, lock missing, broken, or damaged ✓ Top of fence sagging more than one-third its original height ✓ Gap(s) in gate or fence greater than 6 inches ✓ Holes in fence fabric greater than 2 square feet ✓ Two consecutive fence post(s) missing or broken ✓ Two consecutive fence post(s) have fabric not attached ✓ Less than on continuous strand of barbed wire on top of fence, if part of original design or installation ✓ Any other condition not meeting MRP standards	✓ Secure immediately ✓ Repair or replace lock ✓ Repair cut and sagging fence sections ✓ Repair gate or fence gaps ✓ Replace missing or broken fence posts ✓ Reattach fabric ✓ Replace broken strand(s) of barbed wire ✓ Other maintenance as needed to meet MRP standards
Hydraulic Recovery Condition			
Overall Recovery	Good A-26 A-28 A-35	✓ System appears to recover its treatment volume within the regulatory timeframe	✓ None
	Fair A-47	✓ System appears to be recovering more slowly than required ✓ Bottom of pond appears slightly wet or has small volume of water remaining during periods of little to no rainfall	✓ Proactive maintenance recommended ○ Check control structure for blockages ○ Evaluate need to disc or scarify pond bottom
	Poor A-39 A-48 A-50	✓ System appears to not recover within the regulatory timeframe ✓ Bottom of pond has obvious standing water even in periods of little to no rainfall	✓ Identify and correct problems preventing pond from recovering ✓ Disc or scarify pond bottom ✓ Other maintenance as needed to correct deficiencies
Sedimentation	Good A-18 A-32 A-34	✓ No evidence of sedimentation problem observed	✓ None
	Fair A-29 A-35	✓ Sediment and/or vegetation at inlet pipes indicative of sedimentation of pond bottom at inlet pipes, but pond is functioning as designed	✓ Proactive maintenance recommended ○ Clear sedimentation/ vegetation at pipe opening ○ Find/eliminate source of sedimentation if possible

Dry Detention Pond without Filtration Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Sedimentation	Poor A-7 A-8 A-33	✓ Sediment accumulation is evident at or near the inflow pipes throughout pond, with accumulation inside and around pipes indicating excessive sedimentation on pond bottom and reduced pool volume. ✓ If pipes are below water surface and not visible, excessive emergent vegetation may be an indication of sedimentation	✓ Remove sediment and re-establish pond bottom to original design grade.
Vegetation Condition			
	Good A-26 A-34 A-46	✓ The vegetative cover is in good condition and well maintained ✓ Pond side slopes mowed regularly ✓ No nuisance or invasive species present ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair A-8 A-13 A-25	✓ The vegetative cover is in fair condition or requires minor attention ✓ Side slopes need to be mowed ✓ Some invasive or nuisance species are present, but coverage is less than 25% of area ✓ Some vegetation around structures, but pond is functioning as designed	✓ Proactive maintenance recommended ○ Mow side slopes ○ Harvest vegetation
	Poor A-6 A-39 A-48	✓ The vegetative cover is in poor condition and/or not being maintained ✓ Woody vegetation growing in berms ✓ Vegetation and the side slopes have become destabilized ✓ Large portions of side slopes have little to no vegetative cover ✓ Invasive and nuisance species are present and covering more than 25% of area ✓ Excessive vegetation present in and around overflow structure	✓ Remove invasive and nuisance vegetation ✓ Remove vegetation from around structural controls ✓ Re-establish vegetation where needed ✓ Stabilize side slopes ✓ Other maintenance as needed to correct deficiencies
Structural Condition			
Control Structure	Good A-30 A-31 A-32	✓ Like new and functioning as designed ✓ Structure intact with no visible damage ✓ Accumulation of debris or sediment is less than 25% of the depth of the chamber ✓ Grates present and properly placed with little to no damage ✓ Safety chain present	✓ None

Dry Detention Pond without Filtration Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Control Structure	Fair	✓ Accumulation of debris/sediment is more than 25% but less than 50% of the chamber depth ✓ Safety chain missing ✓ Minor damage to structure or grates ✓ Sediment/debris accumulation under skimmer bottom blocks 25% to 50% of flow area under skimmer	✓ Proactive maintenance recommended ○ Replace safety chain ○ Remove sediment ○ Remove skimmer blockages
	Poor A-33 APP-3	✓ Not functioning as designed ✓ Collapsed or severely damaged structure ✓ Excessive trash and debris accumulation, more than 50% of chamber depth ✓ Grate is missing or significantly damaged ✓ Excessive leakage at joints ✓ Sediment/debris accumulation under skimmer bottom blocks more than 50% of flow area under skimmer	✓ Repair structure ✓ Remove trash and debris ✓ Replace grates ✓ Remove sediment under skimmer to design clearance ✓ Other maintenance as needed to correct deficiencies
Orifice	Good APP-4	✓ Orifice is undamaged ✓ Anti-clog device present and undamaged ✓ No obstructions	✓ None
	Fair APP-5	✓ Minor obstruction or damage but still allowing for full recovery ✓ Anti-clog device present with minor damage not affecting function	✓ Proactive maintenance recommended ○ Repair damage
	Poor A-33	✓ Orifice blocked or clogged ✓ Anti-clog device missing or damaged	✓ Unclog orifice ✓ Replace anti-clog device ✓ Other maintenance as needed to correct deficiencies
Weir	Good	✓ No obstructions or debris preventing flow ✓ Structurally sound	✓ None
	Fair	✓ Minor damage to structure ✓ Less than 25% of weir opening is blocked and pond recovery rate is acceptable	✓ Proactive maintenance recommended ○ Remove weir blockages ○ Repair damage
	Poor	✓ Debris, vegetation, or other obstruction is present and inhibiting flow over the weir ✓ More than 25% of weir opening is blocked	✓ Remove weir blockages ✓ Other maintenance as needed to correct deficiencies

Dry Detention Pond without Filtration Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Skimmer	Good A-30 A-46 A-47	✓ Like new with little or no deterioration ✓ Structurally sound and functioning as designed. Minor damage e.g., cracks, is acceptable provided function is maintained.	✓ None
	Fair	✓ May have minor damage and some deterioration, but structurally sound and functionally adequate	✓ Proactive maintenance recommended ○ Repair damage to skimmer
	Poor A-33	✓ Missing, detached, or collapsed ✓ Not functioning as designed	✓ Replace skimmer ✓ Other maintenance as needed to correct deficiencies
Inflow and Outflow Pipes	Good A-6 A-41	✓ Like new with little or no deterioration and functioning as designed ✓ Up to 25% of pipe opening is obstructed but providing adequate conveyance	✓ None
	Fair	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function	✓ Proactive maintenance recommended ○ Remove pipe obstructions ○ Repair structural damage ○ Repair or replace flap gates
	Poor A-7 A-8 A-44	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as intended	✓ Repair or replace damaged components ✓ Other maintenance as needed to correct deficiencies

Dry Detention Pond without Filtration Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Erosion Condition			
	Good A-25 A-26 A-27	✓ Some surficial erosion with minor rills present ✓ Vegetation on slope generally intact with minimal bare areas, low erosion potential, stable slope ✓ Minimal to no undermining is apparent	✓ None
	Fair A-18 A-28	✓ Minor erosion on pond slopes or berms ✓ Minor undermining around headwall, mitered end sections, or control structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion o Repair undermining
	Poor A-29 A-35 A-36	✓ Substantial erosion compromising slope and/or berm stability ✓ Large rills and gullies present along slope ✓ Large areas of vegetation on slope have become dislodged and slope is unstable ✓ Undermining of structures is evident	✓ Stabilize slopes and berm ✓ Re-establish vegetation ✓ Other maintenance as needed to correct deficiencies

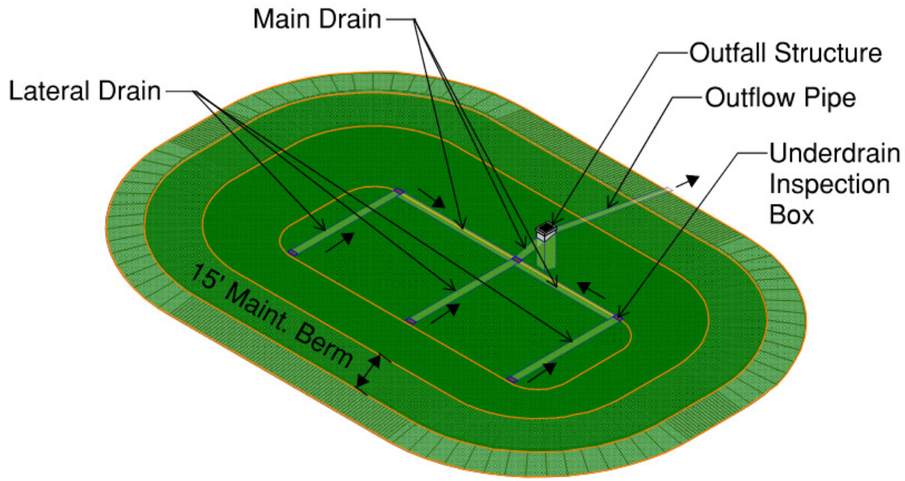
4.1.1.3 Dry Detention with Underdrain or Side Bank Filtration

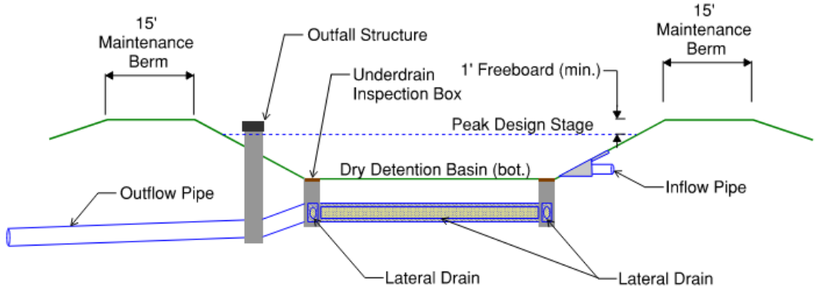
Dry detention systems with underdrains consist of a dry basin underlain with perforated drainage pipe that collects and conveys stormwater following percolation from the basin through permeable soils or filter media. Underdrain systems are intended to control the groundwater table elevation over the entire area of the treatment basin and provide for the drawdown of the treatment volume.

Underdrain systems typically discharge filtered stormwater to a control structure through a lateral connection (Figure 4-13). Cleanout ports for maintenance are provided at the inflow and terminus of an underdrain system. Cleanouts may also be provided at intermediate locations throughout the system and at bends in the perforated pipe or other locations where clogging is more likely to occur.

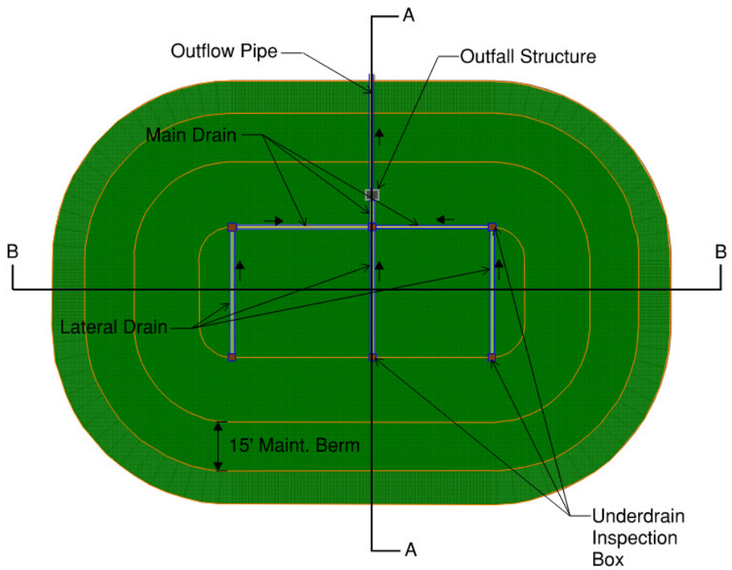
Dry detention systems with side bank filters (Figure 4-14) typically have side bank underdrain systems that are situated within the slopes of the pond berm instead of beneath the pond bottom. The pond bottom in these systems typically slopes towards the side bank underdrain system to reduce saturated soils conditions below the pond bottom.

Typical details for cleanout ports and perforated pipe are shown in Figure 4-15 and Figure 4-16, respectively. An aerial view of a dry pond with filtration is shown in Figure 4-17, and photos of typical dry detention ponds with filtration in good condition are shown in Figure 4-18.

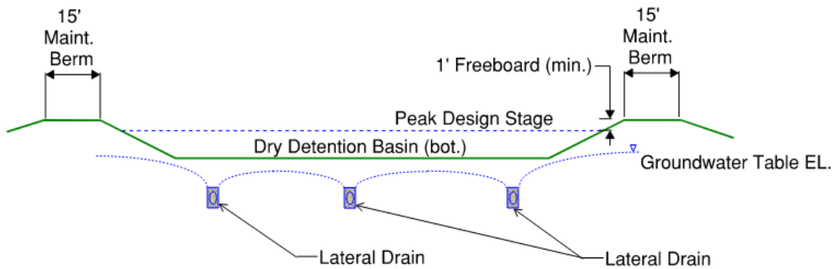




SECTION A-A

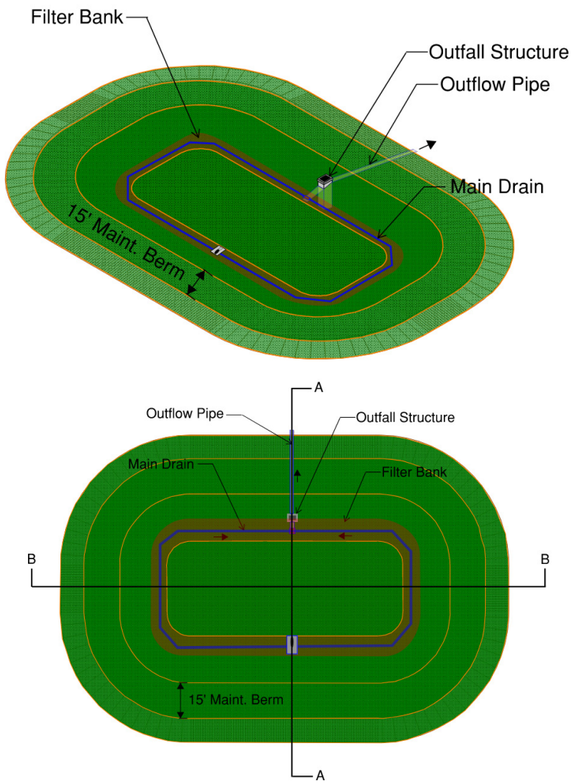


PLAN VIEW

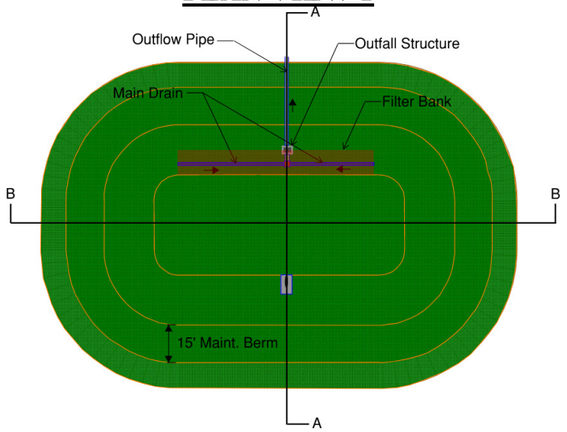


SECTION B-B

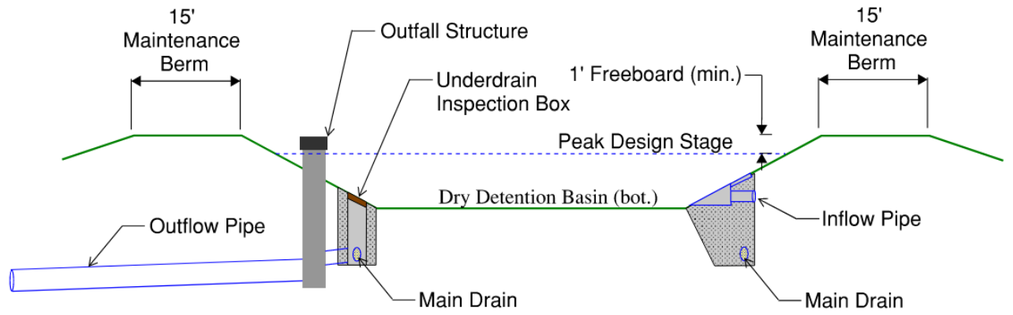
Figure 4-13. Typical Dry Detention Pond with Underdrain Schematic (Not to Scale) *Return to List of Figures*



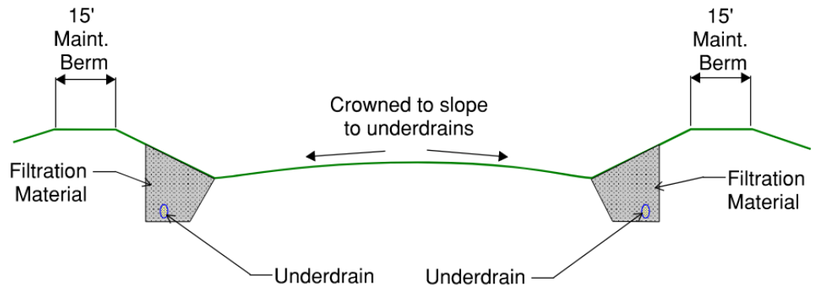
PLAN VIEW 1



PLAN VIEW 1A



SECTION A-A



SECTION B-B

Figure 4-14. Typical Dry Detention Pond with Side Bank Filtration System Schematic (Not to scale) Return to List of Figures

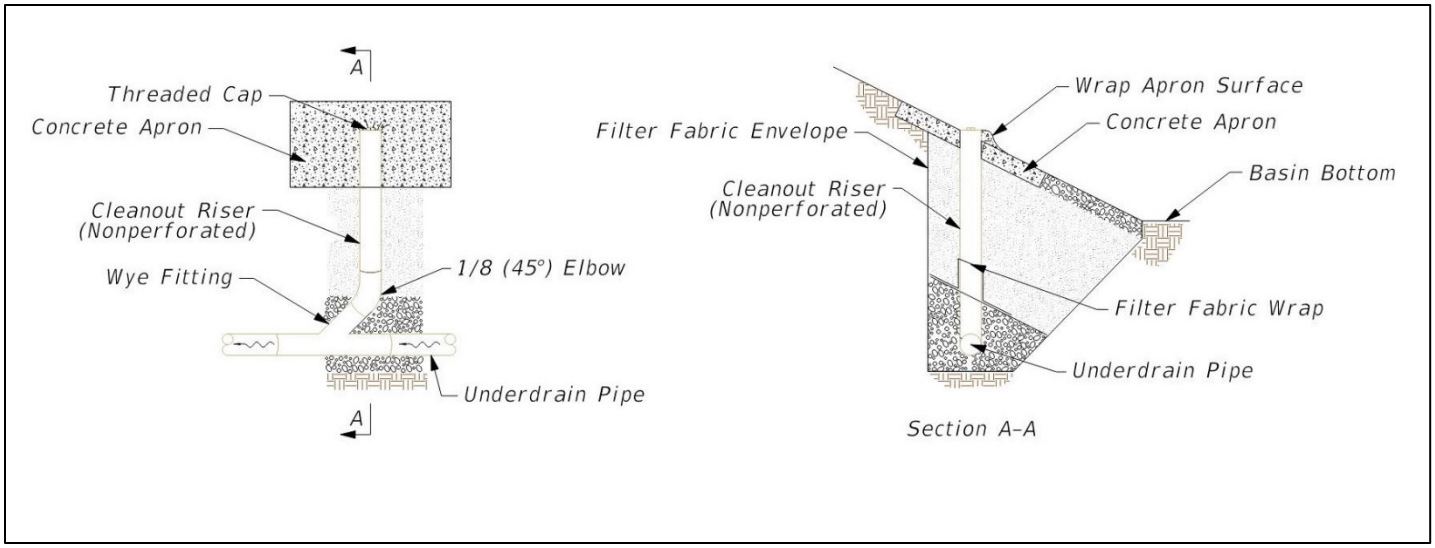


Figure 4-15. Typical Cleanout Detail (Not to scale) Return to List of Figures

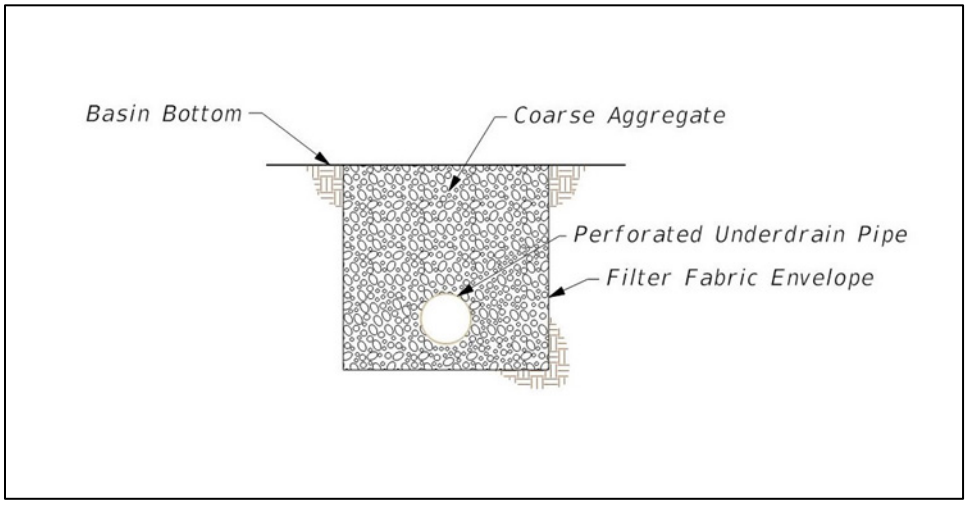


Figure 4-16. Typical Perforated Pipe Underdrain Detail (Not to scale) Return to List of Figures

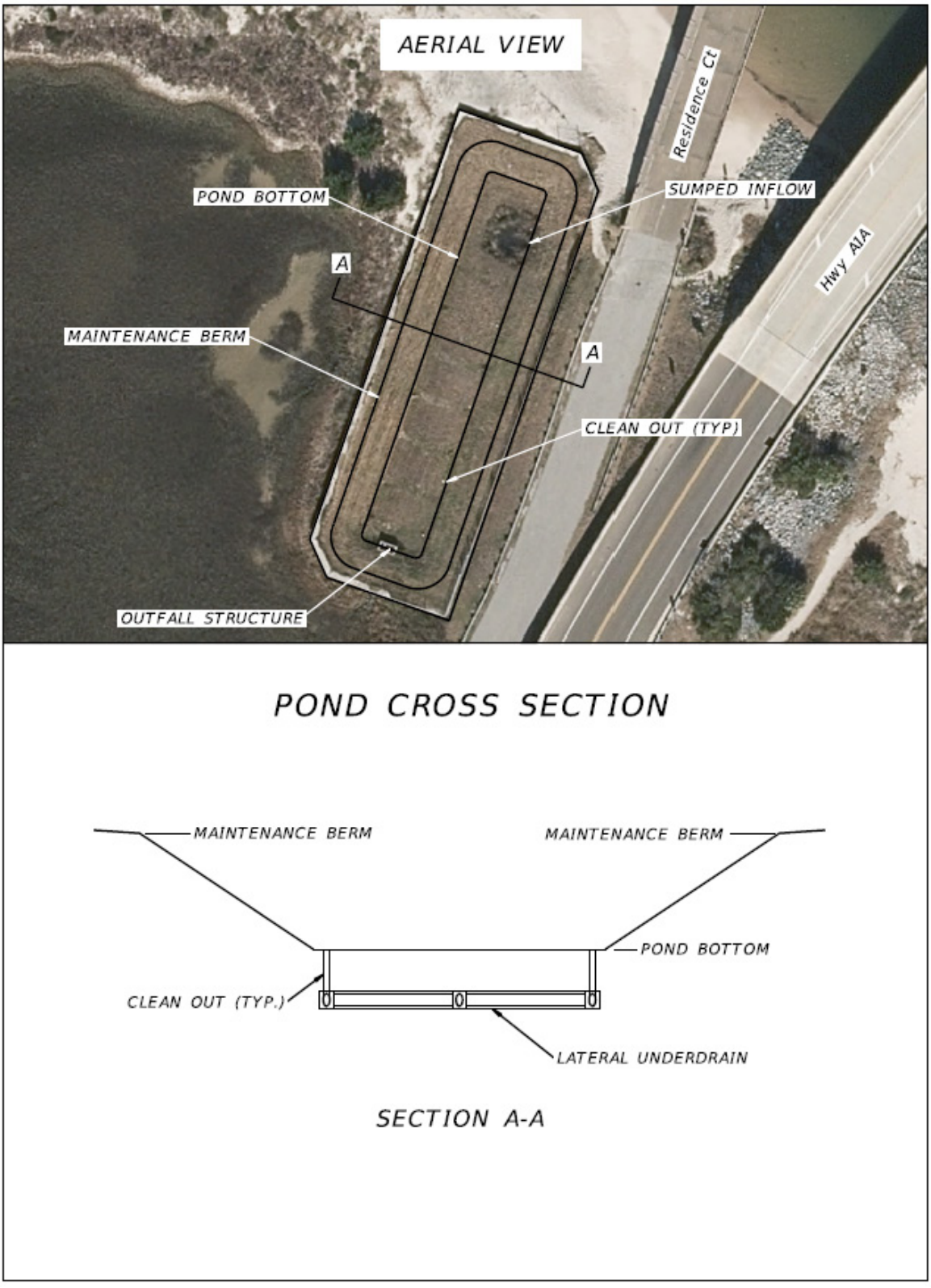


Figure 4-17. Typical Dry Detention Pond with Filtration Return to List of Figures

Figure 4-18. Typical Dry Detention Pond with Filtration in Good Condition Return to List of Figures

Dry Detention Pond with Filtration (Underdrain or Side Bank Filter) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
Overall Appearance	Good A-26 A-33 A-34	✓ Side slopes are well maintained, mowed regularly ✓ Free of trash, debris, and graffiti in and around pond ✓ Signage in place	✓ None
	Fair A-7 A-18 A-20	✓ Small amounts of trash or debris in and around the pond	✓ Proactive maintenance recommended o Remove trash and debris
	Poor A-21 A-36 A-50	✓ Side slopes are not being routinely maintained ✓ Excessive trash and debris present in and around pond ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Other maintenance as needed to correct deficiencies
Fence	Good A-10 A-60	✓ Fence and lock in like-new condition ✓ Fence is closed and locked ✓ No holes or sagging of fence fabric ✓ No gaps in gate or fence greater than 6 inches ✓ Gate is closed and locked ✓ All fence posts present and intact ✓ No detached fence fabric ✓ All barbed wire strands on top of fence are in place, continuous, and unbroken	✓ None
	Fair A-11	✓ Gate loose ✓ Fence sagging, but amount of sagging is less than one-third of original height ✓ Holes in fence fabric, but individual holes less than 2 square feet ✓ Non-consecutive fence post(s) missing or broken ✓ Non-consecutive post(s) have fabric not attached ✓ At least one continuous strand of barbed wire is in place on top of fence, if originally installed and part of original design	✓ Proactive maintenance recommended o Repair cut and sagging fence sections o Replace missing or broken fence posts o Reattach fabric o Replace broken strand(s) of barbed wire o Repair fence to design condition

Dry Detention Pond with Filtration (Underdrain or Side Bank Filter) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Fence	Poor A-12 A-38 A-55	✓ Gate open, lock missing, broken, or damaged ✓ Top of fence sagging more than one-third its original height ✓ Gap(s) in gate or fence greater than 6 inches ✓ Holes in fence fabric greater than 2 square feet ✓ Two consecutive fence post(s) missing or broken ✓ Two consecutive fence post(s) have fabric not attached ✓ Less than on continuous strand of barbed wire on top of fence, if part of original design or installation ✓ Any other condition not meeting MRP standards	✓ Secure immediately ✓ Repair or replace lock ✓ Repair cut and sagging fence sections ✓ Repair gate or fence gaps ✓ Replace missing or broken fence posts ✓ Reattach fabric ✓ Replace broken strand(s) of barbed wire ✓ Other maintenance as needed to meet MRP standards
Hydraulic Recovery Condition			
Overall Recovery	Good A-29 A-34 A-36	✓ System appears to recover its treatment volume within the regulatory timeframe	✓ None
	Fair A-47	✓ System appears to be recovering more slowly than required ✓ Bottom of pond appears slightly wet or has small volume of water remaining during periods of little to no rainfall	✓ Proactive maintenance recommended o Check control structure for blockages o Evaluate need to disc or scarify pond bottom
	Poor A-39 A-48 A-50	✓ System appears to not recover within the regulatory timeframe ✓ Bottom of pond has obvious standing water even in periods of little to no rainfall ✓ Wetland type vegetation observed growing within pond bottom.	✓ Identify and correct problems preventing pond from recovering ✓ Disc or scarify pond bottom ✓ Other maintenance as needed to correct deficiencies
Sedimentation	Good A-25 A-28 A-31	✓ No evidence of sedimentation problem observed	✓ None
	Fair A-29 A-35	✓ Sediment and/or vegetation at inlet pipes indicative of sedimentation of pond bottom at inlet pipes, but pond is functioning as designed	✓ Proactive maintenance recommended o Clear sedimentation/ vegetation at pipe opening o Find/eliminate source of sedimentation if possible

Dry Detention Pond with Filtration (Underdrain or Side Bank Filter) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Sedimentation	Poor A-7 A-8 A-33	✓ Sediment accumulation is evident at or near the inflow pipes throughout pond, with accumulation inside and around pipes indicating excessive sedimentation on pond bottom and reduced pool volume. ✓ If pipes are below water surface and not visible, excessive emergent vegetation may be an indication of sedimentation	✓ Remove sediment and re-establish pond bottom to original design grade.
Vegetation Condition			
	Good A-26 A-31 A-34	✓ The vegetative cover is in good condition and well maintained ✓ Pond side slopes mowed regularly ✓ No nuisance or invasive species present ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair A-8 A-18 A-25	✓ The vegetative cover is in fair condition or requires minor attention ✓ Side slopes need to be mowed ✓ Some invasive or nuisance species are present, but coverage is less than 25% of area ✓ Some vegetation around structures, but pond is functioning as designed	✓ Proactive maintenance recommended o Mow side slopes o Harvest vegetation
	Poor A-28 A-36 A-50	✓ The vegetative cover is in poor condition and/or not being maintained ✓ Woody vegetation growing in berms ✓ Vegetation and the side slopes have become destabilized ✓ Large portions of side slopes have little to no vegetative cover ✓ Invasive and nuisance species are present and covering more than 25% of area ✓ Excessive vegetation present in and around overflow structure	✓ Remove invasive and nuisance vegetation ✓ Remove vegetation from around structural controls ✓ Re-establish vegetation where needed ✓ Stabilize side slopes ✓ Other maintenance as needed to correct deficiencies
Structural Condition			
Control Structure	Good A-27 A-46 A-47	✓ Like new and functioning as designed ✓ Structure intact with no visible damage ✓ Accumulation of debris or sediment is less than 25% of the depth of the chamber ✓ Grates present and properly placed with little to no damage ✓ Safety chain present	✓ None

Dry Detention Pond with Filtration (Underdrain or Side Bank Filter) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Control Structure	Fair	✓ Accumulation of debris/sediment is more than 25% but less than 50% of the chamber depth ✓ Safety chain missing ✓ Minor damage to structure or grates ✓ Sediment/debris accumulation under skimmer bottom blocks 25 to 50% of flow area under skimmer	✓ Proactive maintenance recommended o Replace safety chain o Remove sediment o Remove skimmer blockages
	Poor A-33	✓ Not functioning as designed ✓ Collapsed or severely damaged structure ✓ Excessive trash and debris accumulation, more than 50% of chamber depth ✓ Grates missing or significantly damaged ✓ Excessive leakage at joints ✓ Sediment/debris accumulation under skimmer bottom blocks more than 50% of flow area under skimmer	✓ Repair structure ✓ Remove trash and debris ✓ Replace grates ✓ Remove sediment under skimmer to design clearance ✓ Other maintenance as needed to correct deficiencies
Orifice	Good	✓ Orifice is undamaged ✓ Anti-clog device present and undamaged ✓ No obstructions	✓ None
	Fair	✓ Minor obstruction or damage but still allowing for full recovery ✓ Anti-clog device present with minor damage not affecting function	✓ Proactive maintenance recommended o Repair damage
	Poor A-33	✓ Orifice blocked or clogged ✓ Anti-clog device missing or damaged	✓ Unclog orifice ✓ Replace anti-clog device ✓ Other maintenance as needed to correct deficiencies
Weir	Good	✓ No obstructions or debris preventing flow ✓ Structurally sound	✓ None
	Fair	✓ Minor damage to structure ✓ Less than 25% of weir opening is blocked and pond recovery rate is acceptable	✓ Proactive maintenance recommended o Remove weir blockages o Repair damage
	Poor	✓ Debris, vegetation, or other obstruction is present and inhibiting flow over the weir ✓ More than 25% of weir opening is blocked	✓ Remove weir blockages ✓ Other maintenance as needed to correct deficiencies

Dry Detention Pond with Filtration (Underdrain or Side Bank Filter) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Skimmer	Good A-46 A-47	✓ Like new with little or no deterioration ✓ Structurally sound and functioning as designed. Minor damage, e.g., cracks, is acceptable provided function is maintained.	✓ None
	Fair	✓ May have minor damage and some deterioration, but structurally sound and functionally adequate	✓ Proactive maintenance recommended ○ Repair damage
	Poor A-33	✓ Missing, detached, or collapsed ✓ Not functioning as designed	✓ Replace skimmer ✓ Other maintenance as needed to correct deficiencies
Inflow and Outflow Pipes	Good A-6 A-43	✓ Like new with little or no deterioration and functioning as designed ✓ Up to 25% of pipe opening is obstructed but providing adequate conveyance	✓ None
	Fair	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function	✓ Proactive maintenance recommended ○ Remove pipe obstructions ○ Repair structural damage ○ Repair or replace flap gates
	Poor A-7 A-8 A-45	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as intended	✓ Repair or replace damaged components ✓ Other maintenance as needed to correct deficiencies
Cleanout Ports	Good	✓ Groundwater flowing freely to the control structure. System exhibiting good hydraulic performance. ✓ Port free of damage, joints intact.	✓ None
	Fair B-2	✓ Restricted groundwater outflow to the control structure due to partial blockage. ✓ Minor damage to port and/or joints not affecting performance.	✓ Proactive maintenance recommended ○ Remove blockages ○ Repair damage

Dry Detention Pond with Filtration (Underdrain or Side Bank Filter) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Cleanout Ports	Poor	✓ Groundwater flow to control structure is completely blocked. ✓ Port damaged and preventing free flow to the control structure.	✓ Remove obstructions to restore flow to control structure. ✓ Repair/replace cleanout port
Erosion Condition			
	Good A-26 A-34 A-50	✓ Some surficial erosion with minor rills present ✓ Vegetation on slope generally intact with minimal bare areas, low erosion potential, stable slope ✓ Minimal to no undermining is apparent	✓ None
	Fair A-18 A-28	✓ Minor erosion on pond slopes or berms ✓ Minor undermining around headwall, mitered end sections, or control structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion o Repair undermining
	Poor A-29 A-35 A-36	✓ Substantial erosion compromising slope and/or berm stability ✓ Large rills and gullies present along slope ✓ Large areas of vegetation on slope have become dislodged and slope is unstable ✓ Undermining of structures is evident	✓ Stabilize slopes and berm ✓ Re-establish vegetation ✓ Other maintenance as needed to correct deficiencies

4.1.2 Retention Ponds

Dry retention systems are storage areas designed to temporarily store a defined quantity of stormwater runoff, gradually recovering its storage capacity by infiltrating stormwater through the pond bottom to the surficial groundwater aquifer and evaporating water to the atmosphere (Figure 4-19). After drawdown of the stored runoff is completed, the basin does not hold any water, thus the system is dry under normal conditions.

An online dry retention system will typically have the following components:

1. An emergency overflow structure that does not include a drawdown device (i.e., orifice or weir notch) since the treatment volume should be recovered through percolation through the pond bottom (Figure 4-20 and Figure 4-21).
2. The emergency overflow structure may have a broad, usually rectangular, weir opening that is above the pond bottom elevation. This weir opening is generally referred to as the overflow weir and allows for discharge of stormwater runoff during major rainfall events. The emergency overflow structure or emergency spillway usually includes an oil and trash skimmer that helps prevent the discharge of accumulated floatables and oils.
3. A grate located at the top of the emergency overflow structure serves as the emergency outfall for a dry retention system. If an emergency overflow structure is not provided, an emergency spillway will be installed in the pond bank to provide flood protection.

The treatment volume is the quantity of stormwater runoff that is permitted to percolate through the pond bottom and into the shallow groundwater aquifer. Dry retention systems are required to drawdown the entire treatment volume within the regulatory timeframe, typically 72 hours. However, some designs may have longer recovery periods in accordance with regulatory criteria. An aerial view of a dry retention system is shown in Figure 4-22, and photos of typical dry retention systems in good condition are shown in Figure 4-23.

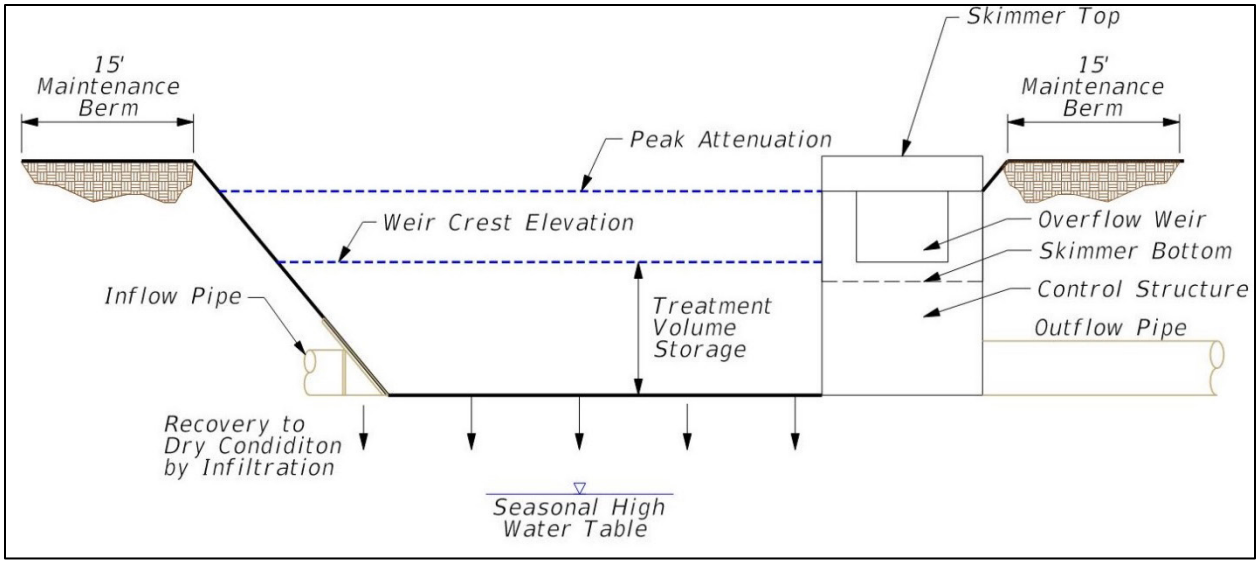


Figure 4-19. Typical Dry Retention System Schematic (Not to scale) Return to List of Figures

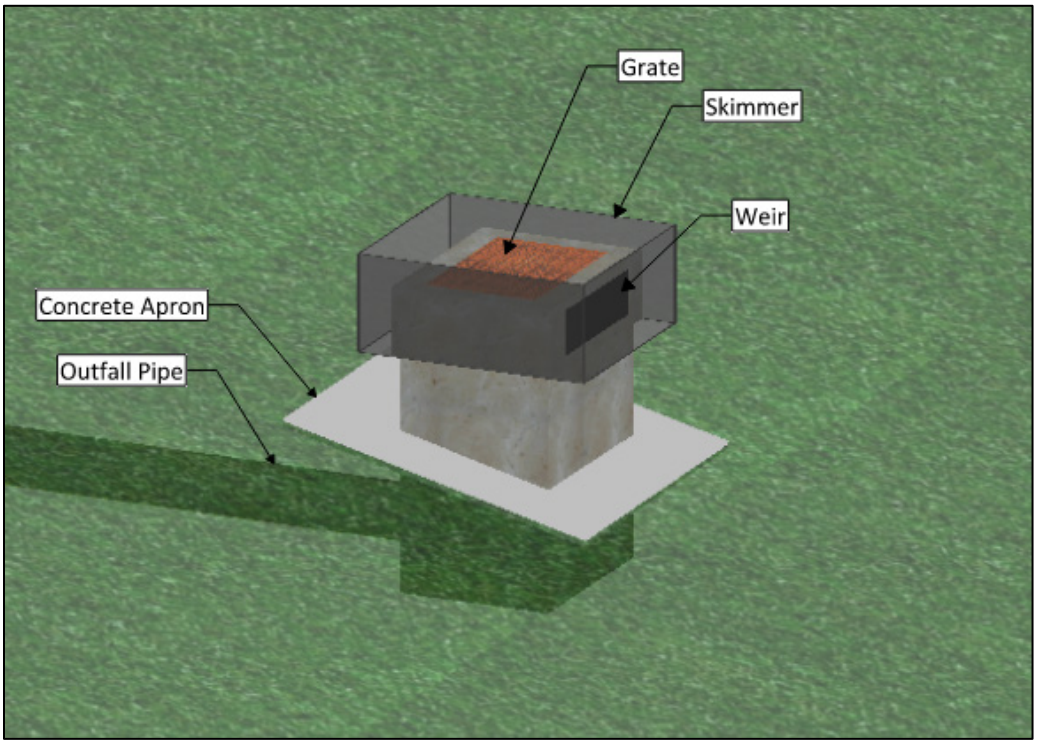


Figure 4-20. Typical Dry Retention Pond Control Structure – Isometric View (Not to scale)
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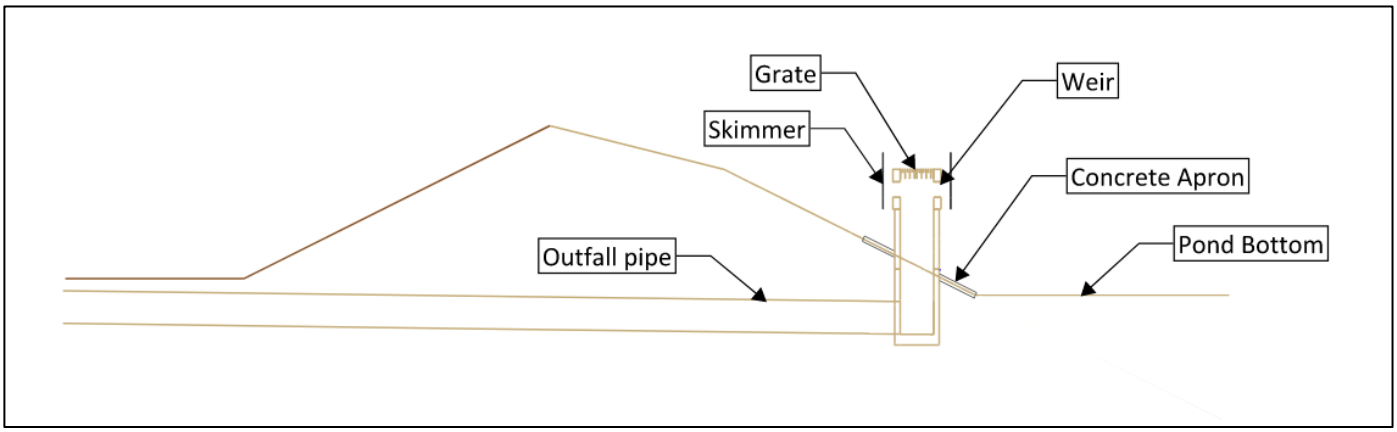

Figure 4-21. Typical Dry Retention Pond Control Structure – Section view (Not to scale)

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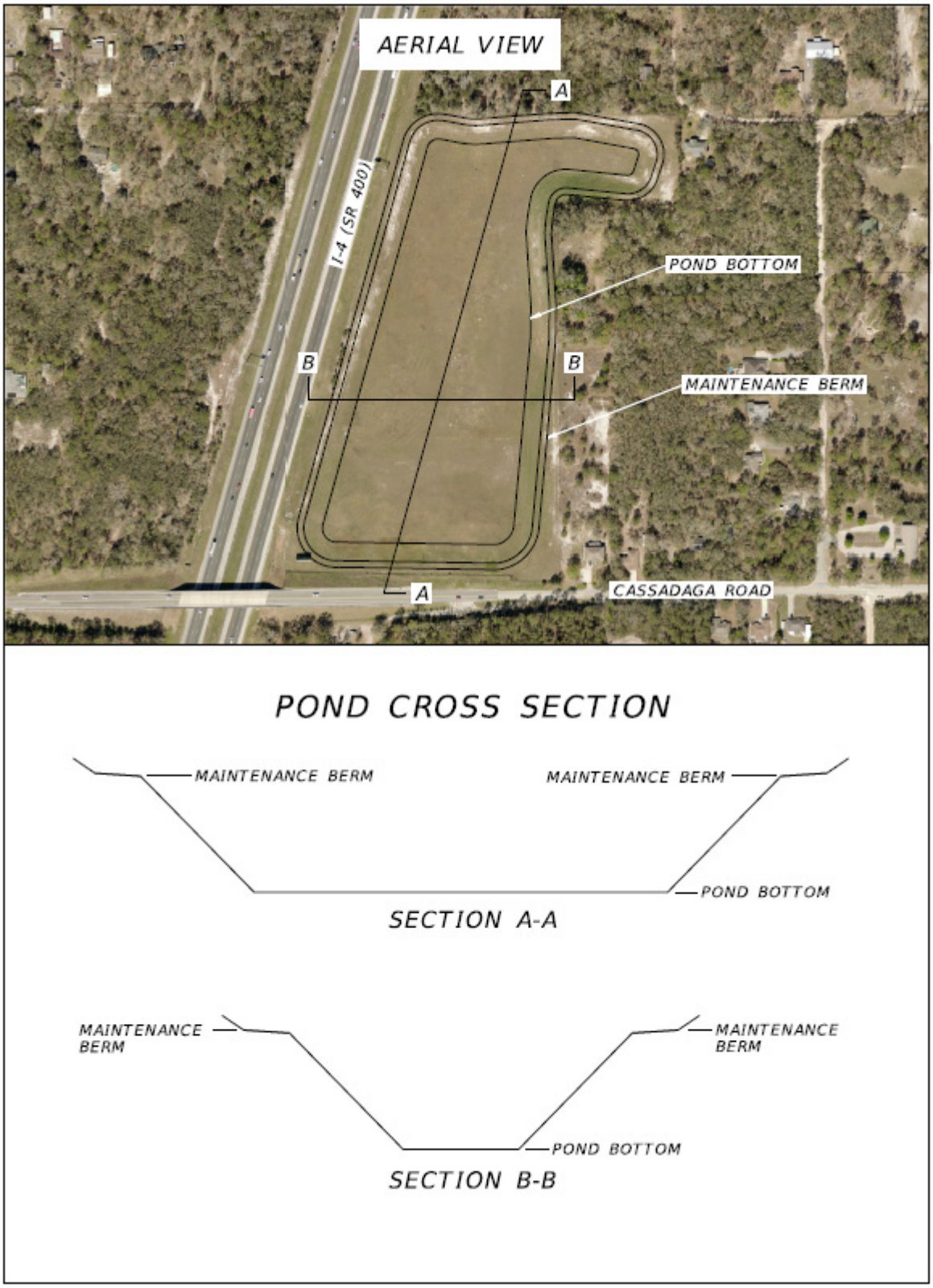


Figure 4-22. Typical Dry Retention Pond Return to List of Figures

Figure 4-23. Typical Dry Retention Ponds in Good Condition Return to List of Figures

Dry Retention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
Overall Appearance	Good A-27 A-31 A-32	✓ Side slopes are well maintained, mowed regularly ✓ Free of trash, debris, and graffiti in and around pond ✓ Signage in place	✓ None
	Fair A-18 A-20 A-25	✓ Small amounts of trash or debris in and around the pond	✓ Proactive maintenance recommended ○ Remove trash and debris
	Poor A-35 A-49 A-58	✓ Side slopes are not being routinely maintained ✓ Excessive trash and debris present in and around pond ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Other maintenance as needed to correct deficiencies
Fence	Good A-10 A-60	✓ Fence and lock in like-new condition ✓ Fence is closed and locked ✓ No holes or sagging of fence fabric ✓ No gaps in gate or fence greater than 6 inches ✓ Gate is closed and locked ✓ All fence posts present and intact ✓ No detached fence fabric ✓ All barbed wire strands on top of fence are in place, continuous, and unbroken	✓ None
	Fair A-11	✓ Gate loose ✓ Fence sagging, but amount of sagging is less than one-third of original height ✓ Holes in fence fabric, but individual holes less than 2 square feet ✓ Non-consecutive fence post(s) missing or broken ✓ Non-consecutive post(s) have fabric not attached ✓ At least one continuous strand of barbed wire is in place on top of fence, if originally installed and part of original design	✓ Proactive maintenance recommended ○ Repair cut and sagging fence sections ○ Replace missing or broken fence posts ○ Reattach fabric ○ Replace broken strand(s) of barbed wire ○ Repair fence to design condition

Dry Retention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Fence	Poor A-12 A-13 A-53	✓ Gate open, lock missing, broken, or damaged ✓ Top of fence sagging more than one-third its original height ✓ Gap(s) in gate or fence greater than 6 inches ✓ Holes in fence fabric greater than 2 square feet ✓ Two consecutive fence post(s) missing or broken ✓ Two consecutive fence post(s) have fabric not attached ✓ Less than on continuous strand of barbed wire on top of fence, if part of original design or installation ✓ Any other condition not meeting MRP standards	✓ Secure immediately ✓ Repair or replace lock ✓ Repair cut and sagging fence sections ✓ Repair gate or fence gaps ✓ Replace missing or broken fence posts ✓ Reattach fabric ✓ Replace broken strand(s) of barbed wire ✓ Other maintenance as needed to meet MRP standards
Hydraulic Recovery Condition			
Overall Recovery	Good A-18 A-25 A-27	✓ System appears to recover its treatment volume within the regulatory timeframe	✓ None
	Fair A-47	✓ System appears to be recovering more slowly than required ✓ Bottom of pond appears slightly wet or has small volume of water remaining during periods of little to no rainfall	✓ Proactive maintenance recommended ○ Check control structure for blockages ○ Evaluate need to disc or scarify pond bottom
	Poor A-48 A-49 A-50	✓ System appears to not recover within the regulatory timeframe ✓ Bottom of pond has obvious standing water even in periods of little to no rainfall	✓ Identify and correct problems preventing pond from recovering ✓ Disc or scarify pond bottom ✓ Other maintenance as needed to correct deficiencies
Sedimentation	Good A-26 A-27 A-31	✓ No evidence of sedimentation problem observed	✓ None

Dry Retention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Sedimentation	Fair A-29 A-35	✓ Sediment and/or vegetation at inlet pipes indicative of sedimentation of pond bottom at inlet pipes, but pond is functioning as designed	✓ Proactive maintenance recommended ○ Clear sedimentation/vegetation at pipe opening ○ Find/eliminate source of sedimentation if possible
	Poor A-7 A-8 A-33	✓ Sediment accumulation is evident at or near the inflow pipes throughout pond, with accumulation inside and around pipes indicating excessive sedimentation on pond bottom and reduced pool volume. ✓ If pipes are below water surface and not visible, excessive emergent vegetation may be an indication of sedimentation	✓ Remove sediment and re-establish pond bottom to original design grade.
Vegetation Condition			
	Good A-27 A-32 A-34	✓ The vegetative cover is in good condition and well maintained ✓ Pond side slopes mowed regularly ✓ No nuisance or invasive species present ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair A-18 A-20 A-30	✓ The vegetative cover is in fair condition or requires minor attention ✓ Side slopes need to be mowed ✓ Some invasive or nuisance species are present, but coverage is less than 25% of area ✓ Some vegetation around structures, but pond is functioning as designed	✓ Proactive maintenance recommended ○ Mow side slopes ○ Harvest vegetation
	Poor A-35 A-47 A-49	✓ The vegetative cover is in poor condition and/or not being maintained ✓ Woody vegetation growing in berms ✓ Vegetation and the side slopes have become destabilized ✓ Large portions of side slopes have little to no vegetative cover ✓ Invasive and nuisance species are present and covering more than 25% of area ✓ Excessive vegetation present in and around overflow structure	✓ Remove invasive and nuisance vegetation ✓ Remove vegetation from around structural controls ✓ Re-establish vegetation where needed ✓ Stabilize side slopes ✓ Other maintenance as needed to correct deficiencies

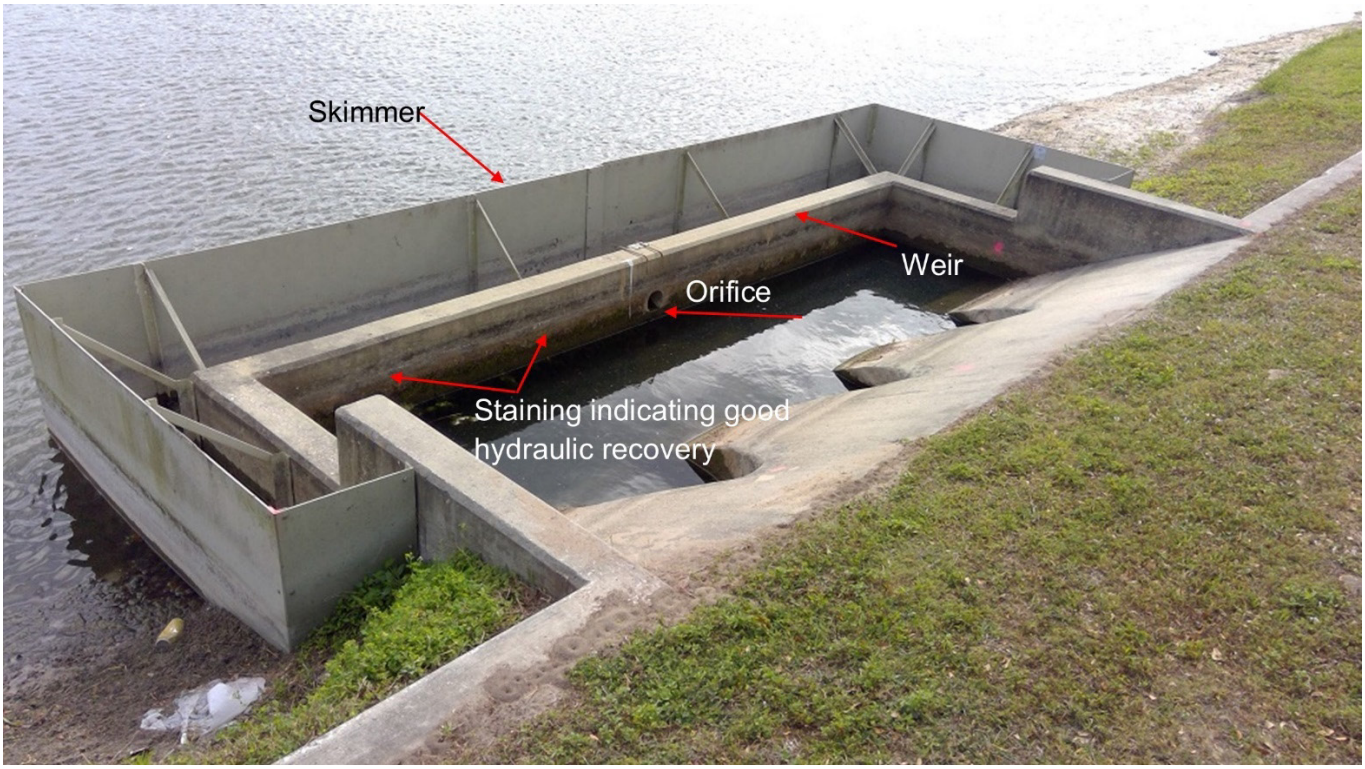
Dry Retention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Structural Condition			
Emergency Overflow Structure	Good A-27 A-31 A-32	✓ Like new and functioning as designed ✓ Structure intact with no visible damage ✓ Accumulation of debris or sediment is less than 25% of the depth of the chamber ✓ Grates present and properly placed with little to no damage ✓ Safety chain present	✓ None
	Fair	✓ Accumulation of debris or sediment is more than 25% but less than 50% of the chamber depth ✓ Safety chain missing ✓ Minor damage to structure or grates ✓ Sediment or debris accumulation under skimmer bottom blocks 25 to 50% of flow area under skimmer	✓ Proactive maintenance recommended o Replace safety chain o Remove sediment o Remove vegetation blocking skimmer o Repair damage
	Poor A-33	✓ Not functioning as designed ✓ Collapsed or severely damaged structure ✓ Excessive trash and debris accumulation, more than 50% of chamber depth ✓ Grates missing or significantly damaged ✓ Excessive leakage at joints ✓ Sediment or debris accumulation under skimmer bottom blocks more than 50% of flow area under skimmer	✓ Repair structure ✓ Remove trash and debris ✓ Replace grates ✓ Remove sediment under skimmer to design clearance ✓ Other maintenance as needed to correct deficiencies
Overflow Weir	Good APP-6	✓ No obstructions or debris preventing flow ✓ Structurally sound	✓ None
	Fair	✓ Minor damage to structure ✓ Less than 25% of weir opening is blocked and pond recovery rate is acceptable	✓ Proactive maintenance recommended o Remove weir blockages o Repair damage
	Poor	✓ Debris, vegetation, or other obstruction is present and inhibiting flow over the weir ✓ More than 25% of weir opening is blocked	✓ Remove weir blockages ✓ Other maintenance as needed to correct deficiencies

Dry Retention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Skimmer	Good A-30 A-31 A-32	✓ Like new with little or no deterioration ✓ Structurally sound and functioning as designed. Minor damage, e.g., cracks, is acceptable provided function is maintained.	✓ None
	Fair	✓ May have minor damage and some deterioration, but structurally sound and functionally adequate	✓ Proactive maintenance recommended ○ Repair damage to skimmer
	Poor A-33	✓ Missing, detached, or collapsed ✓ Not functioning as designed	✓ Replace skimmer ✓ Other maintenance as needed to correct deficiencies
Inflow and Outflow Pipes	Good A-6 A-42	✓ Like new with little or no deterioration and functioning as designed ✓ Up to 25% of pipe opening is obstructed but providing adequate conveyance	✓ None
	Fair	✓ 25 to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function	✓ Proactive maintenance recommended ○ Remove pipe obstructions ○ Repair structural damage ○ Repair or replace flap gates
	Poor A-7 A-8 A-40	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as intended	✓ Repair or replace damaged components ✓ Other maintenance as needed to correct deficiencies

Dry Retention Pond Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Erosion Condition			
	Good A-27 A-34 A-49	✓ Some surficial erosion with minor rills present ✓ Vegetation on slope generally intact with minimal bare areas, low erosion potential, stable slope ✓ Minimal to no undermining is apparent	✓ None
	Fair A-18 A-28 A-32	✓ Minor erosion on pond slopes or berms ✓ Minor undermining around headwall, mitered end sections, or control structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended ○ Repair erosion ○ Repair undermining
	Poor A-29 A-35 A-36	✓ Substantial erosion compromising slope and/or berm stability ✓ Large rills and gullies present along slope ✓ Large areas of vegetation on slope have become dislodged and slope is unstable ✓ Undermining of structures is evident	✓ Stabilize slopes and berm ✓ Re-establish vegetation ✓ Other maintenance as needed to correct deficiencies

Examples of Wet and Dry Pond Rating Criteria

Wet Detention Pond **A-1**



Rating Summary

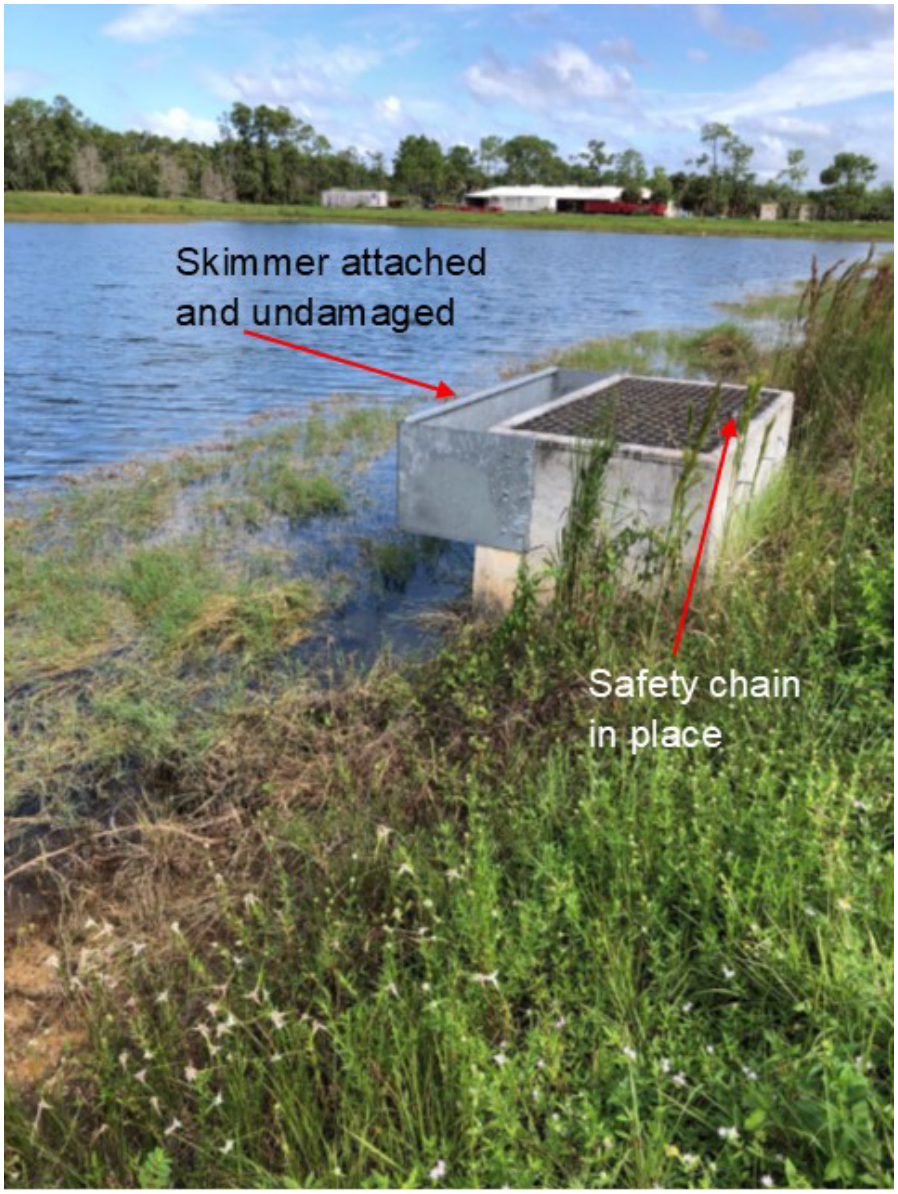
- Control Structure – Good
  - Chamber – Good – No accumulation of debris or vegetation, no visible damage
  - Orifice – Good - No obstructions restricting flow, structurally undamaged
  - Skimmer – Good – No damage or deterioration, less than 25 percent of opening is obstructed by vegetation or debris
  - Weir – Good – No obstructions or debris preventing flow, structurally sound
- Pipes – Good
  - No obstructions, no structural damage
- Hydraulic Recovery – Good
  - Permanent pool below control (orifice)
  - Staining near top of orifice indicates slow, but steady drawdown during recovery

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-2**



Rating Summary

- Control Structure – Good
  - Skimmer – Good – No damage or deterioration, no obstructions
  - Chamber – Good – Grate undamaged and safety chain in place
- Vegetation Condition – Fair
  - Excessive vegetation on side slopes

Maintenance Needs

- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-3**

Rating Summary

- Control Structure - Fair
  - Chamber– Fair – Vegetation present in chamber, but coverage is less than 25 percent
  - Orifice – Good – Observed flowing freely change to flowing orifice
  - Skimmer – Good – No damage or deterioration, some vegetation, but less than 25 percent of opening is obstructed
  - Grate – NA – As-built shows grate is not required for this structure
- Hydraulic Recovery – Good
  - Water is discharging freely from orifice indicating steady drawdown during recovery
- Vegetation – Fair
  - Excessive vegetation on side slopes

Maintenance Needs

- Remove vegetation from structure chamber
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-4**

Rating Summary

- Overall Control Structure – Poor
  - Chamber – Poor – Grate is missing
  - Skimmer – Poor – Skimmer is broken and detached

Maintenance Needs

- Replace missing grate
- Replace/repair damaged skimmer

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-5**

Rating Summary

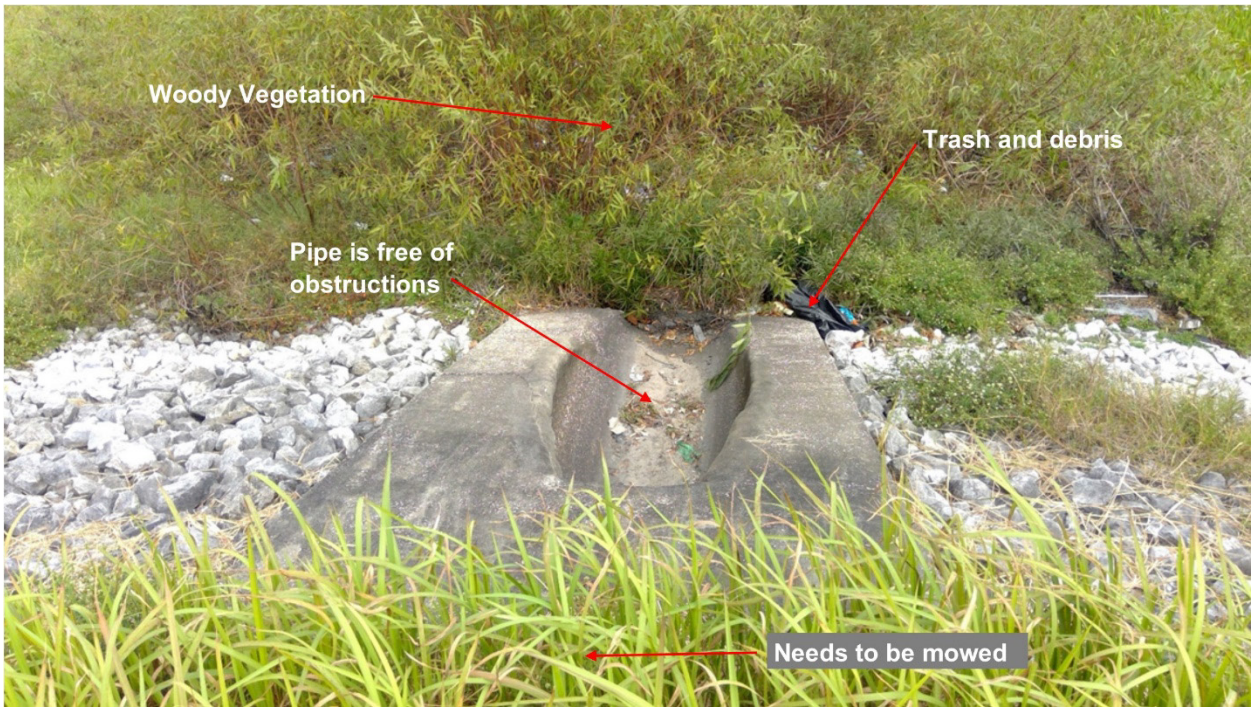
- Control Structure - Fair
  - Orifice – Fair – Threaded cap for bleed-down orifice cleanout is missing
  - Weir – Good – Free of obstructions
  - Skimmer – Fair – Opening less than 50 percent obstructed by vegetation

Maintenance Needs

- Replace threaded cap
- Clear vegetation from inside and around skimmer

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Inflow Pipe (Dry Pond) A-6



Rating Summary

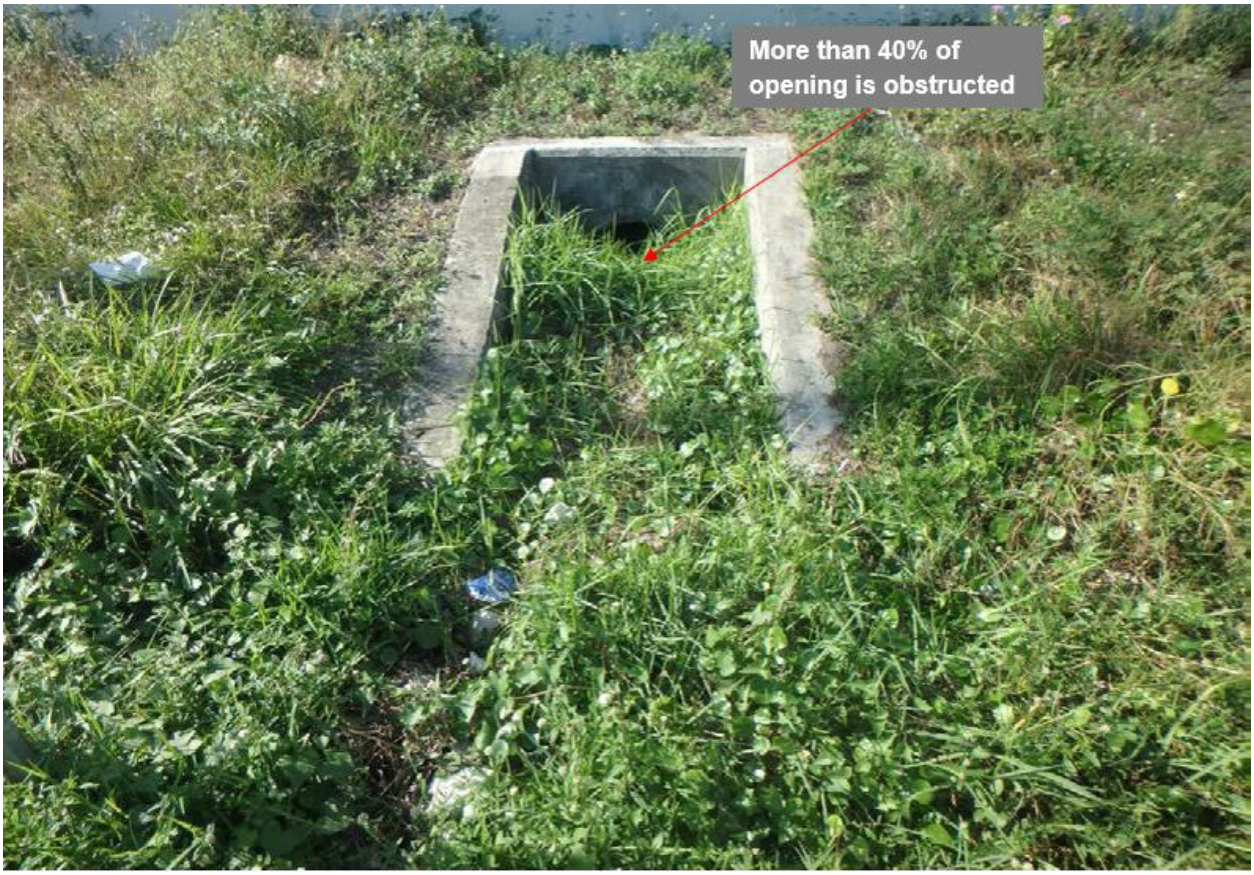
- Inflow and Outflow Pipes – Good
  - No significant cracks or undermining observed
  - Sedimentation observed, but less than 25 percent of pipe is obstructed
  - Pipe appears to be functioning as designed
- Vegetation Condition – Poor
  - Woody vegetation growing in pond bottom

Maintenance Needs

- Remove woody vegetation from pond bottom
- Remove trash and debris
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Inflow Pipe (Dry Pond) **A-7**



Rating Summary

- Inflow and Outflow Pipes – Poor
  - More than 40 percent of pipe opening is obstructed
- Aesthetic Condition – Fair
  - Small amounts of trash present
- Sedimentation – Poor
  - Sediment accumulation is present
- Vegetation Condition – Fair
  - Vegetative cover is in fair condition
  - Side slopes need to be mowed

Maintenance Needs

- Remove sediment and vegetation from the inflow pipe opening
- Remove trash
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Inflow Pipe (Dry Pond) **A-8**

Rating Summary

- Inflow and Outflow Pipes – Poor
  - More than 40 percent of pipe opening is obstructed
  - Crack in mitered end section
- Sedimentation – Poor
  - Sediment accumulation within inflow pipe is evident
- Vegetation Condition – Fair
  - Excess vegetation within inflow pipe
  - Vegetation in pond bottom needs to be mowed

Maintenance Needs

- Remove sediment and vegetation accumulation from pipe opening
- Check pipe for damage and document if additional action needed
- Repair mitered end section
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-9**

Rating Summary

- Aesthetic Condition – Good
  - Slopes are mowed
  - No trash visible
  - Vegetative cover is intact, i.e., no bare spots
- Erosion Condition – Good
  - Slope vegetation is fully intact
  - No rills or gullies observed
- Water Condition – Good
  - Water is clear and free of any surface sheen
  - No water vegetation
- Vegetation Condition – Good
  - Vegetative cover is well maintained and in good condition
  - Side slopes are mowed
  - No nuisance or invasive vegetation is present
  - Control structure is visible and clear of vegetative growth

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-10**

Rating Summary

- Fence – Good
    - Sections and posts like new with no damage

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond A-11

Rating Summary

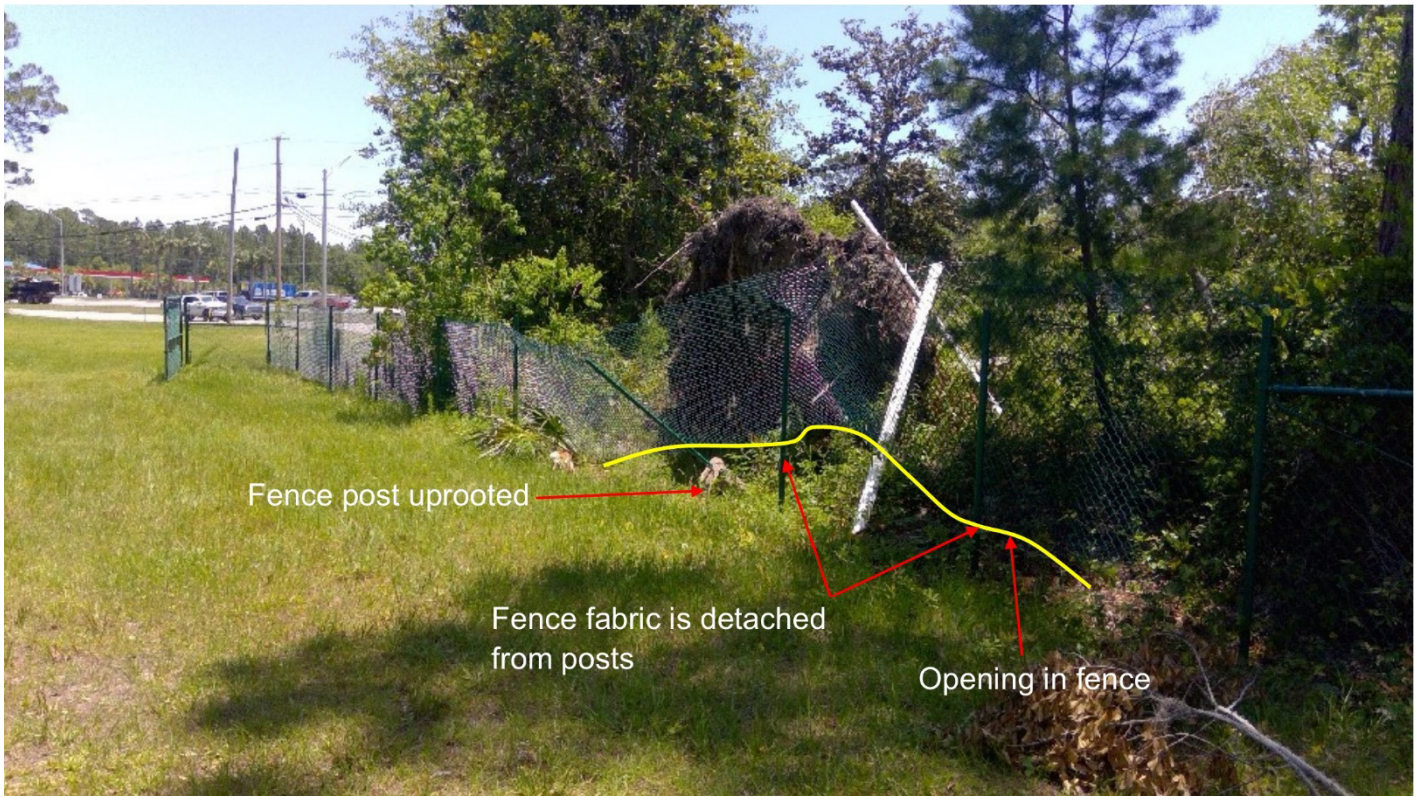
- Overall Appearance – Fair
  - Fence is sagging but the sag is not more than one-third of original height
  - Side slopes are maintained
- Sedimentation – Fair
  - Excess sediment on weir allowing vegetation to grow
- Vegetation Condition – Poor
  - Vegetation blocking skimmer affects system performance
- Control Structure – Poor
  - Skimmer – Poor
    - Skimmer opening more than 50% blocked by vegetation
  - Weir – Fair
    - Sediment allowing vegetative growth on weir, but still functioning as designed
- Erosion Condition – Good
  - Side slopes stable, no erosion evident

Maintenance Needs

- Remove vegetation blocking skimmer
- Clear weir of vegetation and sediment
- Reset fence posts

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-12**



Rating Summary

- Fence – Poor
  - Fence fabric is detached from consecutive fence posts
  - Opening in fence is greater than 2 square feet
  - Fence post is damaged
  - Site is not secure

Maintenance Needs

- Secure site immediately
- Reattach sagging fence section
- Reset fence post or replace if damaged

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-13**

Rating Summary

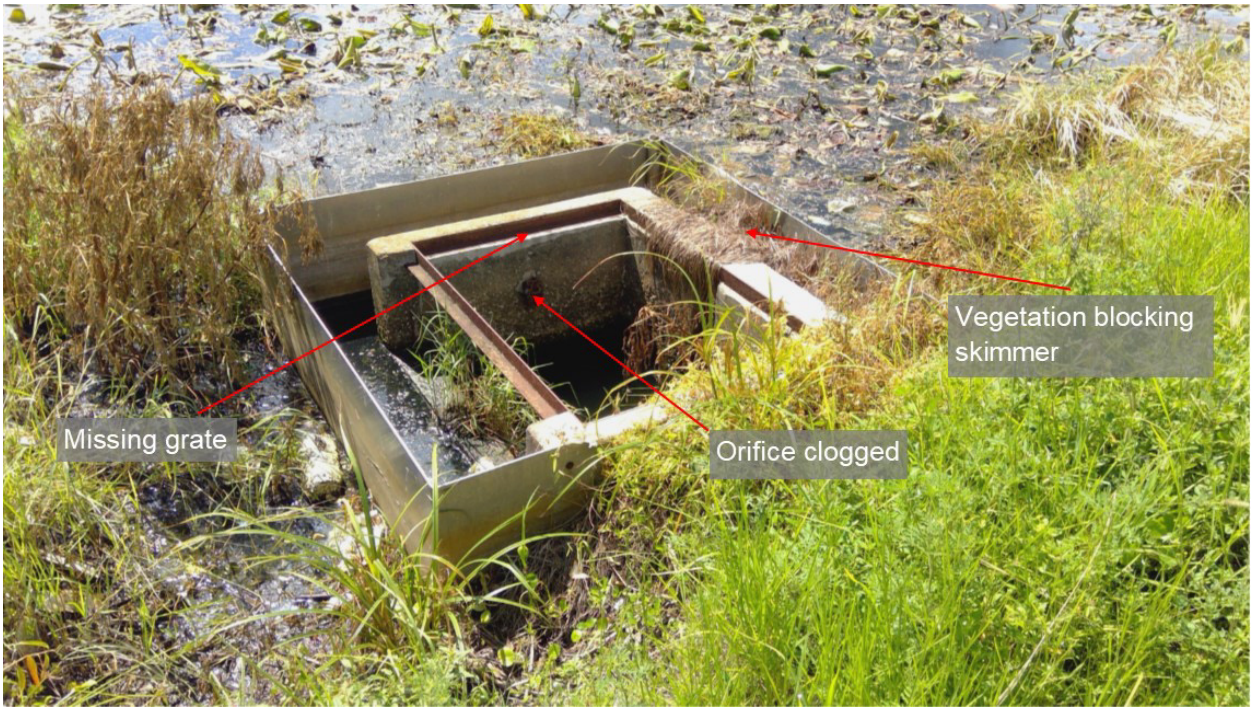
- Fence – Poor
  - Lock and chain missing
  - Gap in gate is greater than 6 inches
- Vegetation Condition – Fair
  - Excessive vegetation on side slopes and along fence line

Maintenance Needs

- Install chain and lock on gate
- Re-seat, repair, or replace gate to eliminate gap
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-14**



Rating Summary

- Control Structure – Poor
  - Orifice – Poor – Orifice is clogged with debris
  - Skimmer – Fair – Vegetation blocking more than 25 percent but less than 50 percent of opening and is intruding into structure chamber
  - Chamber – Poor – Grate is missing
- Hydraulic Recovery – Likely poor due to blocked orifice

Maintenance Needs

- Remove debris from orifice
- Replace missing grate
- Clear vegetation from skimmer

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-15**

Rating Summary

- Overall Appearance – Poor
  - Excessive vegetation
- Vegetation Condition – Poor
  - Woody vegetation present around control structure
- Control Structure – Poor
  - Weir opening is blocked by vegetation

Maintenance Needs

- Remove vegetation blocking weir

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-16**

Rating Summary

- Aesthetic Condition – Poor
- Water Condition – Poor
    - Evidence of illicit discharge

Maintenance Needs

- Find and eliminate illicit discharge
- Contact District NPDES Coordinator to report an illicit discharge

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-17**

Rating Summary

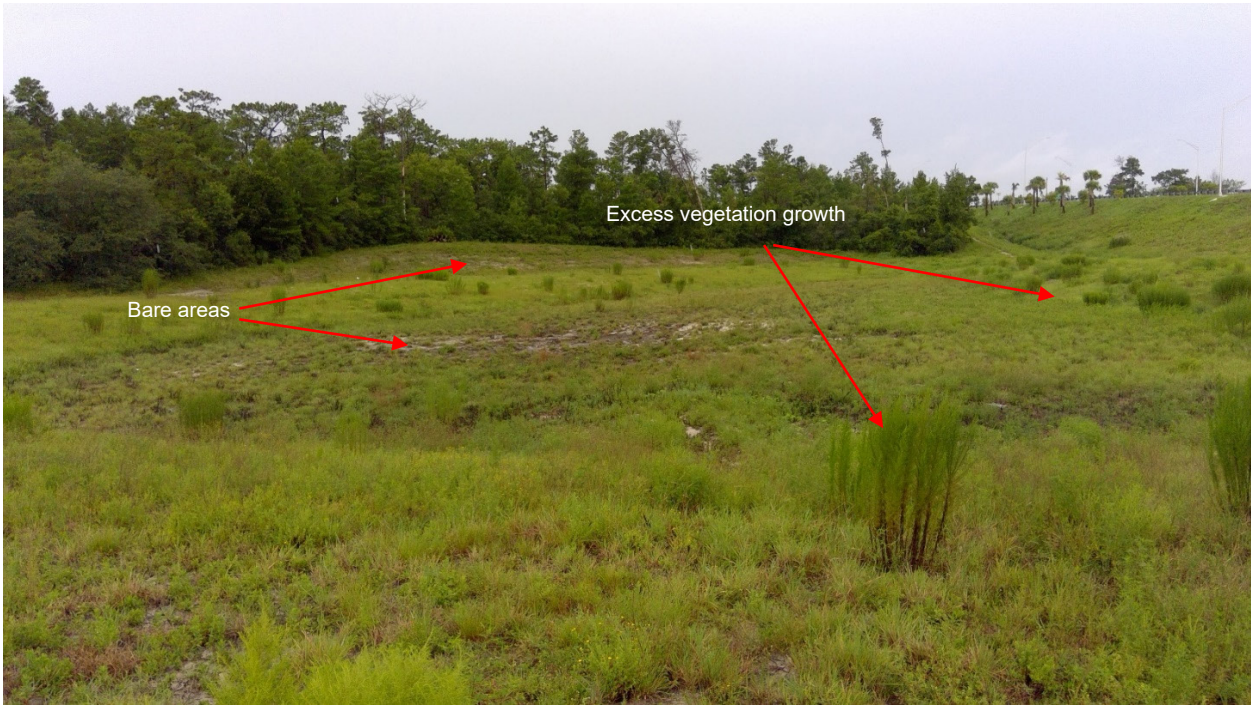
- Aesthetic Condition – Poor
  - Water is turbid and discolored
  - Banks maintained and mowed regularly
  - Free of trash and debris
- Erosion Condition – Good
  - No rills, gullies, or bare spots
- Water Condition – Poor
  - Water is dark and turbid
- Vegetation Condition – Good
  - Vegetative cover is well maintained
  - Slopes mowed regularly
  - No invasive or nuisance species

Maintenance Needs

- Investigate and address cause of turbid water
- Contact District NPDES Coordinator to report an illicit discharge

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-18**



Rating Summary

- Aesthetic Condition – Fair
  - Bare areas on side slopes and within pond
  - No debris or trash present
- Erosion Condition – Fair
  - Areas of bare soil observed within the pond and along the side slopes
- Hydraulic Recovery – Good
  - System dry, indicating the system is properly recovering
- Sedimentation – Good
  - No evidence of sedimentation problems observed.
- Vegetation Condition – Fair
  - Excessive vegetation growth observed within the pond bottom and along the side slopes

Maintenance Needs

- Re-establish turf/grass
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-19**

Rating Summary

- Aesthetic Condition – Poor
  - Pipes corroded
  - Erosion at outfall pipe and adjacent to endwall
  - Excessive vegetation in and around pond
- Erosion Condition – Poor
  - Flow is bypassing endwall due to erosion
  - Erosion undermining pipe
- Sedimentation Condition - Fair
  - Emergent vegetation in pond
- Pipes – Poor
  - Pipes corroded
- Vegetation Condition – Fair
  - Emergent vegetation in pond
  - Excessive vegetation around pond

Maintenance Needs

- Replace pipe
- Restore and repair eroded areas to original design condition
- Re-establish original grade around endwall
- Remove vegetation and accumulated sediment in pond
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Berm and Slope **A-20**

Rating Summary

- Aesthetic Condition – Fair
  - Minor amounts of trash
  - Needs to be mowed
- Vegetation Condition – Fair
  - Needs to be mowed

Maintenance Needs

- Properly dispose of trash and debris
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Access Road **A-21**

Rating Summary

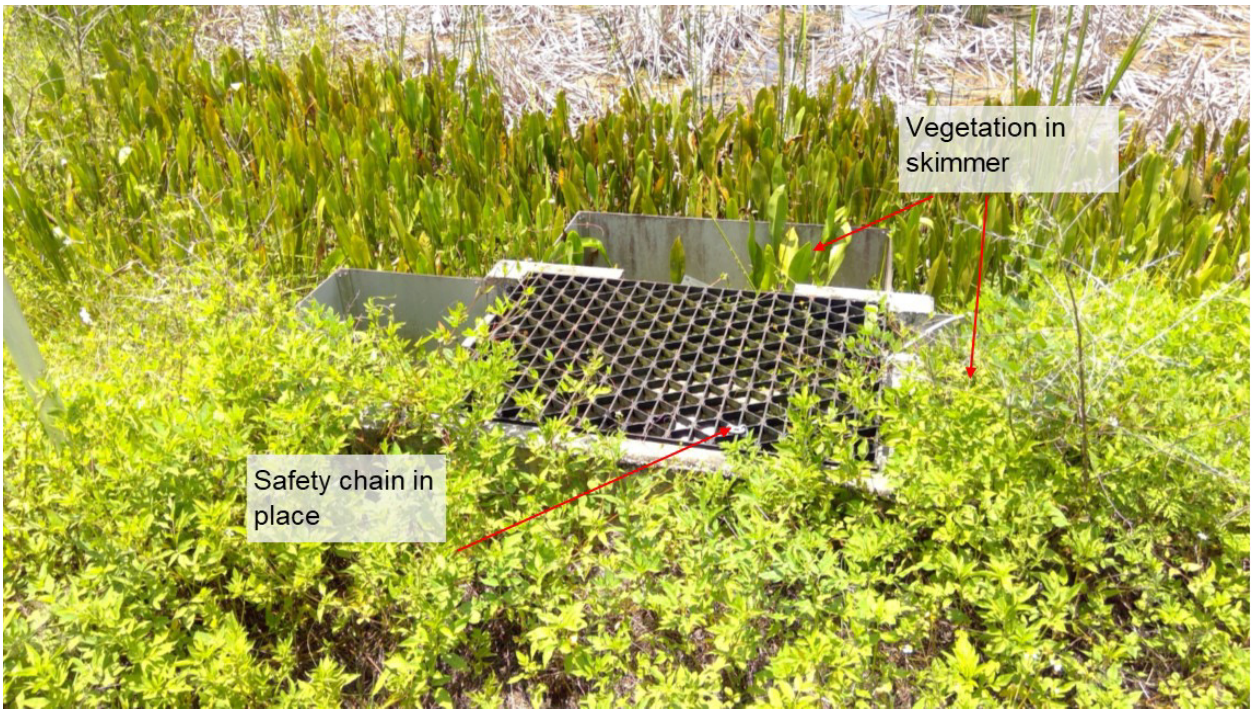
- Aesthetic Condition – Poor
  - Large amounts of trash and debris
  - Needs to be mowed

Maintenance Needs

- Properly dispose of trash and debris
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-22**



Rating Summary

- Control Structure - Fair
  - Skimmer – Fair – More than 25 percent of opening is obstructed by vegetation
  - Grate – Good – Free of damage, safety chain in place
- Vegetation – Fair
  - Excessive vegetation around structure

Maintenance Needs

- Remove vegetation from skimmer
- Remove vegetation around structure

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-23**

Rating Summary

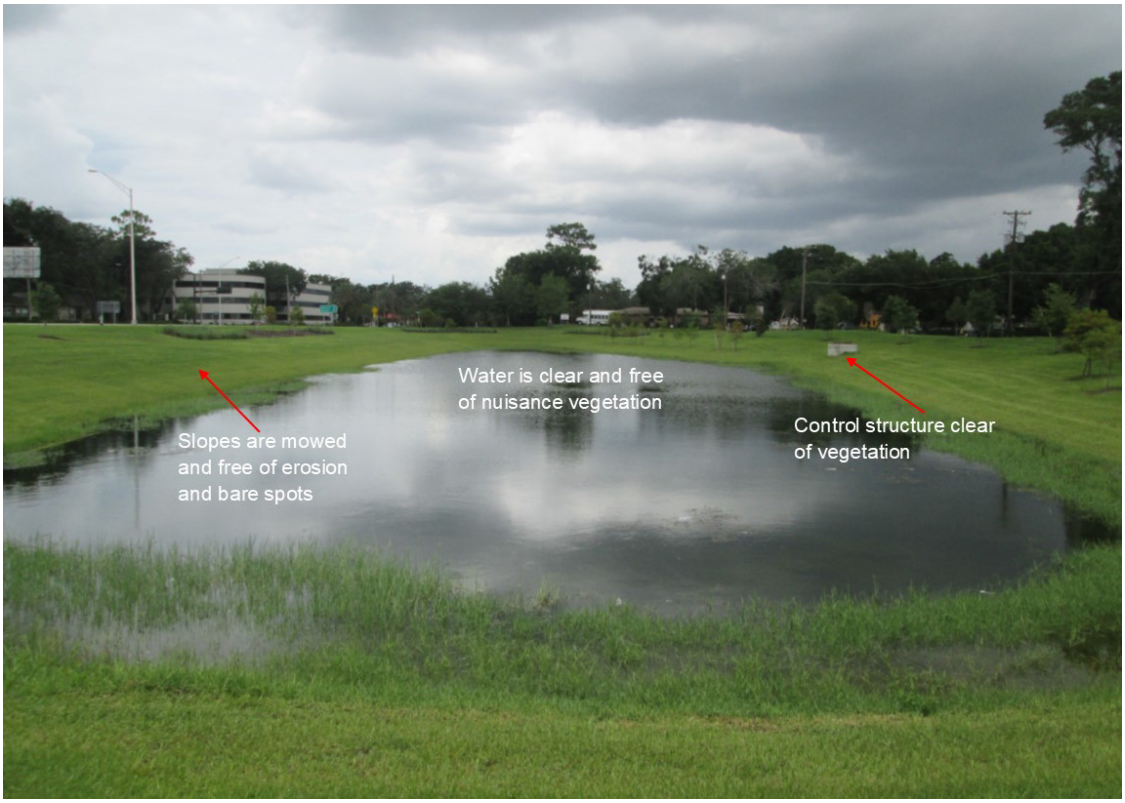
- Aesthetic Condition – Fair
  - Excess vegetation on side slopes
- Erosion Condition – Good
  - Slope vegetation is fully intact
  - No rills or gullies observed
- Water Condition – Good
  - Water is clear and free of any surface sheen
  - No water vegetation
- Vegetation Condition – Fair
  - Excess vegetation on side slopes
  - Nuisance vegetation present in pond

Maintenance Needs

- Mow pond area
- Remove nuisance vegetation

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-24**



Rating Summary

- Aesthetic Condition – Good
  - Slopes are mowed
  - No trash visible
  - Vegetative cover is intact, i.e., no bare spots
- Erosion Condition – Good
  - Slope vegetation is fully intact
  - No rills or gullies observed
- Water Condition – Good
  - Water is clear and free of any surface sheen
  - No water vegetation
- Vegetation Condition – Good
  - Vegetative cover is well maintained and in good condition
  - Side slopes are mowed
  - No nuisance or invasive vegetation is present
  - Control structure is visible and clear of vegetative growth

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-25**

Rating Summary

- Aesthetic Condition – Fair
  - No debris or trash present
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Good
  - System dry, indicating the system is properly recovering
- Sedimentation – Good
  - No evidence of sedimentation problems observed
- Vegetation Condition – Fair
  - Excessive vegetation growth observed within the pond bottom and along the side slopes

Maintenance Needs

- Remove palm tree from pond bottom
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-26**

Rating Summary

- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes are well maintained
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Good
  - System dry, indicating the system recovering its treatment volume
- Sedimentation – Good
  - No evidence of sedimentation problems observed
- Vegetation Condition – Good
  - Vegetation cover intact, with no bare areas
  - Pond is mowed regularly

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-27**

Rating Summary

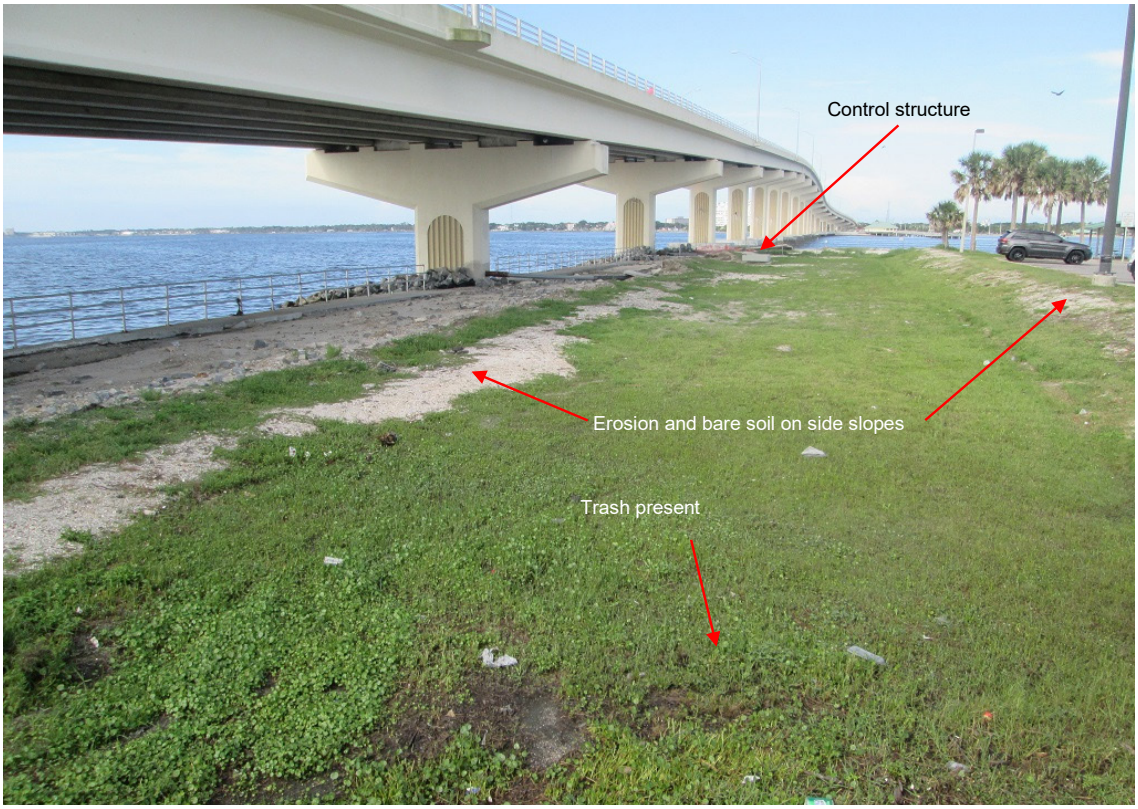
- Control Structures – Good
  - No visible damage
  - Free of vegetation growth
- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes are well maintained
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Sedimentation – Good
  - No evidence of sedimentation problems observed
- Vegetation Condition – Good
  - Vegetation cover intact, with no bare areas
  - Pond is mowed regularly

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-28**



Rating Summary

- Control Structure – Good
  - No visible damage
  - Free of vegetation growth
- Aesthetic Condition – Poor
  - Debris and trash present
  - Side slopes have areas of bare soil
- Erosion Condition – Fair
  - Erosion present on side slopes
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Sedimentation – Good
  - No evidence of sedimentation problems observed
- Vegetation Condition – Poor
  - Vegetation on the side slopes has become destabilized

Maintenance Needs

- Stabilize bare areas with vegetation
- Remove trash from pond bottom

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-29**

Rating Summary

- Aesthetic Condition – Poor
  - Side slopes have areas of bare soil
- Erosion Condition – Poor
  - Erosion present that may compromise slope stability
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume.
- Sedimentation – Fair
  - Sedimentation to pond bottom present as a result of erosion on slopes.
- Vegetation Condition – Poor
  - Vegetation on the side slopes has become destabilized
  - Pond does not appear to be mowed regularly
  - Woody vegetation present within pond bottom and side slopes

Maintenance Needs

- Remove pine trees from pond
- Mow pond area
- Regrade side slopes to original design and re-establish turf/grass
- Remove sedimentation that has accumulated in the pond bottom

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-30**

Rating Summary

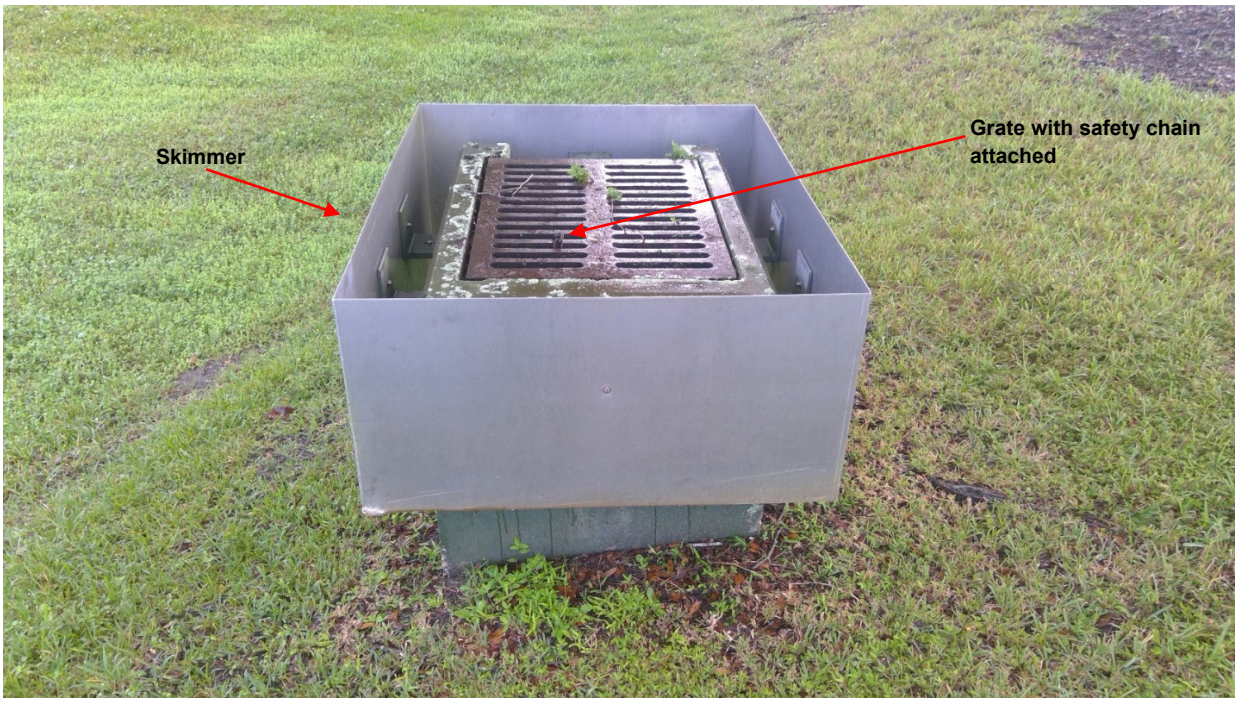
- Control Structure – Good
  - Skimmer present and intact
  - Grate present
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Vegetation Condition – Fair
  - Excessive vegetation growth present around control structure
  - Pond does not appear to be mowed regularly

Maintenance Needs

- Remove excess vegetation from around control structure
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-31**



Rating Summary

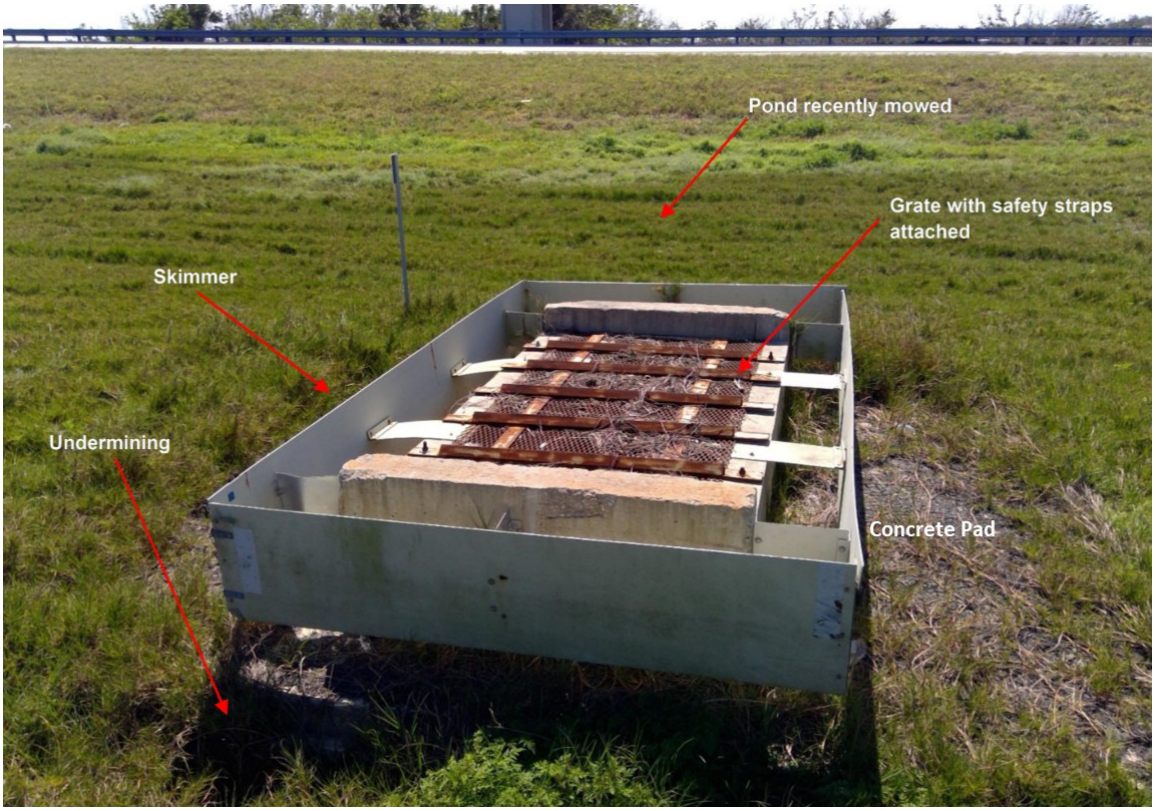
- Control Structure – Good
  - No visible damage
  - No sediment or vegetation accumulation in or around structure
- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes well maintained
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Sedimentation – Good
  - No evidence of sediment accumulation
- Vegetation Condition – Good
  - Vegetation cover is intact with no bare areas
  - Pond is mowed regularly

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-32**



Rating Summary

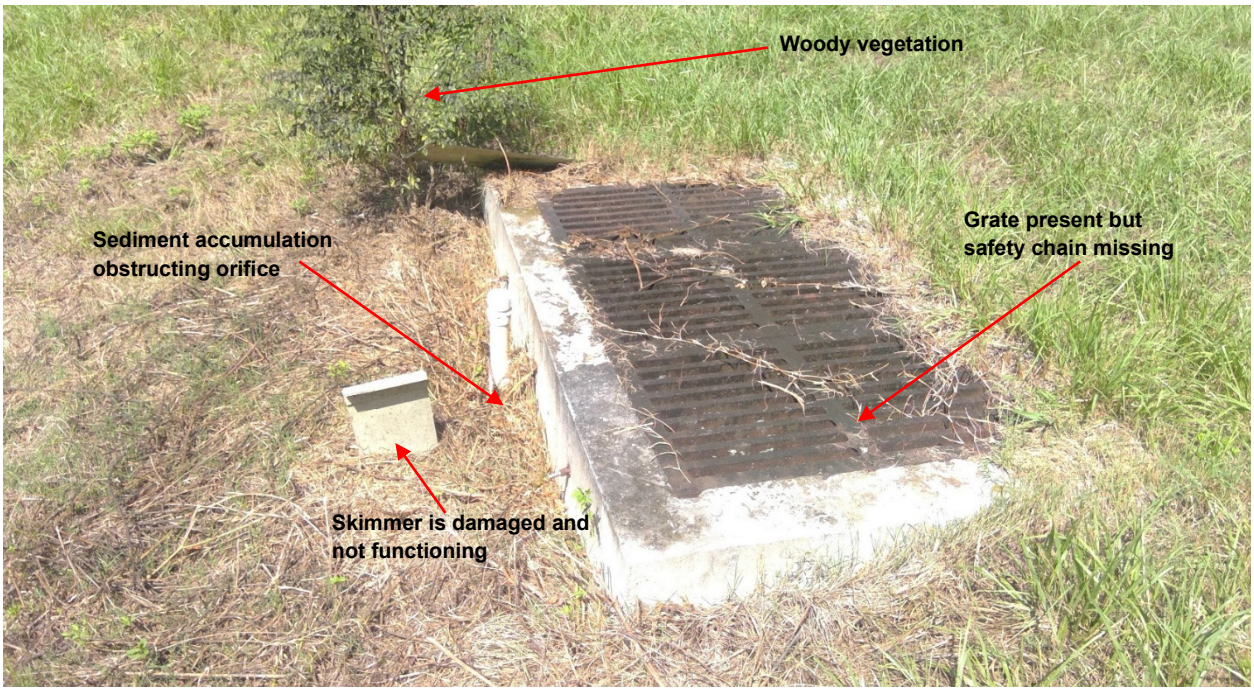
- Control Structure – Good
  - No sediment or vegetation accumulation in or around structure
  - Skimmer and grate are present and intact
- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes well maintained
- Erosion Condition – Fair
  - Minor undermining present around concrete slab but not sufficient to cause structural damage
- Hydraulic Recovery – Good
  - System dry, indicating the system recovering its treatment volume
- Sedimentation – Good
  - No evidence of sediment accumulation
- Vegetation Condition – Good
  - Vegetation cover intact with no bare areas
  - Pond is mowed regularly

Maintenance Needs

- Fill, grade, and stabilize undermining present around concrete slab

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-33**



Rating Summary

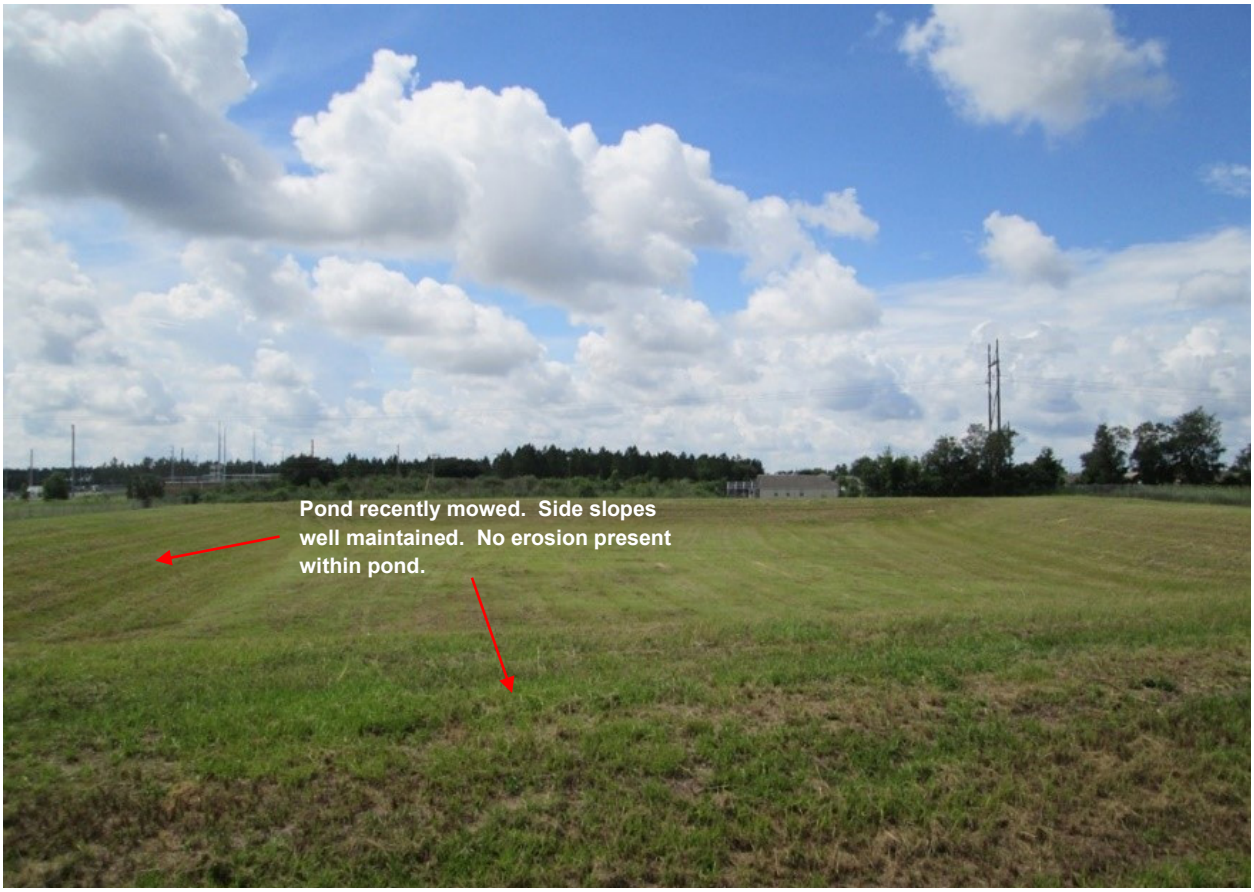
- Control Structure – Poor
  - Skimmer damaged and not functioning
  - Grate present but safety chain is missing
  - Orifice is blocked
- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes are well maintained
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume.
- Sedimentation – Poor
  - Sediment accumulation appears to be blocking the orifice.
- Vegetation Condition – Poor
  - Woody vegetation growth present

Maintenance Needs

- Install new skimmer per original design
- Clear sediment and vegetation from around structure
- Install safety chain
- Remove woody vegetation

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-34**



Rating Summary

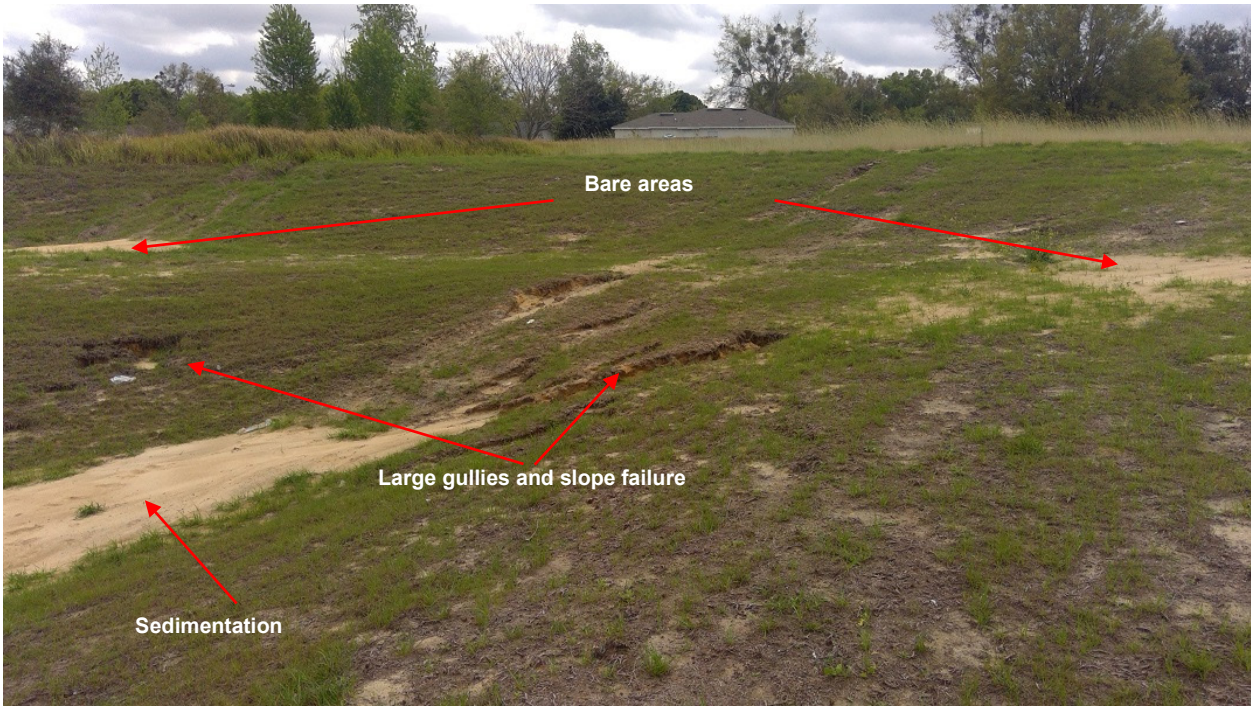
- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes well maintained
- Erosion Condition – Good
  - No erosion on side slopes observed
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Sedimentation – Good
  - No evidence of sedimentation problems observed
- Vegetation Condition – Good
  - Vegetation cover is intact with no bare areas
  - Pond is mowed regularly

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-35**



Rating Summary

- Aesthetic Condition – Poor
  - Side slopes not well maintained
- Erosion Condition – Poor
  - Substantial erosion present
  - Large gullies present along slope
  - Slope stability compromised
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Sedimentation – Fair
  - Sedimentation to pond bottom from slope erosion
- Vegetation Condition – Poor
  - Vegetative cover poor, with bare areas present

Maintenance Needs

- Regrade and fill areas where slope erosion is present
- Re-establish turf/grass
- Remove accumulated sediment build up from pond bottom

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-36**

Rating Summary

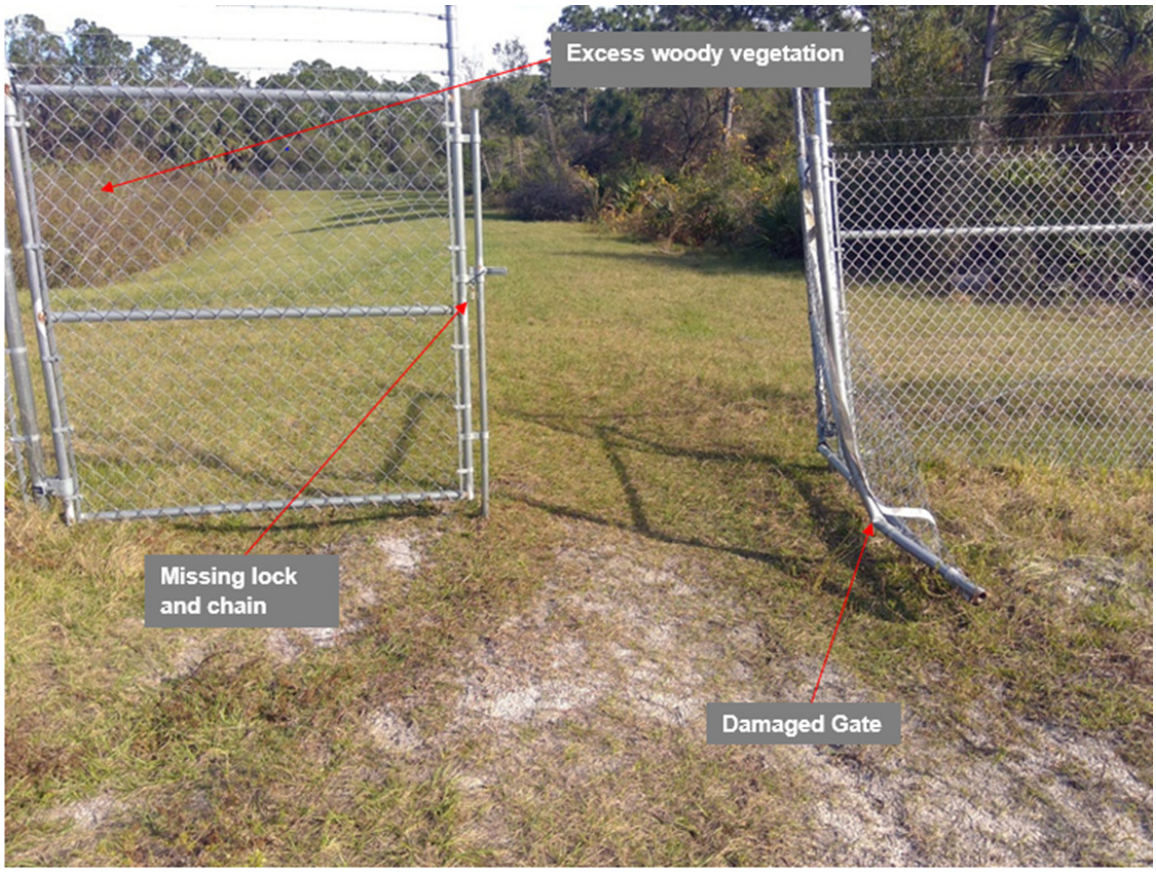
- Aesthetic Condition – Poor
  - Side slopes not well maintained
- Erosion Condition – Poor
  - Substantial erosion present
  - Gullies present along slope
  - Slope stability has been compromised
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Vegetation Condition – Poor
  - Vegetative cover is poor with significant bare areas present

Maintenance Needs

- Fill and regrade side slope to original design
- Re-establish turf/grass

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-37**



Rating Summary

- Fence Condition – Poor
  - Gate open and no longer secure
  - Chain and lock missing
  - Fence gate has significant damage with gap greater than 6 inches
- Vegetation Condition – Poor
  - Woody vegetation present within pond bottom.

Maintenance Needs

- Repair or replace damaged access gate
- Install lock and chain
- Secure access immediately
- Remove woody vegetation from pond bottom

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-38**

Rating Summary

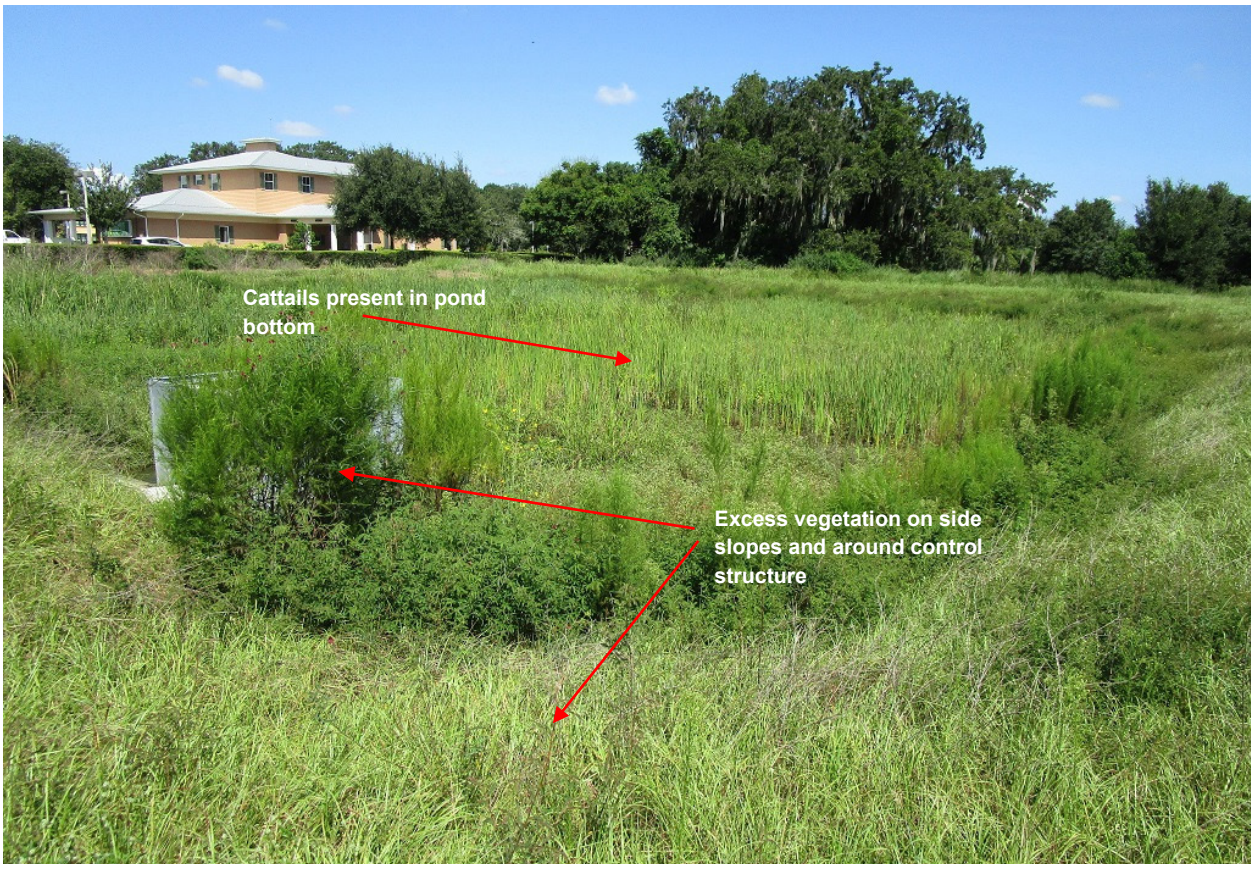
- Fence Condition – Poor
  - Fence fabric has become detached and is sagging greater than 1/3 its original height
- Vegetation Condition – Poor
  - Bare soil present on berm
  - Fallen tree branch on fence

Maintenance Needs

- Reattach or repair fence fabric
- Re-establish turf/grass
- Remove fallen tree branch from fence

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-39**



Rating Summary

- Aesthetic Condition – Poor
  - Excess vegetation on side slopes and within pond bottom
  - Vegetation growth around control structure
- Hydraulic Recovery – Poor
  - System does not appear to be fully recovering its treatment volume
  - Cattails in pond bottom indicate prolonged presence of water
- Vegetation Condition – Poor
  - Side slopes need to be mowed
  - Vegetation around control structure present

Maintenance Needs

- Remove excess vegetation from pond bottom and from around control structure
- Scarify/scrape pond bottom or regrade to original design elevation
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-40**

Rating Summary

- Inflow and Outflow Pipes – Poor
  - Woody vegetation growth with more than 40 percent of pipe obstructed
  - No significant cracks or undermining observed
- Vegetation Condition – Poor
  - Excess vegetation present in and around inflow pipe

Maintenance Needs

- Remove excess vegetation from in and around inflow pipe

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-41**

Rating Summary

- Inflow and Outflow Pipes – Good
  - Like-new condition
  - No significant cracks or undermining observed
  - Pipe is open and no obstructions observed
  - Pipe appears to be functioning as designed
- Aesthetic Condition – Good
  - No trash and debris present
  - Side slopes are regularly mowed and well maintained
- Vegetation Condition – Good
  - Vegetative cover is in good condition and well maintained

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-42**

Rating Summary

- Inflow and Outflow Pipes – Good
  - Like-new condition
  - No significant cracks or undermining observed
  - Pipe is open and no obstructions observed
  - Pipe appears to be functioning as designed
- Aesthetic Condition – Good
  - No trash or debris present
  - Side slopes are regularly mowed and well maintained
- Vegetation Condition – Good
  - Vegetative cover is in good condition and well maintained

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-43**

Rating Summary

- Inflow and Outflow Pipes – Good
  - Like-new condition
  - No significant cracks or undermining observed
  - Pipe is open and no obstructions observed
  - Pipe appears to be functioning as designed
- Aesthetic Condition – Good
  - Side slopes are well maintained and regularly mowed
  - No trash and debris present
- Vegetation Condition – Good
  - Vegetative cover is in good condition and well maintained

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-44**

Rating Summary

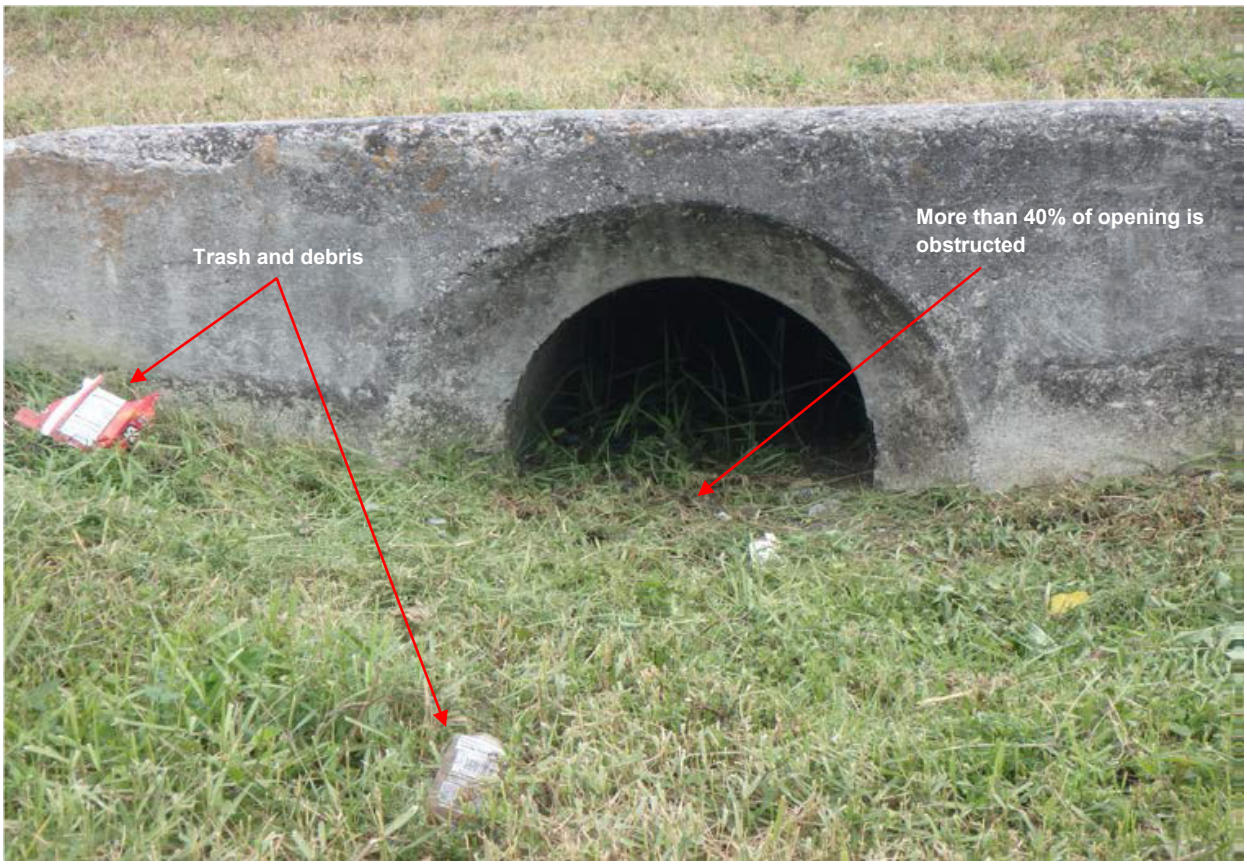
- Inflow and Outflow Pipes – Poor
  - More than 40 percent of pipe opening is obstructed
- Aesthetic Condition – Good
  - No trash or debris present
- Vegetation Condition – Good
  - Vegetative cover is in good condition and recently mowed

Maintenance Needs

- Remove sediment accumulation from pipe
- Re-establish grade to original design

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-45**



Rating Summary

- Inflow and Outflow Pipes – Poor
  - More than 40 percent of pipe opening is obstructed
- Aesthetic Condition – Fair
  - Minor amounts of trash and debris present
- Vegetation Condition – Good
  - Vegetative cover is in good condition and recently mowed

Maintenance Needs

- Remove sediment accumulation from pipe
- Re-establish grade to original design
- Remove trash and debris

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-46**

Rating Summary

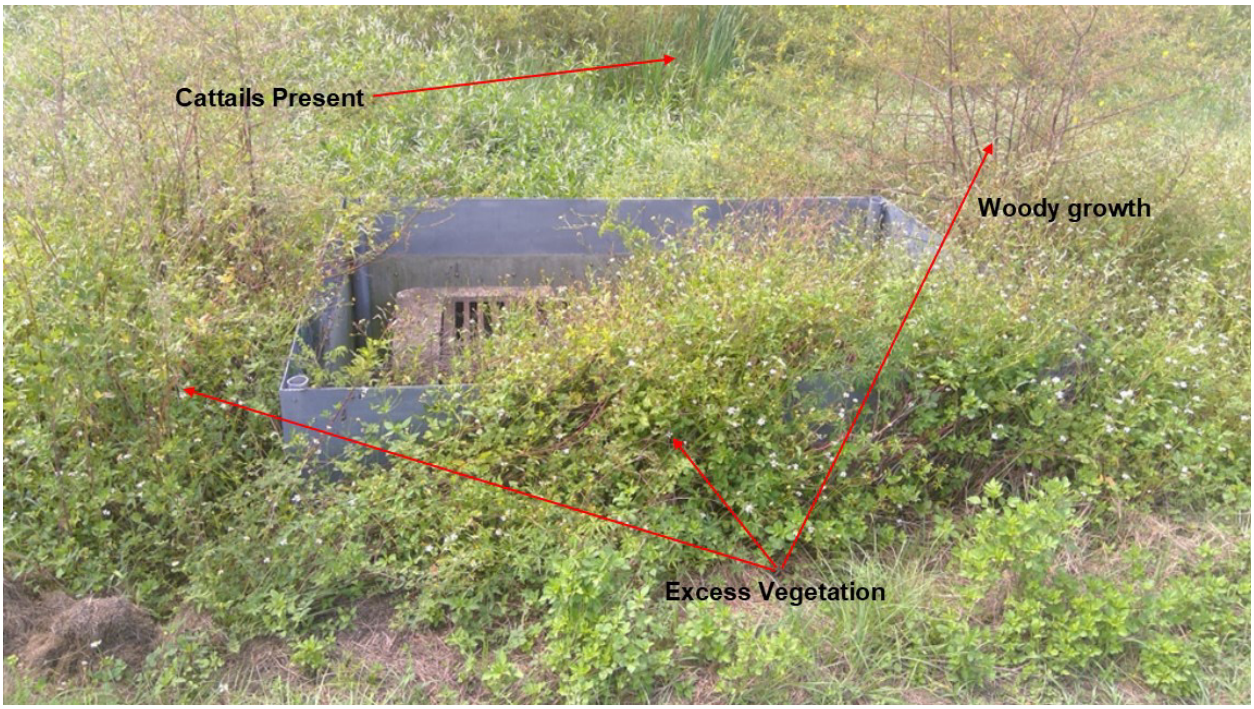
- Control Structure – Good
  - Skimmer present and intact
  - Grate and safety chain present
- Aesthetic Condition – Good
  - No debris or trash present
  - Side slopes are well maintained
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Good
  - System dry, indicating the system is recovering its treatment volume
- Vegetation Condition – Good
  - Pond appears to be mowed regularly

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-47**



Rating Summary

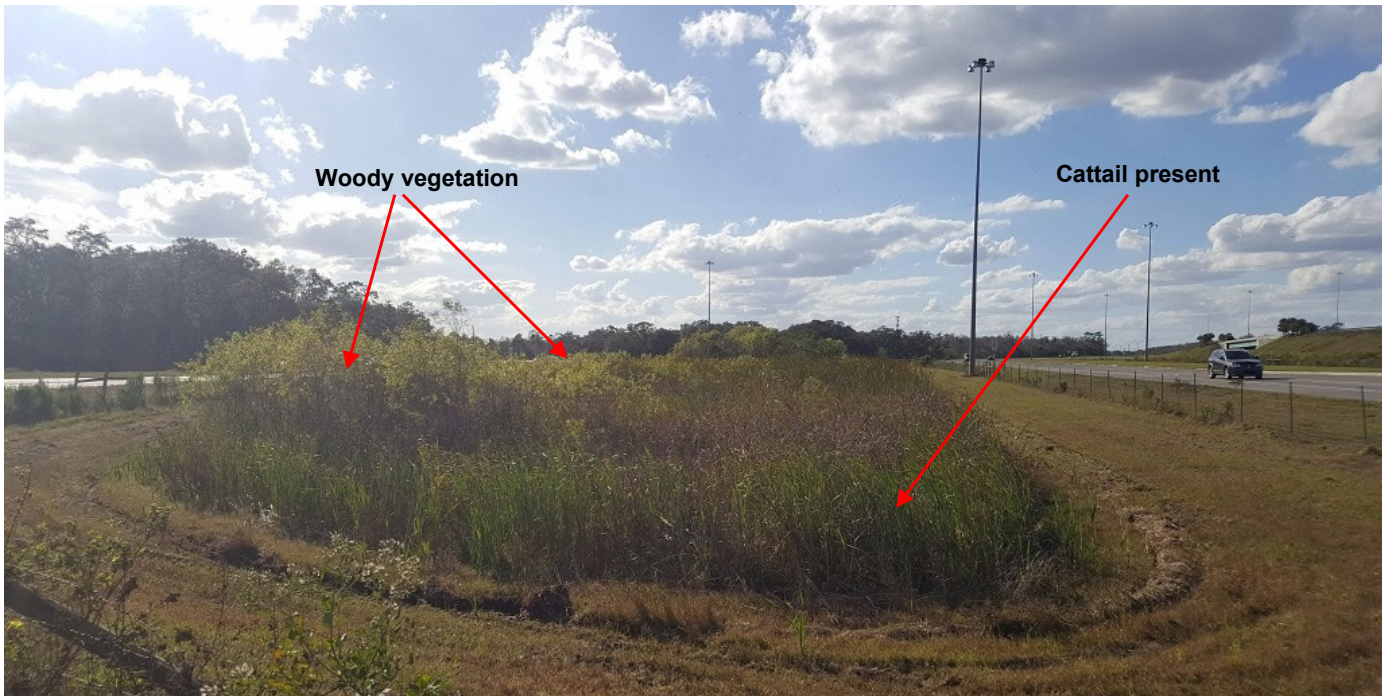
- Control Structure – Good
  - Skimmer present and intact
  - Grate is present
- Hydraulic Recovery – Fair
  - System mostly dry
  - Small amount of cattail present indicates the system may not be fully recovering its treatment volume
- Vegetation Condition – Poor
  - Excess vegetation growth present around control structure and within the pond bottom.

Maintenance Needs

- Remove excess vegetation from around control structure
- Remove excess vegetation from the pond bottom

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-48**



Rating Summary

- Aesthetic Condition – Poor
  - Excess vegetation in pond
  - No debris or trash present
  - Side slopes are regularly mowed
  - Fence is in good condition
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Poor
  - The presence of cattail throughout the pond bottom indicates the system may not be fully recovering its treatment volume
- Vegetation Condition – Poor
  - Woody vegetation present within the pond bottom.
  - Excess vegetation growth present within the pond bottom

Maintenance Needs

- Remove excess vegetation from the pond bottom
- Scarify pond bottom to allow full recovery of treatment volume

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-49**

Rating Summary

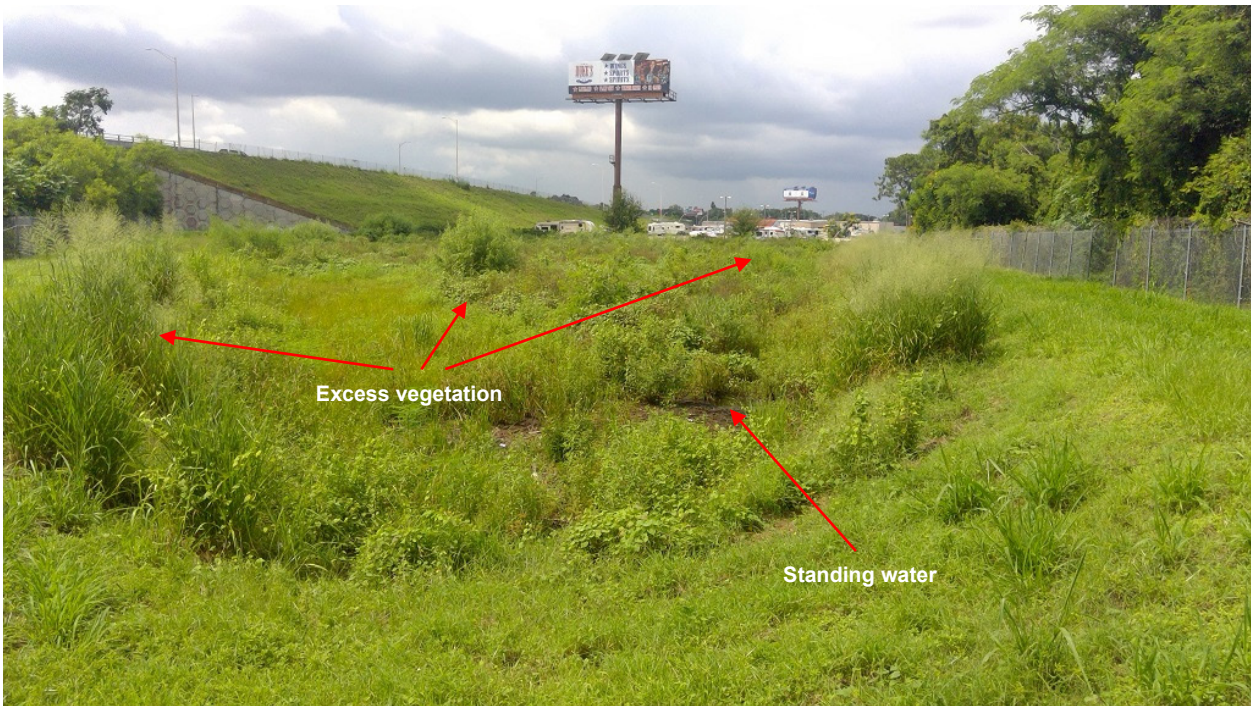
- Aesthetic Condition – Poor
  - Excess vegetation in pond
  - No debris or trash present
  - Side slopes are regularly mowed
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Recovery – Poor
  - Excess, woody vegetation inhibits recovery
- Vegetation Condition – Poor
  - Woody vegetation present within the pond bottom.
  - Excess vegetation growth present within the pond bottom

Maintenance Needs

- Remove excess vegetation from the pond bottom.

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Dry Pond **A-50**



Rating Summary

- Aesthetic Condition – Poor
  - Excess vegetation in pond
  - No debris or trash present
  - Side slopes need to be mowed
  - Fence is in good condition
- Erosion Condition – Good
  - No slope erosion or rills observed
- Hydraulic Condition – Poor
  - Standing water indicates the system is not fully recovering its treatment volume
- Vegetation Condition – Poor
  - Excess vegetation growth present within the pond bottom

Maintenance Needs

- Remove excess vegetation from the pond bottom
- Scrape/scarify pond bottom

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-51**

Rating Summary

- Aesthetic Condition – Good
- Erosion Condition – Good
  - Healthy, complete vegetative cover
- Vegetation – Fair
  - Side banks need to be mowed
- Water Condition – Good
  - Water is clear, free of trash, vegetation, and visible sheens

Maintenance Needs

- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-52**

Rating Summary

- Aesthetic Condition – Good
- Erosion Condition – Good
  - Healthy vegetative cover with no bare spots
- Water Condition – Good
  - Water is clear, free of trash, vegetation, and visible sheens
- Vegetation – Good
  - Vegetation is well maintained and recently mowed
  - Complete vegetative cover with no bare spots

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-53**

Rating Summary

- Fence – Poor
  - Cut section is greater than 2 square feet
  - Fabric is detached from fence post
  - Site is no longer secure

Maintenance Needs

- Secure site immediately
- Repair fence fabric
- Reattach fabric to fence post

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-54**

Rating Summary

- Fence – Poor
  - Fence fabric is detached from consecutive fence posts
  - Opening at sagging fence section is greater than one-third original fence height
  - Site is not secure

Maintenance Needs

- Secure site immediately
- Reattach sagging sections to fence posts and restore to original height
- Reset leaning post

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-55**

Rating Summary

- Fence – Poor
  - Downed tree on fence
  - Cut section in fence is greater than 2 square feet
  - Opening at cut section is greater than one-third original fence height
  - Site is not secure

Maintenance Needs

- Secure site immediately
- Remove tree
- Replace damaged fence section

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-56**

Rating Summary

- Fence – Poor
  - Consecutive broken and damaged fence posts
  - Opening at sagging fence section is greater than one-third original fence height
  - Site is not secure

Maintenance Needs

- Secure site immediately
- Replace damaged fence posts
- Reattach sagging fence section and restore to original height

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-57**

Rating Summary

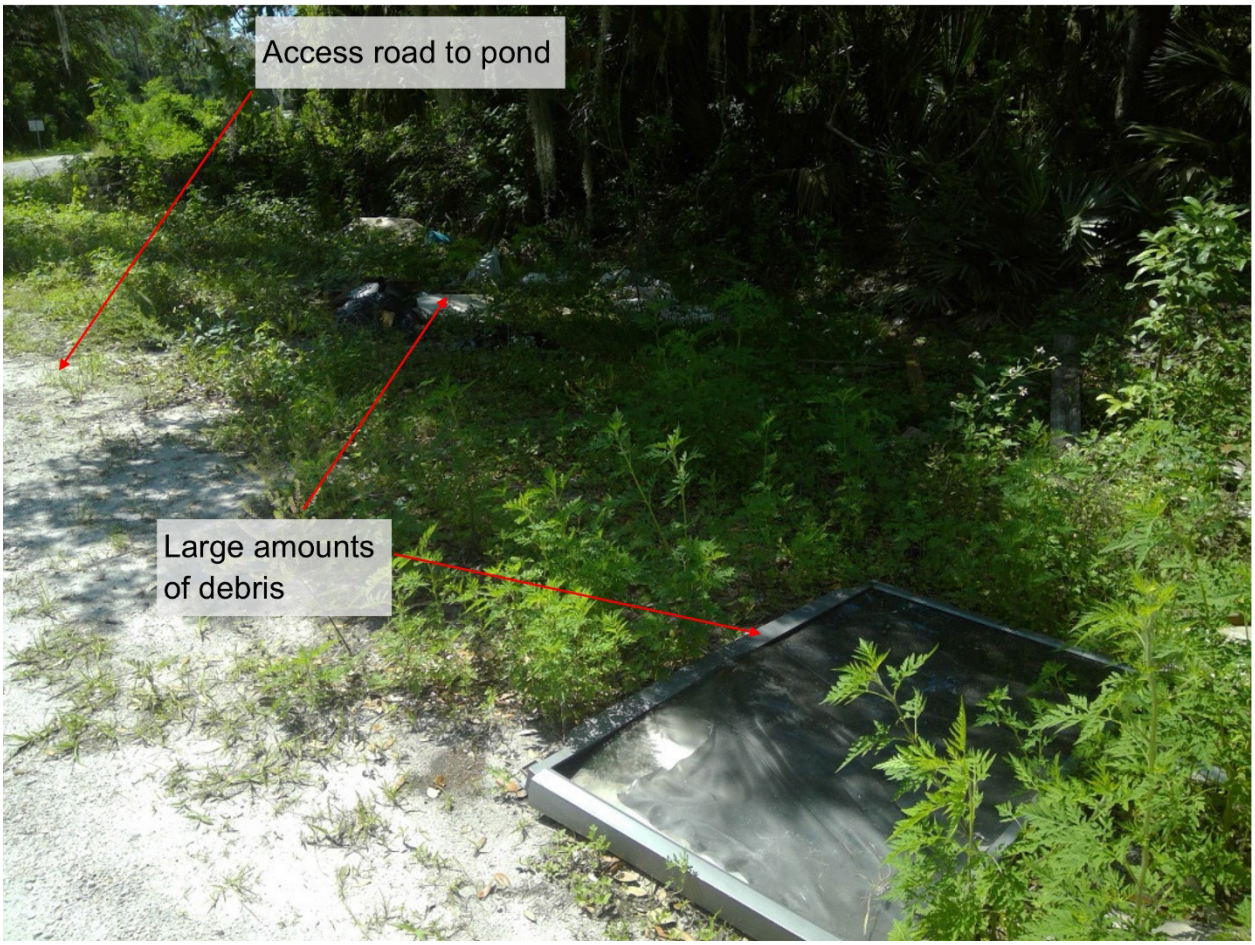
- Aesthetic Condition – Fair
  - Debris on slope
- Water Condition – Good
  - Minor amount of floating vegetation present

Maintenance Needs

- Remove large piece of debris
- Mow pond area

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Access Road **A-58**



Rating Summary

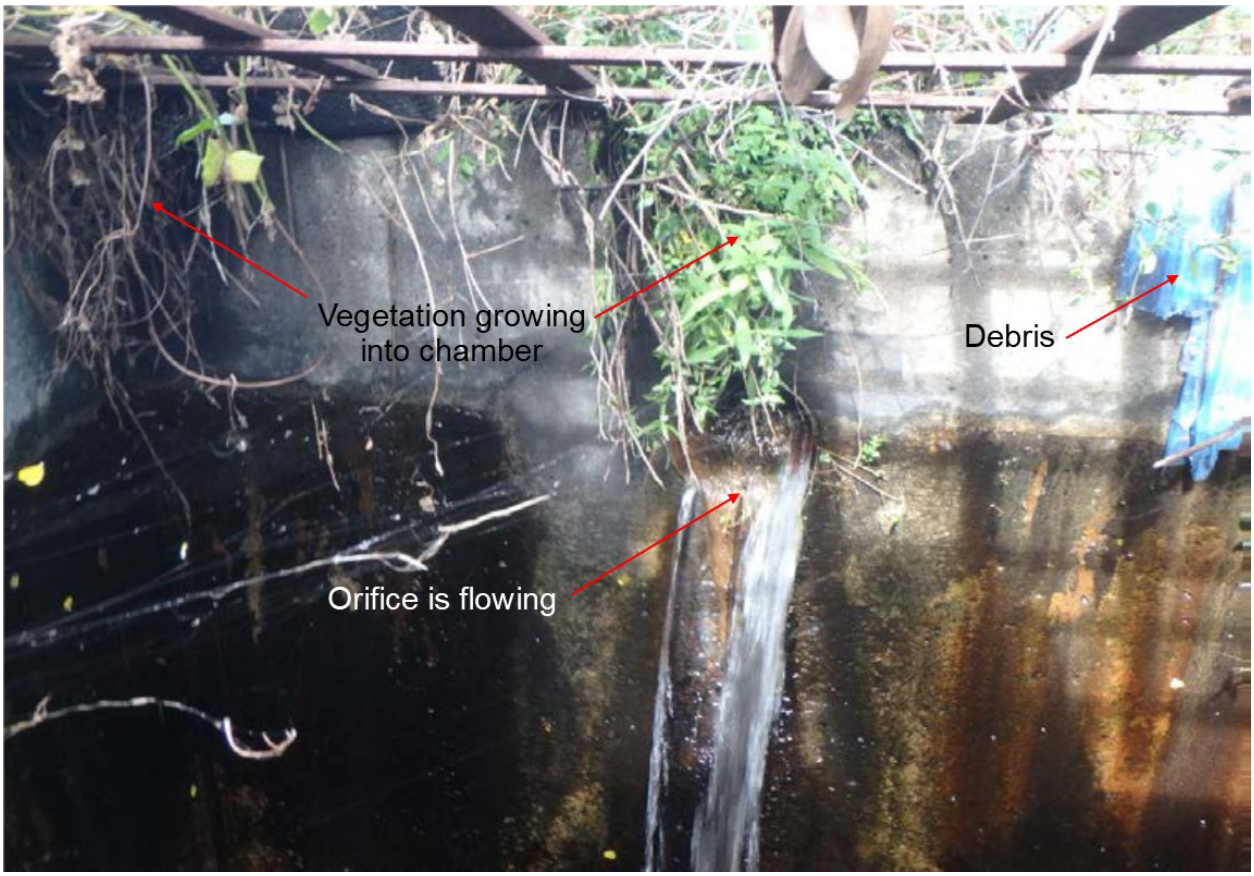
- Aesthetic Condition – Poor
  - Large amounts of trash and debris
  - Access road vegetation is overgrown

Maintenance Needs

- Properly dispose of trash and debris
- Mow access road

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Wet Detention Pond **A-59**



Rating Summary

- Control Structure – Fair
  - Chamber – Fair – Grate partially blocked by vegetation and debris
  - Orifice – Fair – Discharging, but unclear if flowing at full capacity; vegetation growing in front of orifice

Maintenance Needs

- Remove vegetation and debris
- Check for vegetation obstructing flow through orifice and clear if necessary

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

Pond Fence **A-60**

Rating Summary

- Fence – Good
  - Sections and posts like new with no damage
  - Strands of barbed wire continuous and unbroken

Maintenance Needs

- None

Return to Rating Table: Wet Detention Dry Retention Dry Detention w/o Filtration Dry Detention with Filtration

4.2 Linear Treatment and Conveyance Systems

4.2.1 Linear Treatment

4.2.1.1 Ditch Blocks and Swales

As a broad category, Linear Swale and Ditch Treatment Systems are vegetated, road-parallel retention or detention areas intended to provide water quality treatment for roadway runoff. They often include structural components such as ditch blocks or overflow structures. Filtration to improve water quality treatment may also be incorporated. When filtration is provided, cleanout ports allow for maintenance of the filtration system. Cleanouts can be located on the swale bottom or on the side slopes. Inspectors should check the as-built drawings to confirm the number and locations of cleanouts. Both retention and detention systems are typically designed to drawdown the entire treatment volume in no more than 72 hours after a rainfall event. For purposes of this guide, rating criteria are provided for nine of the most common linear treatment systems, including seven ditch block configurations.

Ditch block systems are linear treatment systems that consist of a series of road-perpendicular raised berms separated by vegetated treatment swales running parallel to the road. Ditch block systems can be wet or dry depending on the design. Under normal design conditions, water is not discharged over the top of the ditch block, however, for larger storms, the ditch block serves as an emergency overflow. The height of ditch blocks varies considerably depending upon the specific site conditions and application. Design heights can range from 6 inches to 4 feet.

Stormwater discharged to a dry ***retention*** ditch block system slowly percolates through permeable soils into the shallow groundwater aquifer. Under typical designs, the treatment volume is not discharged downstream of the system. The treatment volume is the storage that exists between swale bottom and the top of the ditch block.

Dry ***detention*** ditch block systems differ from retention systems in that they include a weir or orifice in the ditch block structure through which the treatment volume is discharged slowly offsite or downstream. Additional recovery is achieved by percolation through

permeable soils into the shallow groundwater aquifer. The treatment volume is the storage that exists between swale bottom and the weir or orifice elevation.

Linear treatment systems vary considerably in terms of design and construction material. Permutations beyond the nine types presented here may exist, however, inspection of those systems can be accomplished by rating the applicable features from two or more of the nine categories. Additional details of the nine types of linear treatment systems included in the rating table are provided below and in Figures 4-24 through 4-32.

1. A **Simple Treatment Swale/Ditch** is a vegetated roadside system that is dry under normal conditions but receives water from roadway runoff during rainfall events. Runoff can be via sheet flow or routed through an inflow pipe. These systems can be open or closed, but do not include supplemental structures to control or regulate discharge.

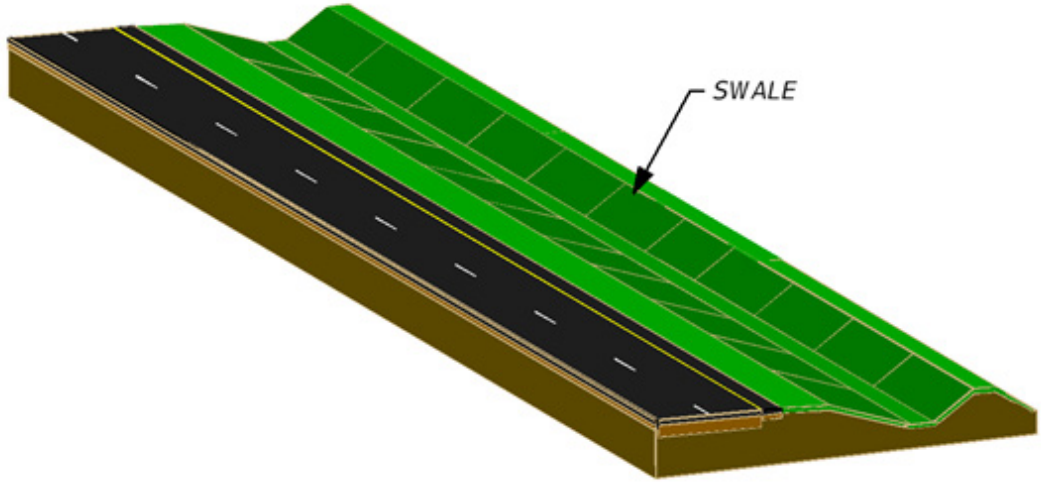


Figure 4-24. Simple Treatment Swale *Return to List of Figures*

2. A **Treatment Swale with Control Structure, with or without Filtration** is a dry retention system with an emergency overflow control structure. The elevation of the outfall control structure determines the depth of retention and treatment volume of the swale. The dry retention area is often underlain with perforated drainage pipe that collects and conveys percolated stormwater to the control structure. Underdrain systems are intended to control the groundwater table elevation over the entire area of the treatment basin and provide for the drawdown of the treatment volume. Cleanout ports are provided for maintenance of the filtration system.

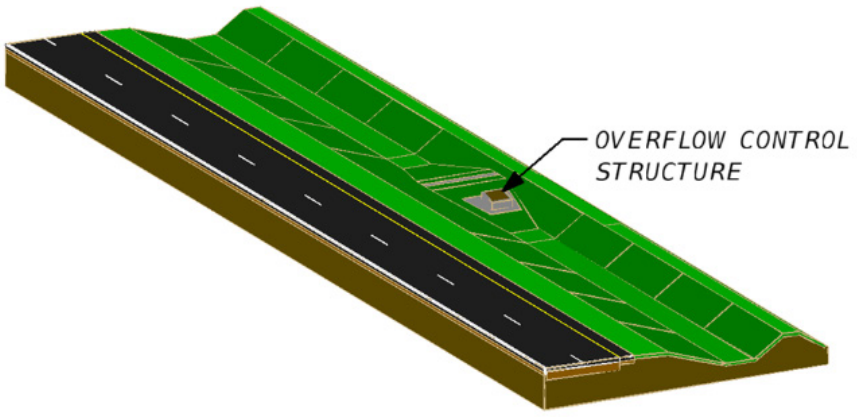


Figure 4-25. Treatment Swale with Control Structure Return to List of Figures

3. In a **Concrete Ditch Block** system, the ditch block structures are overlain by a layer of concrete. These are retention systems that are designed to hold water during typical storm conditions. During more severe storms, water may discharge over the top of the concrete berm.

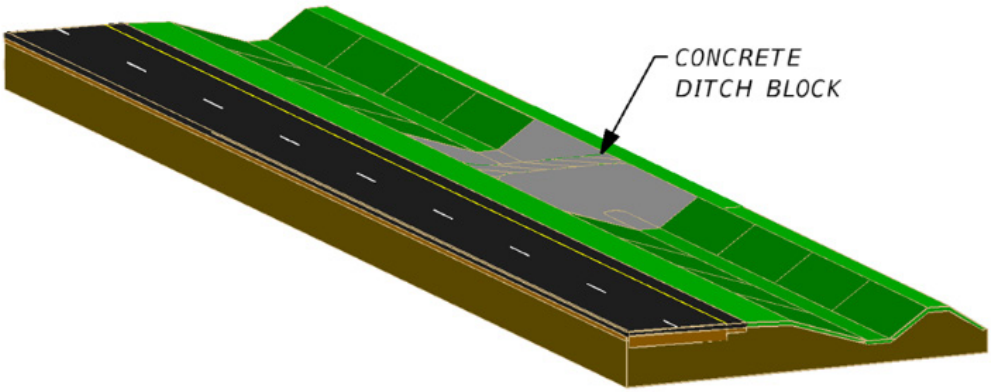


Figure 4-26. Concrete Ditch Block *Return to List of Figures*

4. A **Concrete Ditch Block with Orifice and Sump** includes a concrete berm with a pipe through the berm to slowly draw down the stormwater. Depressed areas, or sumps, at the base of the berm trap sediment to help prevent clogging of the orifice pipe. These are detention systems because they are designed to recover through slow discharge offsite and not complete onsite retention.

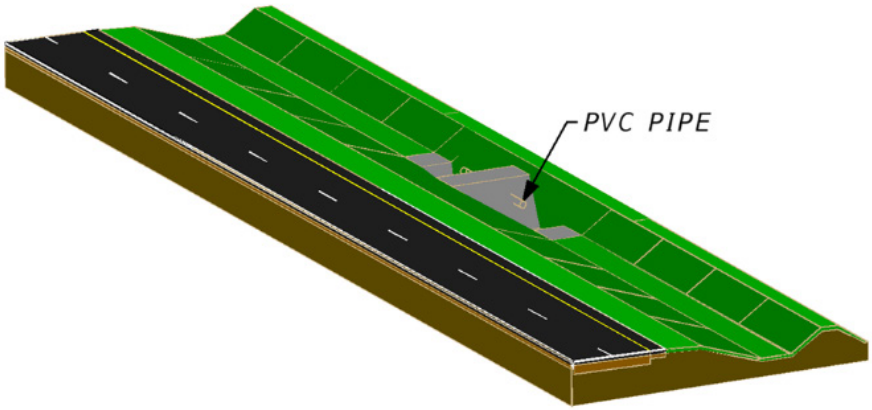


Figure 4-27. Concrete Ditch Block with Orifice and Sump Return to List of Figures

5. A **Concrete Ditch Block with Skimmer** is a concrete berm that includes a skimmer to help prevent the discharge of trash and oils over the top of the berm under emergency overflow conditions.

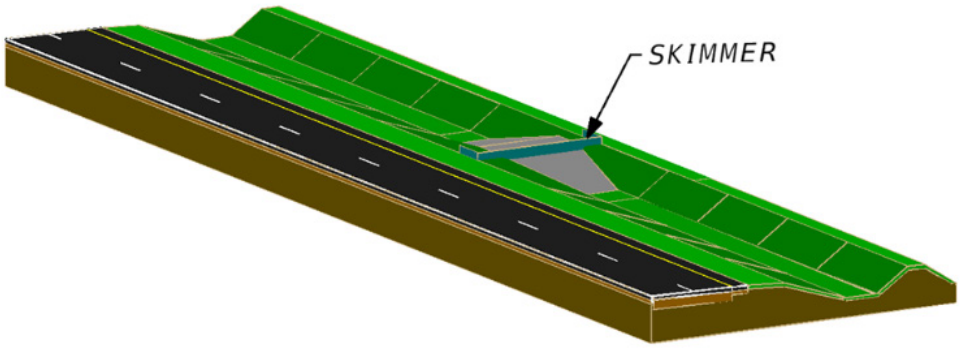


Figure 4-28. Concrete Ditch Block with Skimmer *Return to List of Figures*

6. An **Earthen Ditch Block** is a berm constructed entirely of soil, overlain and protected by turf grass. These are retention systems that are designed to hold water during typical storm conditions. During more severe storms, water may discharge over the top of the earthen berm. Earthen ditch block systems are typically used in flat terrain.

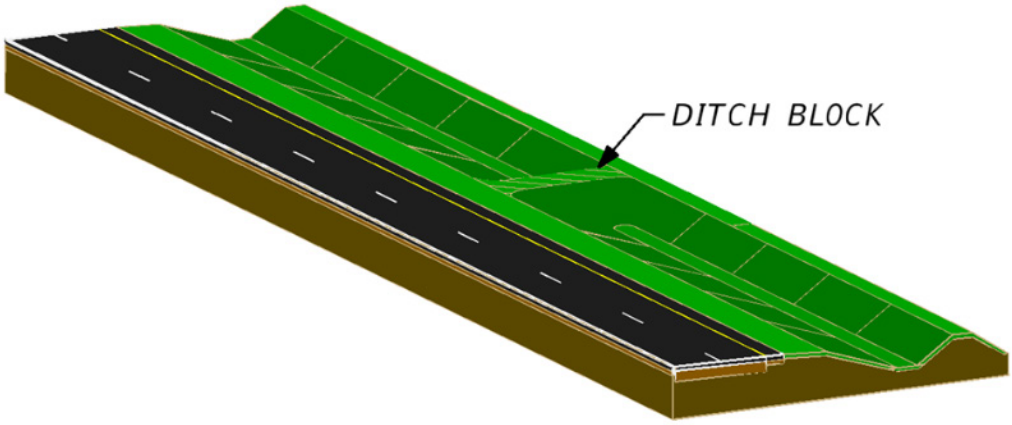


Figure 4-29. Earthen Ditch Block *Return to List of Figures*

7. An **Earthen Ditch Block with Concrete Core** is an earthen berm reinforced internally with a vertical concrete core at its center. The top of the core is typically flush with the ground. Systems are no longer designed with this configuration because they are susceptible to washout and damage from mowers. However, they used to be common and are found frequently in the field.

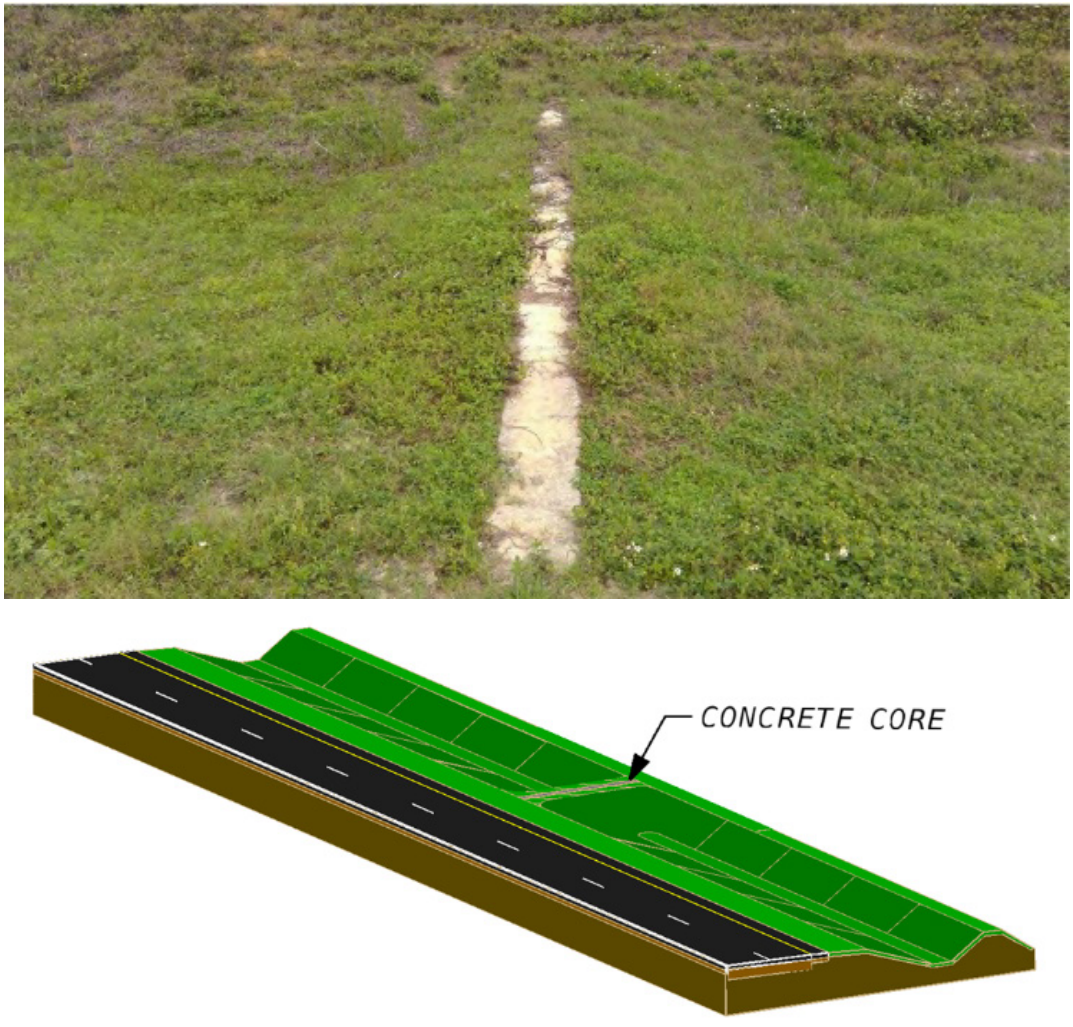


Figure 4-30. Earthen Ditch Block with Concrete Core *Return to List of Figures*

8. An **Earthen or Concrete Ditch Block with Concrete Weir** is a detention system where the drawdown device is a concrete weir. The berm can be earthen, but the weir is protected from washout by a layer of concrete. Other ditch block/weir systems consist of a weir cut into a concrete ditch block.

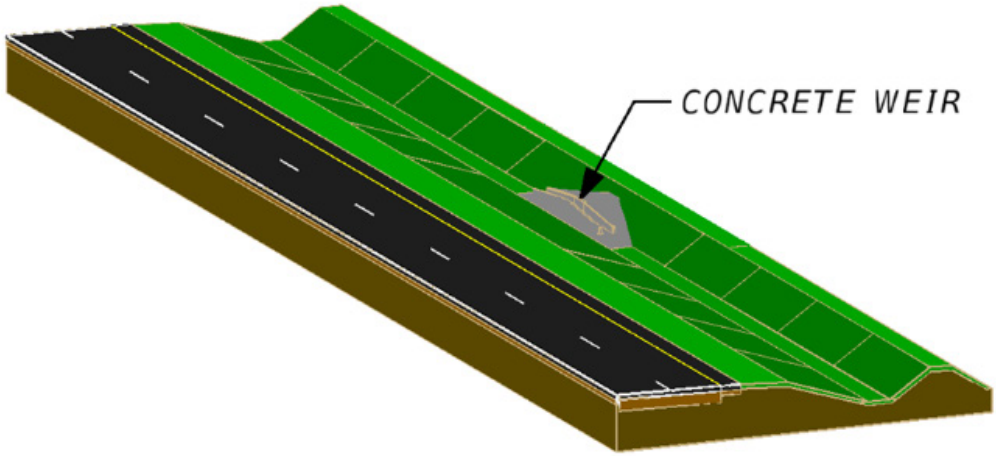


Figure 4-31. Earthen or Concrete Ditch Block with Concrete Weir

Return to List of Figures

9. An **Earthen Berm/ Concrete Discharge Ditch Block** is a retention system that is vegetated on the upstream side and protected by a concrete apron on the downstream or discharge side. Under normal design conditions, the system does not discharge, but for larger storms, the concrete apron protects the downstream side from washout.

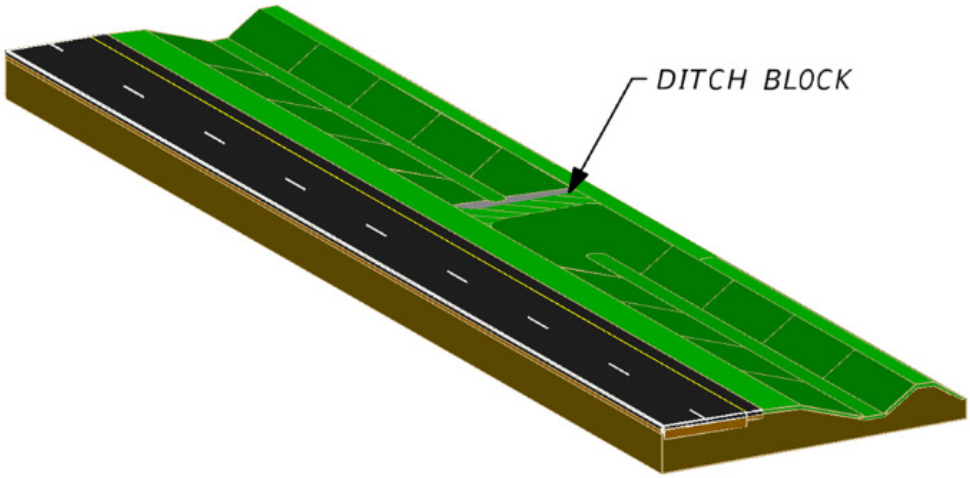


Figure 4-32. Earthen Berm/Concrete Discharge Ditch Block *Return to List of Figures*

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
	Good B-3 B-4 B-10	✓ Swale slopes and vegetated berm are well maintained, mowed regularly ✓ All structures are intact with no structural deficiency ✓ Free of trash, debris, and graffiti	✓ None
	Fair B-6	✓ Swale or berm need to be mowed ✓ Small amounts of trash or debris present	✓ Proactive maintenance recommended o Mow swale or berm o Remove trash and debris
	Poor B-7	✓ Swale and vegetated berm not being routinely maintained ✓ Excessive trash and debris present in swale bottom or along berm ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Mow slopes and berm ✓ Other maintenance as needed to correct deficiencies
Hydraulic Recovery Condition			
Overall Recovery	Good B-1 B-4 B-5	✓ System appears to recover its treatment volume within the regulatory timeframe ✓ No sedimentation inhibiting infiltration ✓ No blockage of bleed-down device evident, if applicable ✓ No aquatic vegetation	✓ None
	Fair B-7 APP-9	✓ System appears to be recovering more slowly than designed ✓ Partial blockage of weir or bleed-down device (if applicable) is slowing recovery ✓ Minimal aquatic vegetation	✓ Proactive maintenance recommended o Remove any observed blockage from weir or bleed-down orifice (if applicable)
	Poor B-6	✓ System appears to not recover within the regulatory timeframe ✓ Compacted sediment preventing proper infiltration ✓ Excess aquatic vegetation growth observed within swale bottom ✓ Bleed-down device (if applicable) is blocked	✓ Identify and correct problems preventing pond from recovering ✓ Other maintenance as needed to correct deficiencies ✓ Scrape out excess sediment and aquatic vegetation from swale bottom.
Sedimentation	Good B-1 B-9 B-11	✓ No evidence of sedimentation problem observed	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Sedimentation	Fair	✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation	✓ Proactive maintenance recommended ○ Remove accumulated sediment ○ Find/eliminate source of sedimentation
	Poor B-6	✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation	✓ Remove accumulated sediment to re-establish swale bottom to original design grade ✓ Find/eliminate source of sedimentation
Vegetation Condition			
	Good B-2 B-3 B-11	✓ No unwanted vegetation in swale ✓ The vegetative cover is in good condition and well maintained ✓ Swale area mowed regularly ✓ No nuisance or invasive species present ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair B-4 B-8 APP-10	✓ The vegetative cover is in fair condition or requires minor attention ✓ Minor areas of dead vegetation or bare soil observed ✓ Swale area needs to be mowed ✓ Some vegetation around structures but functioning as designed and not inhibiting flow or hydraulic recovery function ✓ Some invasive vegetation present but covering less than 25% of area	✓ Proactive maintenance recommended ○ Remove invasive and nuisance vegetation ○ Mow side slopes ○ Harvest vegetation ○ Re-establish turf/grass where needed
	Poor B-6 B-7	✓ The vegetative cover is in poor condition and/or not being maintained ✓ Woody vegetation growing in swale bottom or along berms ✓ Vegetation and swale slopes have become destabilized and sedimentation is affecting function ✓ Large portions of swale have little to no vegetative cover ✓ Invasive and nuisance species are present and covering more than 25% of area ✓ Excessive vegetation on ditch block or inflow and outflow structures such that it may inhibit system recovery of hydraulic function	✓ Remove invasive and nuisance vegetation ✓ Remove vegetation from around structural controls ✓ Re-establish turf/grass where needed ✓ Stabilize slopes ✓ Other maintenance as needed to correct deficiencies

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Structural Condition			
Simple Treatment Swale/Ditch (Treatment System 1 in Description Text)	Good B-1	✓ No erosion of slopes, vegetation intact ✓ Slopes mowed and maintained ✓ System recovers treatment volume ✓ No sediment accumulation	✓ None
	Fair	✓ Minor erosion or missing vegetation, but functioning as designed ✓ Swale bottom elevation varies more than 10% but less than 25% of the design depth ✓ System recovers treatment volume	✓ Proactive maintenance recommended o Locate and eliminate source of sedimentation o Re-establish turf/grass where needed
	Poor	✓ Significant slope erosion and/or missing vegetation ✓ Swale and vegetated berm not being routinely maintained ✓ Excessive trash and debris present in swale bottom or along berm and side slopes ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the design depth ✓ System not recovering treatment volume	✓ Remove excess sediment ✓ Remove trash ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Re-establish turf/grass ✓ Mow slopes ✓ Other maintenance as needed to correct deficiencies
Treatment Swale with Control Structure, with or without Filtration (Treatment System 2 in Description Text)	Good B-3 B-4	✓ Control structure like new and functioning as designed ✓ Control structure intact with no visible damage ✓ Accumulation of debris or sediment is less than 25% the depth of the control structure chamber ✓ Grates present and properly placed with little to no damage ✓ Safety chain present ✓ Systems with filtration, underdrains flowing freely to the control structure. System exhibiting good hydraulic performance. ✓ Cleanout port free of damage, joints intact	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Treatment Swale with Control Structure, with or without Filtration (Treatment System 2 in Description Text)	Fair B-2	✓ Minor damage to structure or grates, but more than 90% of control structure is functioning as designed ✓ Accumulation of debris/sediment is more than 25% but less than 50% of the control structure chamber depth ✓ Safety chain missing ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume ✓ Systems with filtration, limited underdrain flow to the control structure ✓ Minor damage to cleanout ports and/or joints not affecting performance	✓ Proactive maintenance recommended o Locate and eliminate source of sedimentation o Replace safety chain
	Poor APP-11	✓ Collapsed or severely damaged structure ✓ Less than 90% of control structure is functioning as designed ✓ Excessive trash and debris (over 50%) of chamber depth ✓ Grates missing or significantly damaged ✓ Excessive leakage at joints ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume ✓ Systems with filtration, no underdrain flow observed. ✓ Cleanout ports damaged and allowing water to bypass flow through the filter media and discharge untreated ✓ Depressions over underdrain pipe alignment: leaking pipe joints.	✓ Repair structure ✓ Remove trash ✓ Replace grates ✓ Locate and eliminate source of sedimentation ✓ Remove obstructions to restore flow through underdrain system ✓ Repair/replace cleanout port ✓ Other maintenance as needed to correct deficiencies
Concrete Ditch Block (Treatment System 3 in Description Text)	Good B-5	✓ Like new and functioning as designed ✓ No cracks or missing concrete ✓ System recovers treatment volume ✓ No sediment accumulation ✓ No erosion or undermining present	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Concrete Ditch Block (Treatment System 3 in Description Text)	Fair	✓ Minor damage, subsidence, scour, or missing vegetation, but functioning as designed ✓ Cracks in concrete, missing corners, scour on outside edges of berm ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume	✓ Proactive maintenance recommended o Locate and eliminate source of sedimentation o Monitor progression of damage noted
	Poor	✓ Less than 90% of structure functioning as designed ✓ Large cracks or missing concrete preventing detention of stormwater ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Other maintenance as needed to correct deficiencies
Concrete Ditch Block with Orifice and Sump (Treatment System 4 in Description Text)	Good	✓ Like new and functioning as designed ✓ No cracks or missing concrete ✓ System recovers treatment volume ✓ No sediment accumulation ✓ No erosion or undermining present ✓ Bleed-down orifice is undamaged and not obstructed ✓ Anti-clog device present and undamaged ✓ No sediment accumulation in sump	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Concrete Ditch Block with Orifice and Sump (Treatment System 4 in Description Text)	Fair	✓ Minor damage, subsidence, scour, or missing vegetation, but more than 90% of structure functioning as designed ✓ Minor cracks in concrete, missing corners, scour on outside edges of berm ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume ✓ Minor obstruction or damage to orifice but still allowing for full recovery ✓ Anti-clog device present with minor damage not affecting function ✓ System recovers treatment volume ✓ Sediment accumulation in sump is more than 10% but less than 25% of sump design depth	✓ Proactive maintenance recommended ○ Locate and eliminate source of sedimentation ○ Monitor progression of damage noted
	Poor B-6	✓ Less than 90% of structure functioning as designed ✓ Large cracks or missing concrete preventing detention of stormwater ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume ✓ Orifice blocked or clogged ✓ Anti-clog device missing or damaged ✓ Sediment accumulation in sump is more than 25% of sump design depth	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Unclog orifice ✓ Replace anti-clog device ✓ Other maintenance as needed to correct deficiencies
Concrete Ditch Block with Skimmer (Treatment System 5 in Description Text)	Good	✓ Like new and functioning as designed ✓ No cracks or missing concrete ✓ No sediment accumulation ✓ No erosion or undermining present ✓ Skimmer is like new with little or no deterioration and functioning as designed ✓ Less than 25% of skimmer opening is obstructed by vegetation/debris	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Concrete Ditch Block with Skimmer (Treatment System 5 in Description Text)	Fair APP-12	✓ Minor damage, subsidence, scour, or missing vegetation, but more than 90% of structure functioning as designed ✓ Minor cracks in concrete, missing corners, scour on outside edges of berm ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume ✓ Skimmer may have minor damage (i.e., cracks) and some deterioration, but structurally sound and functionally adequate ✓ Between 25% and 50% of skimmer opening is obstructed by vegetation, debris, or sediment accumulation	✓ Proactive maintenance recommended ○ Locate and eliminate source of sedimentation ○ Repair damage to skimmer ○ Remove skimmer obstructions ○ Monitor progression of damage noted
	Poor B-7	✓ Less than 90% of structure functioning as designed ✓ Large cracks or missing concrete preventing detention of stormwater ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume ✓ Skimmer is missing, detached, or collapsed and not functioning as designed ✓ More than 50% of skimmer opening is blocked by vegetation, debris, or sediment accumulation	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Replace skimmer ✓ Other maintenance as needed to correct deficiencies
Earthen Ditch Block (Treatment System 6 in Description Text)	Good B-8	✓ Like new and functioning as designed ✓ No subsidence in ditch block height, no scour, vegetation intact, no damage visible ✓ No sediment accumulation ✓ No erosion or undermining present ✓ System recovers treatment volume	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Earthen Ditch Block (Treatment System 6 in Description Text)	Fair	✓ Minor damage, subsidence, scour, or missing vegetation, but more than 90% of structure is functioning as designed ✓ Berm subsidence less than 10% of design height ✓ Less than 10% vegetation missing ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume	✓ Proactive maintenance recommended o Locate and eliminate source of sedimentation o Monitor progression of damage noted
	Poor	✓ Less than 90% of structure functioning as designed ✓ Berm subsidence more than 10% of design height ✓ Significant scour and/or rills and gullies developed ✓ More than 10% of vegetative cover missing ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Re-establish turf/grass ✓ Other maintenance as needed to correct deficiencies
Earthen Ditch Block with Concrete Core (Treatment System 7 in Description Text)	Good B-4	✓ Like new and functioning as designed ✓ No subsidence in height of earthen berm ✓ No scour, erosion, or undermining present ✓ Vegetation on ditch block intact, no damage visible ✓ Concrete core like new, no cracks or missing concrete ✓ No sediment accumulation ✓ System recovers treatment volume	✓ None
	Fair B-9	✓ Minor damage, subsidence, scour, or missing vegetation, but more than 90% of structure is functioning as designed ✓ Berm subsidence less than 10% of design height ✓ Less than 10% vegetation missing from ditch block ✓ Concrete core has small cracks, missing corners, minor scour on outside edges of berm ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume	✓ Proactive maintenance recommended o Locate and eliminate source of sedimentation o Monitor progression of damage noted

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Earthen Ditch Block with Concrete Core (Treatment System 7 in Description Text)	Poor APP-13	✓ Less than 90% of structure functioning as designed ✓ Berm subsidence more than 10% of design height ✓ Significant scour and/or rills and gullies developed ✓ More than 10% of vegetative cover missing from ditch block ✓ Concrete core has large cracks or missing concrete preventing detention of stormwater ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Re-establish turf/grass ✓ Other maintenance as needed to correct deficiencies
Earthen/Concrete Ditch Block with Concrete Weir (Treatment System 8 in Description Text)	Good B-10	✓ Like new and functioning as designed ✓ No subsidence in height of earthen berm ✓ No scour, erosion, or undermining present ✓ Vegetation intact, no damage visible ✓ No sediment accumulation ✓ No obstructions or debris at weir preventing flow ✓ No cracks, chips, or damage to weir concrete ✓ System recovers treatment volume	✓ None
	Fair	✓ Minor damage, subsidence, scour, or missing vegetation, but more than 90% of structure is functioning as designed ✓ Berm subsidence is less than 10% of design height ✓ Minor scour, less than 10% vegetation missing ✓ Minor damage to weir, small cracks or chips in concrete ✓ Less than 25% of weir opening is blocked and recovery rate is acceptable ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume	✓ Proactive maintenance recommended ○ Remove blockage ○ Locate and eliminate source of sedimentation ○ Monitor progression of damage noted

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Earthen/Concrete Ditch Block with Concrete Weir (Treatment System 8 in Description Text)	Poor	✓ Less than 90% of structure functioning as designed ✓ Berm subsidence is more than 10% of design height ✓ Significant scour and/or rills and gullies developed ✓ More than 10% of vegetative cover missing ✓ Debris, vegetation, or other obstruction is present and inhibiting flow over the weir ✓ More than 25% of weir opening is blocked ✓ Large cracks or sections of weir missing ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Re-establish turf/grass ✓ Remove blockage ✓ Other maintenance as needed to correct deficiencies
Earthen Berm/Concrete Discharge Ditch Block (Treatment System 9 in Description Text)	Good B-11	✓ Like new and functioning as designed ✓ System recovers treatment volume ✓ No sediment accumulation ✓ No cracks or missing concrete ✓ No subsidence in height, no scour, vegetation intact, no damage visible ✓ No erosion or undermining present	✓ None
	Fair	✓ Minor damage, subsidence, scour, or missing vegetation, but more than 90% of structure is functioning as designed ✓ Earthen berm subsidence is less than 10% of design height ✓ Minor scour, less than 10% vegetation missing ✓ Concrete discharge has small cracks, missing corners, minor scour on outside edges of berm ✓ Swale bottom elevation varies more than 10% but less than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System recovers treatment volume	✓ Proactive maintenance recommended ○ Locate and eliminate source of sedimentation ○ Monitor progression of damage noted

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Earthen Berm/Concrete Discharge Ditch Block (Treatment System 9 in Description Text)	Poor	✓ Less than 90% of structure functioning as designed ✓ Earthen berm subsidence is more than 10% of design height ✓ Significant scour and/or rills and gullies developed ✓ More than 10% of vegetative cover missing ✓ Concrete discharge has large cracks or missing concrete ✓ Excess sediment accumulation affecting system recovery ✓ Swale bottom elevation varies more than 25% of the difference between the design elevation of the top of ditch block and the swale bottom design elevation ✓ System not recovering treatment volume	✓ Repair structure ✓ Remove excess sediment ✓ Locate and eliminate source of sedimentation ✓ Regrade swale to design elevation ✓ Re-establish turf/grass ✓ Other maintenance as needed to correct deficiencies
Non-Pipe Inflow and Outflow Structures	Good B-3	✓ Like new with little or no deterioration and functioning as designed ✓ Structure opening is not obstructed ✓ No undermining of structure present	✓ None
	Fair	✓ Up to 25% of structure opening is obstructed but providing adequate conveyance ✓ Structure has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Undermining present but no damage to structure observed	✓ Proactive maintenance recommended ○ Fill and stabilize undermining ○ Remove obstructions
	Poor	✓ Not functioning properly due to damage, e.g., collapsed apron or flume ✓ More than 25% of structure opening is obstructed, e.g., excessive vegetation or sediment accumulation ✓ Structure has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Significant undermining of structure(s) is present	✓ Repair or replace damaged components ✓ Remove obstructions and/or sediment ✓ Other maintenance as needed to correct deficiencies
Inflow and Outflow Pipes	Good B-2	✓ Like new with little or no deterioration and functioning as designed ✓ Flap gates present and functioning properly ✓ Up to 25% of pipe opening is obstructed but providing adequate conveyance	✓ None

Treatment Swales and Ditches, including Ditch Block Systems Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Inflow and Outflow Pipes	Fair	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function	✓ Proactive maintenance recommended o Remove pipe obstructions o Repair structural damage o Repair or replace flap gates
	Poor	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as designed	✓ Repair or replace damaged components ✓ Remove obstructions ✓ Other maintenance as needed to correct deficiencies
Erosion Condition			
	Good B-2 B-5 B-8	✓ Some surficial erosion with minor rills present ✓ Vegetation on slope generally intact with minimal bare areas, low erosion potential, stable slope ✓ Minimal to no undermining is apparent	✓ None
	Fair B-1 B-9	✓ Minor erosion on swale slopes or ditch block berm ✓ Minor undermining around system structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion o Repair undermining
	Poor	✓ Substantial erosion compromising slope and/or berm stability ✓ Substantial undermining compromising system structures ✓ Large rills and gullies present along swale slope ✓ Large areas of vegetation on slope have become dislodged and slope is unstable	✓ Regrade and stabilize slopes and berm ✓ Re-establish turf/grass ✓ Other maintenance as needed to correct deficiencies

Examples of Linear Treatment System Rating Criteria

Treatment Swale **B-1**

Rating Summary

- Overall Appearance – Good
  - Minimal trash present
  - Slopes well maintained
- Hydraulic Recovery – Good
  - Swale dry, indicating system is recovering its treatment volume
- Sedimentation Condition - Good
  - No buildup of sediment
- Vegetation Condition – Good
  - Vegetation cover intact with no bare areas
  - Slopes mowed regularly
  - Brown turf indicates dormancy, not lack of maintenance
- Erosion Condition – Good
  - No erosion, slope appears stable

Maintenance Needs

- None

Return to Rating Table

Treatment Swale with Underdrain **B-2**

Rating Summary

- Overall Appearance – Good
  - Free of trash and debris
- Hydraulic Recovery – Good
  - No standing water observed
- Sedimentation Condition – Good
  - No sediment accumulation observed
- Vegetation Condition – Good
  - Slopes are mowed and well maintained
- Structural Condition – Fair
  - Underdrain cleanout cap is broken
  - Inflow pipes undamaged and free of obstruction
- Erosion Condition – Good
  - No erosion present

Maintenance Needs

- Replace underdrain cap

Return to Rating Table

Treatment Swale **B-3**

Rating Summary

- Overall Appearance – Good
  - Free of trash and debris
- Hydraulic Recovery – Good
  - System appears to be recovering as designed
- Sedimentation Condition – Good
  - System is free of accumulated sediment
- Vegetation Condition - Good
  - Vegetative cover in good condition and well maintained
- Control Structure – Good
  - Skimmer fully attached and undamaged
  - Grates in place and undamaged
- Erosion Condition – Good
  - No erosion noted

Maintenance Needs

- None

Return to Rating Table

Concrete Core Ditch Block with Overflow Control Structure **B-4**

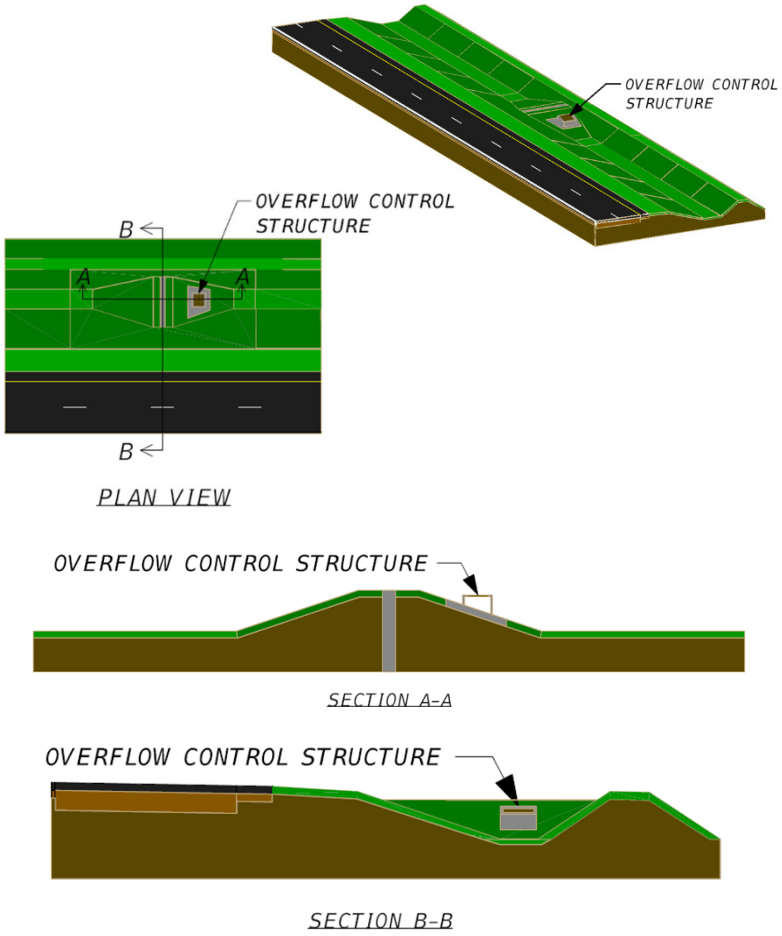
Rating Summary

- Aesthetic Condition – Good
  - No trash or debris
- Hydraulic Recovery - Good
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Fair
  - Patchy vegetative cover
  - Recently mowed
- Structural Condition - Good
  - No damage to overflow structure
  - No damage to concrete core
- Erosion Condition – Good
  - No erosion noted

Maintenance Needs

- None

Return to Rating Table



Concrete Ditch Block **B-5**

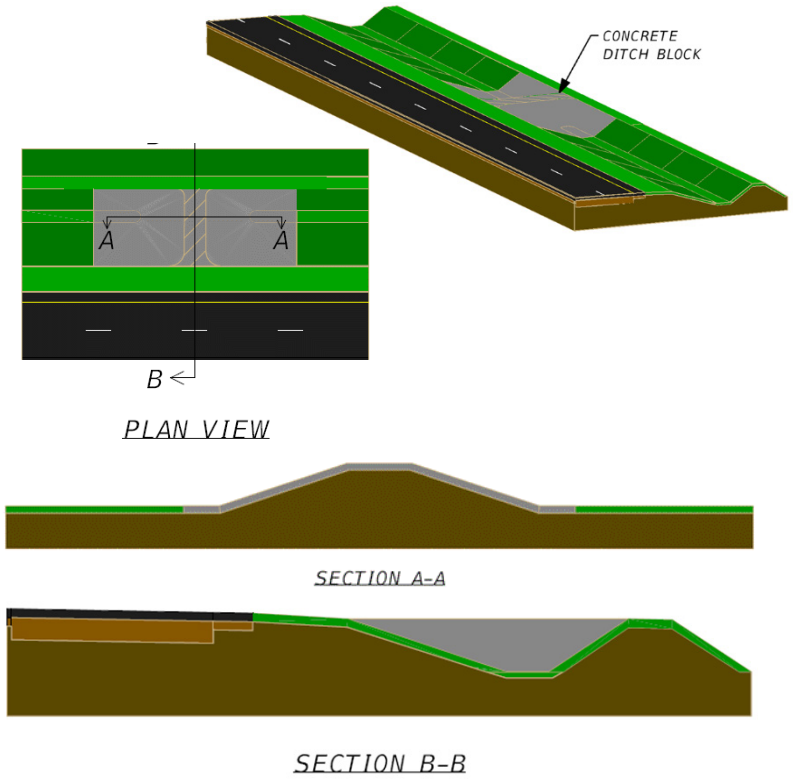
Rating Summary

- Aesthetic Condition – Good
  - Free of debris and litter
- Hydraulic Recovery - Good
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Good
  - Recently mowed
- Structural Condition - Good
  - No damage to concrete; like new
- Erosion Condition – Good
  - No erosion noted

Maintenance Needs

- None

Return to Rating Table



Concrete Ditch Block with Orifice **B-6**

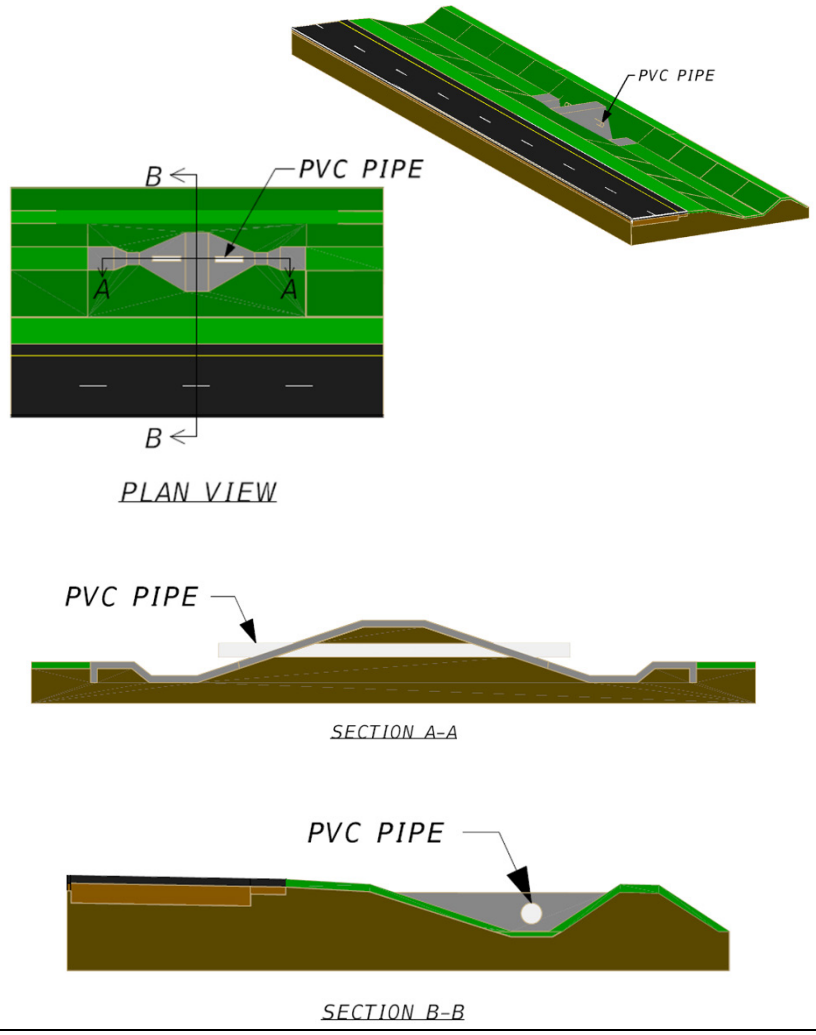
Rating Summary

- Aesthetic Condition – Fair
  - Overgrown, invasive vegetation on slopes
  - Free of debris and litter
- Hydraulic Recovery - Poor
  - Excess vegetation and sediment in sump impacting system recovery
- Vegetation Condition – Poor
  - Invasive vegetation covering more than 25% of area
  - Excess vegetation affecting system recovery
  - Vegetation blocking orifice
- Structural Condition - Poor
  - Excess sedimentation in sump as evidenced by vegetative overgrowth
  - No damage to concrete berm
  - Orifice appears to be intact
- Erosion Condition – Good
  - No erosion noted

Maintenance Needs

- Remove sediment accumulation in sump
- Check orifice for blockages
- Mow swale
- Control for invasive vegetation

Return to Rating Table



Concrete Ditch Block with Skimmer **B-7**

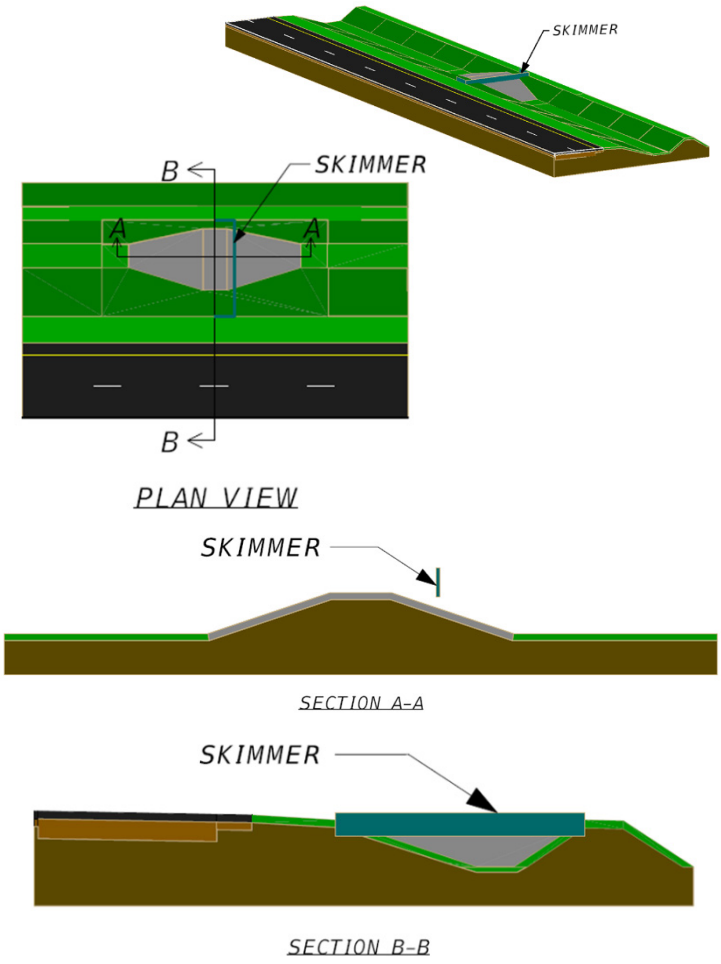
Rating Summary

- Aesthetic Condition – Poor
  - Overgrown vegetation in swale and blocking skimmer
- Hydraulic Recovery - Fair
  - Excess vegetation inhibiting system recovery
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Poor
  - Vegetation not being maintained
- Structural Condition - Poor
  - More than 50% of skimmer opening is obstructed
  - No damage to concrete berm
  - No damage to skimmer
- Erosion Condition – Good
  - No erosion noted

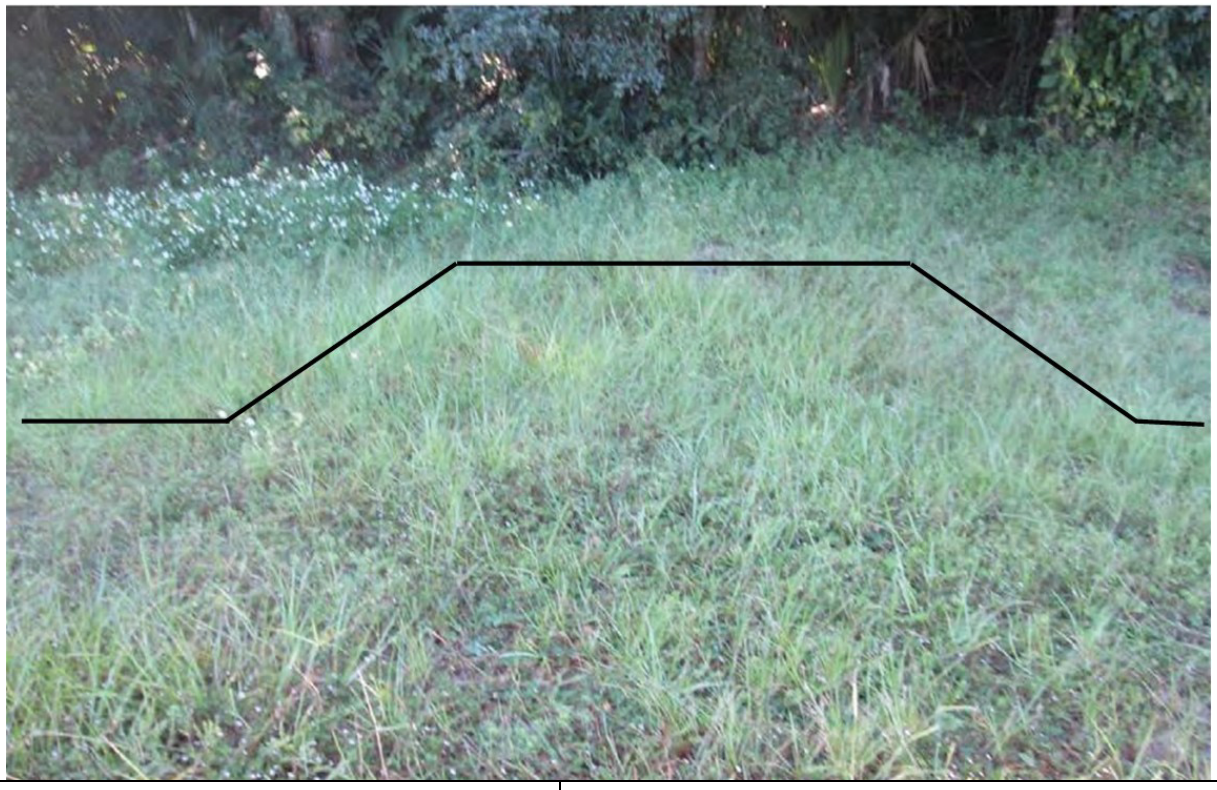
Maintenance Needs

- Address excess vegetation so skimmer function is restored

Return to Rating Table



Earthen Ditch Block **B-8**



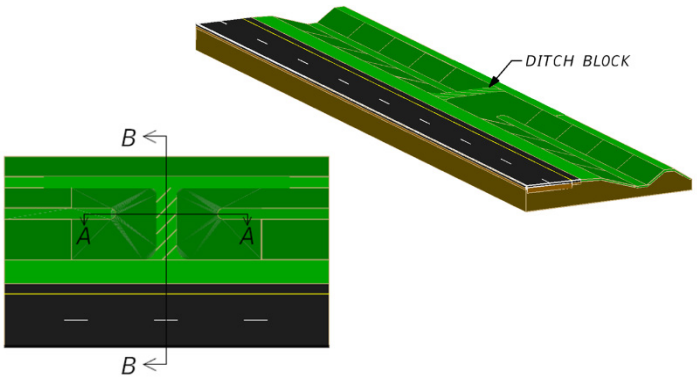
Rating Summary

- Aesthetic Condition – Good
  - Free of debris and litter
- Hydraulic Recovery - Good
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Fair
  - Needs to be mowed
- Structural Condition - Good
  - No erosion or scour
- Erosion Condition - Good

Maintenance Needs

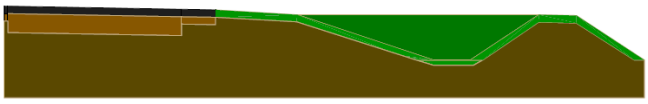
- Mow ditch block and swale

Return to Rating Table



PLAN VIEW

SECTION A-A



SECTION B-B

Concrete Core Ditch Block **B-9**

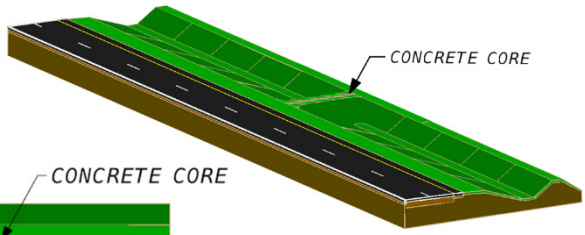
Rating Summary

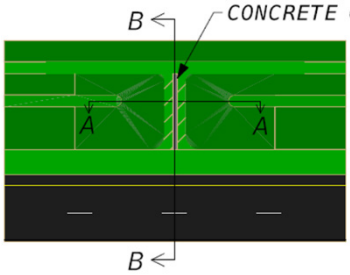
- Aesthetic Condition – Good
  - Free of debris and litter
- Hydraulic Recovery - Good
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Good
  - Recently mowed
- Structural Condition - Fair
  - Minor damage to concrete
- Erosion Condition – Fair
  - Minor scour/erosion on one end

Maintenance Needs

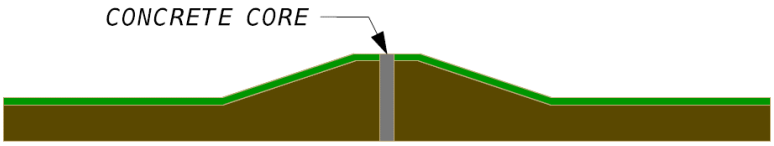
- Monitor scour, and add fill and sod as needed

Return to Rating Table





PLAN VIEW



SECTION A-A

SECTION B-B

Concrete or Earthen Ditch Block with Weir **B-10**

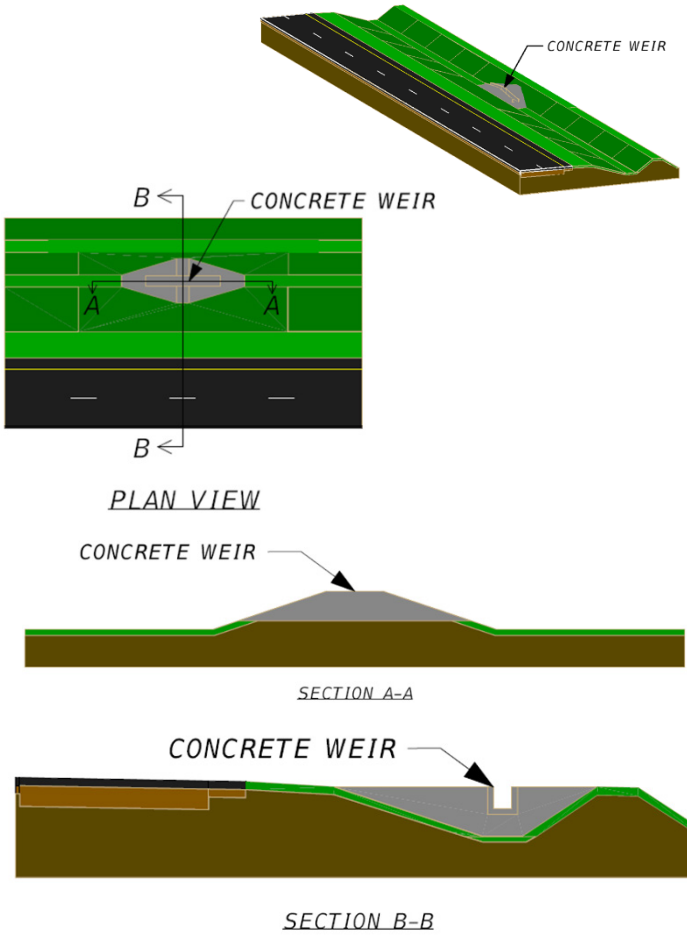
Rating Summary

- Aesthetic Condition – Good
  - No trash or debris
- Hydraulic Recovery - Good
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Good
  - Recently mowed
- Structural Condition - Good
  - No damage to concrete; like new
- Erosion Condition – Good
  - No erosion noted

Maintenance Needs

- None

Return to Rating Table



Earthen Berm/Concrete Discharge Ditch Block **B-11**

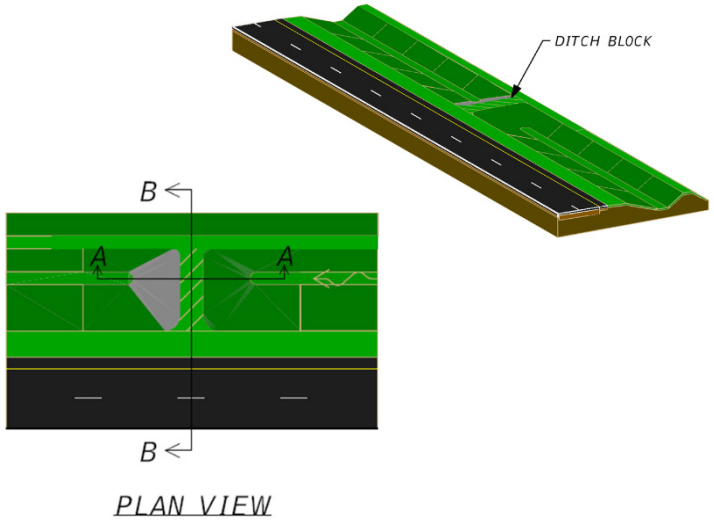
Rating Summary

- Aesthetic Condition – Good
  - No trash or debris
- Hydraulic Recovery - Good
  - No standing water
  - No accumulated sediment
- Vegetation Condition – Good
  - Vegetation intact and recently mowed
- Structural Condition - Good
  - No damage to concrete
- Erosion Condition – Good
  - No erosion noted

Maintenance Needs

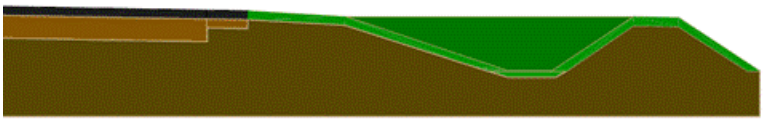
- None

Return to Rating Table



PLAN VIEW

SECTION A-A



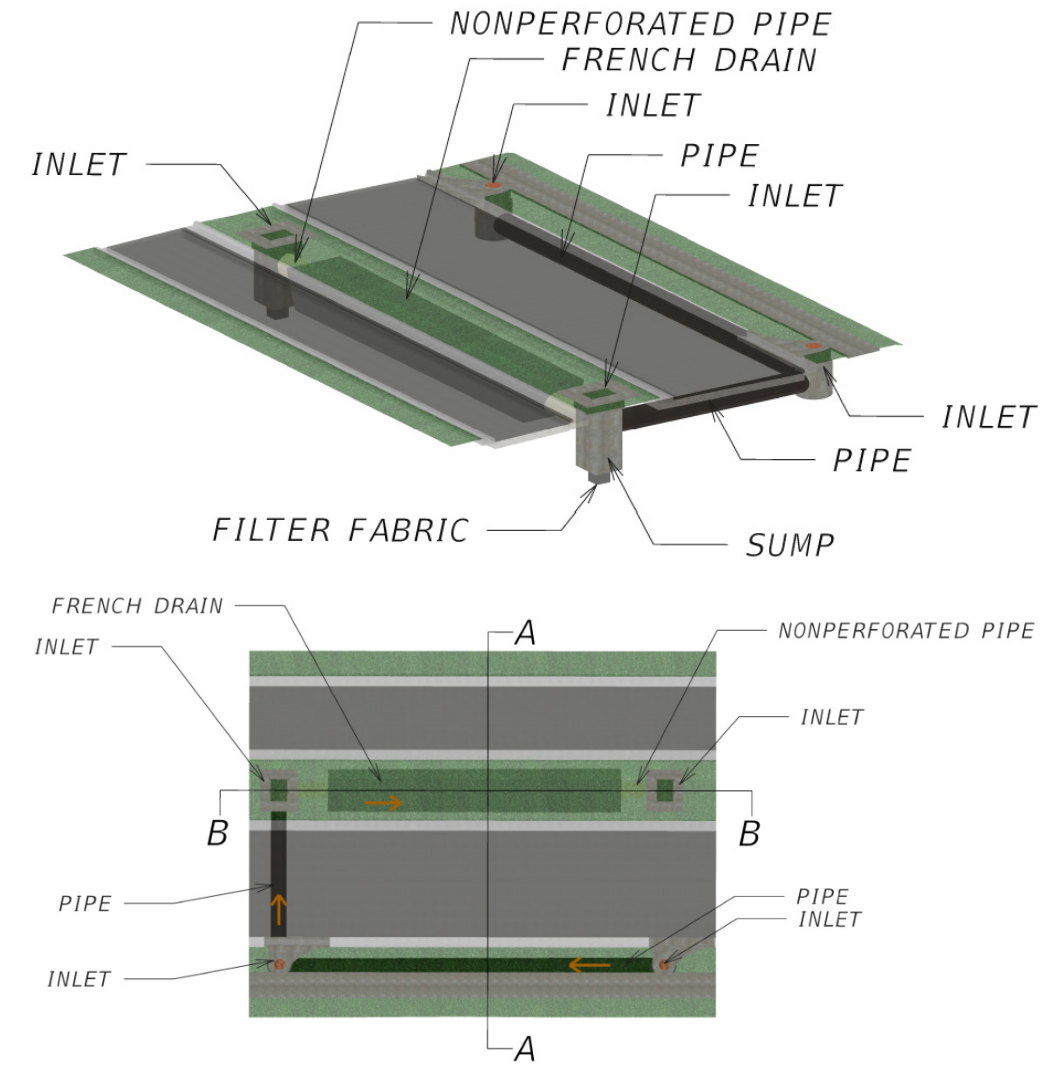
SECTION B-B

4.2.1.2 Exfiltration Systems and Drainage Wells

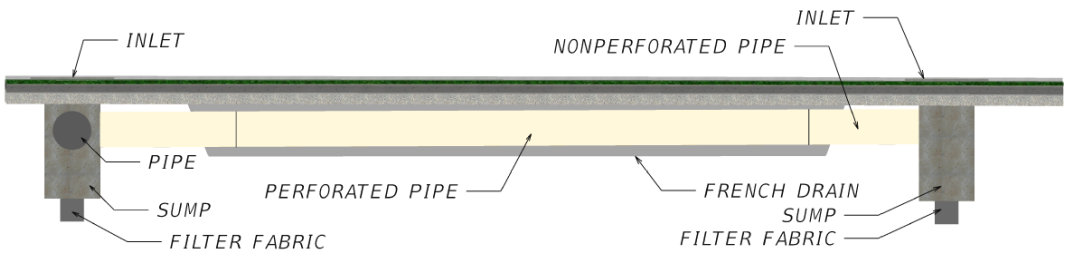
4.2.1.2.1. Horizontal Exfiltration/French Drains

A **horizontal exfiltration system**, or French drain, is an underground drainage system consisting of a perforated pipe surrounded by natural or artificial aggregate, which stores and infiltrates runoff (Figure 4-33). Catch basins/sumps located at the end of each exfiltration trench segment collect stormwater runoff (Figure 4-34); the perforated pipe delivers the stormwater into the surrounding aggregate through the pipe perforations. The stormwater ultimately exfiltrates into the ground water aquifer through the trench walls and bottom. As the treatment volume is not discharged offsite, exfiltration trench systems are considered a type of retention treatment.

French drain systems can be several miles long and consist of many shorter sections, each of which must be inspected. Maintenance problems typically encountered with exfiltration systems include clogging of the filter fabric and void spaces of the aggregates by sediment and trash in the catch basins and sumps. These accumulations of sediment can significantly shorten the operational life of exfiltration systems and prevent system recovery within the 72-hour regulatory timeframe.



PLAN VIEW



SECTION B-B

Figure 4-33. Typical French Drain System Return to List of Figures

Figure 4-34. Typical Horizontal Exfiltration System Control Structures in Good Condition

Return to List of Figures

4.2.1.2.2. Vertical Exfiltration Systems

Vertical exfiltration systems function similarly to horizontal systems except that water is discharged through a media-filled pipe into the surficial groundwater system (Figure 4-35). They are used most frequently in coastal areas. These systems are typically incorporated into the lowest part of a vegetated swale and may be difficult to identify in the field because the area overlying the exfiltration pipe is also vegetated. The primary consideration for inspection of

vertical exfiltration systems is maintenance of adequate hydraulic recovery since inspection of structural components is generally not possible under normal circumstances.

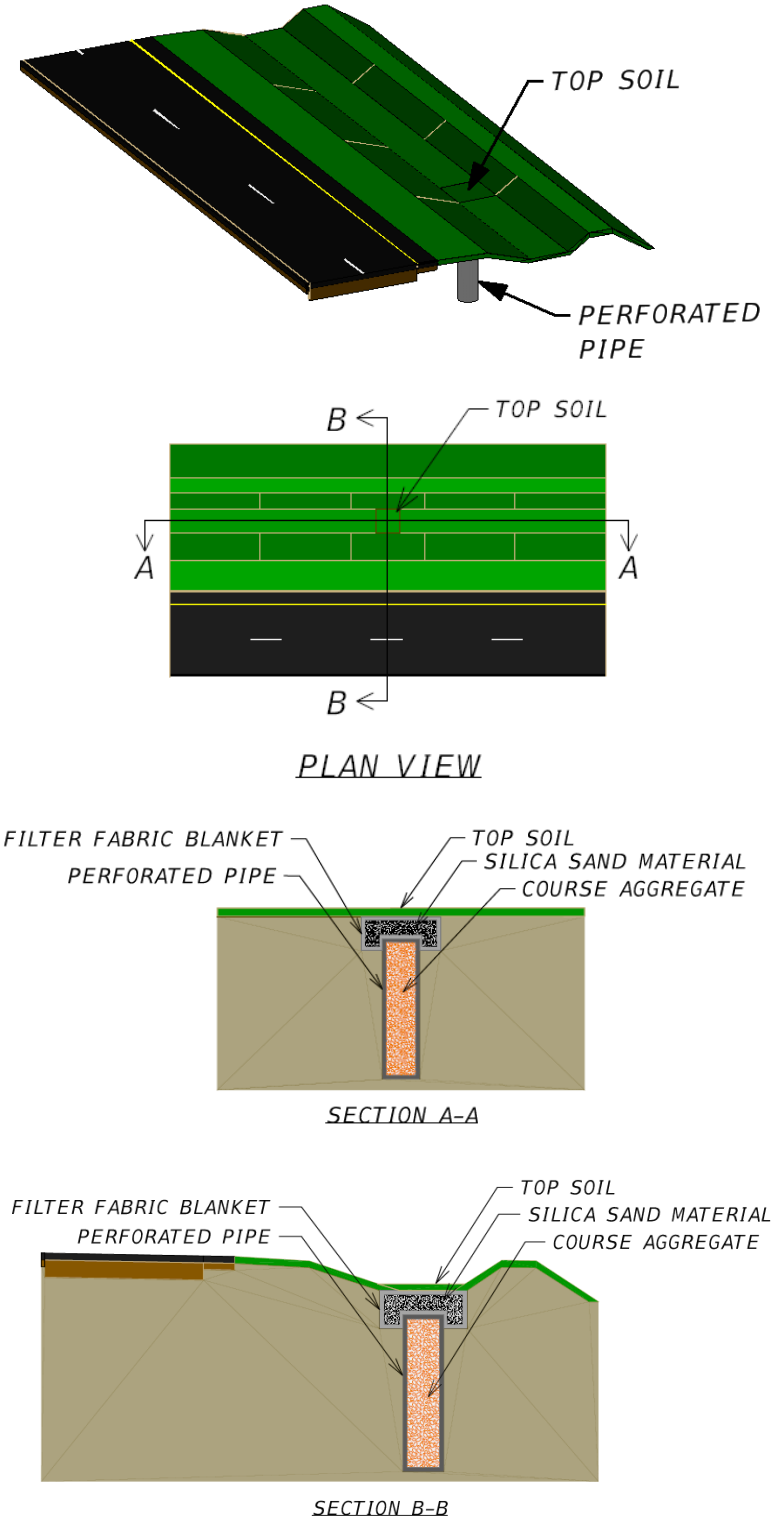


Figure 4-35. Typical Vertical Exfiltration System Return to List of Figures

4.2.1.2.3. Drainage Wells

A stormwater drainage well is defined in the underground injection control (UIC) federal regulation (40 CFR144.3) (Figure 4-36). Stormwater infiltration systems with piping to enhance infiltration capabilities meet the UIC definition of a Class V well. Class V wells are regulated under the federal UIC program implemented by the Florida Department of Environmental Protection. Drainage wells in stormwater systems are intended more for rapid stormwater removal to prevent flooding than to facilitate water quality improvement.

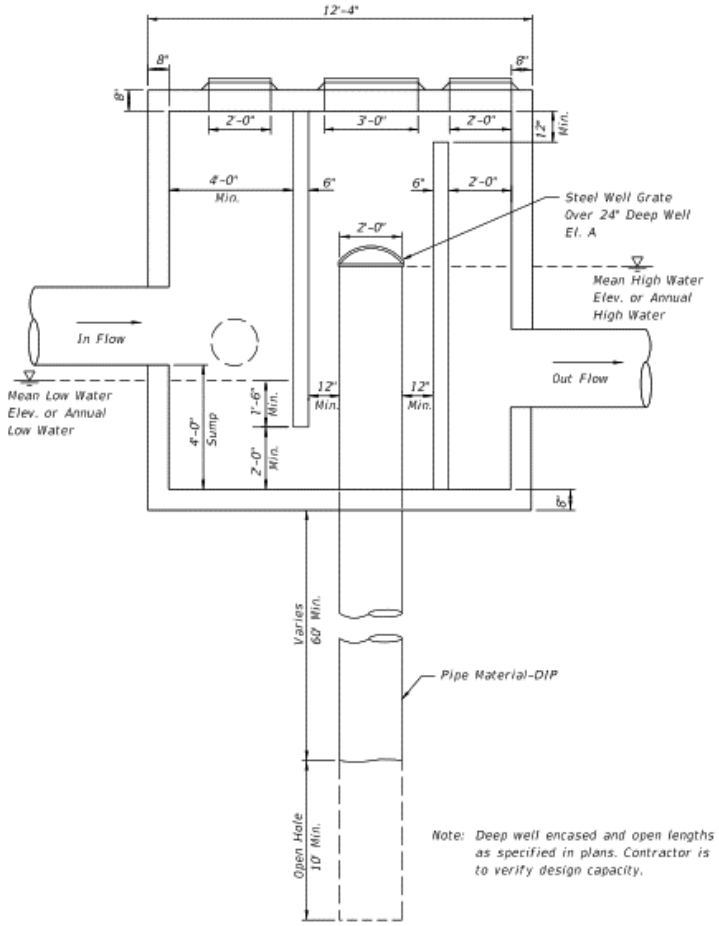


Figure 4-36. Deep Well Injection Box (Standard Plan Drawing 444-T01)

Return to List of Figures

4.2.1.2.4. Exfiltration and Drainage Well Rating Table

Horizontal Exfiltration, Vertical Exfiltration, and Drainage Wells Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Structural Condition			
Horizontal Exfiltration	Good C-1	✓ No evidence of subsidence ✓ No trash / debris accumulation in sump ✓ No pipe joint failures ✓ No groundwater intrusion observed ✓ No sediment accumulation in sump ✓ Water present is below pipe invert elevation ✓ System recovers treatment volume as designed	✓ None
	Fair C-4	✓ Trash covers less than one-third of the sump surface area and not impacting system functioning ✓ Top of sediment or trash accumulation in sump is at least one foot below pipe invert elevation ✓ System recovers treatment volume as designed	✓ Proactive maintenance recommended o Remove trash, debris, and sediment
	Poor C-2 C-3	✓ Pipe joint failures ✓ Evidence of subsidence ✓ Trash covers more than one-third of sump surface area or trash is impeding system functioning ✓ Top of sediment or trash accumulation is less than one foot below pipe invert elevation ✓ Groundwater intrusion observed ✓ System not recovering treatment volume as designed	✓ Remove excess sediment ✓ Remove trash and debris ✓ Repair cracks to prevent groundwater intrusion ✓ Investigate cause of subsidence and address as necessary ✓ Backflush exfiltration pipe to remove sediment and debris accumulation
Vertical Exfiltration	Good	✓ No trash or debris accumulation ✓ System recovers treatment volume as designed	✓ None
	Fair	✓ Minor amounts of trash, debris, sediment accumulation present, but not impeding flow ✓ System recovers treatment volume as designed	✓ Proactive maintenance recommended o Remove trash, debris, and sediment
	Poor	✓ Trash, debris, and or sediment accumulation is impeding flow ✓ System not recovering treatment volume as designed	✓ Remove sediment, trash, and debris, ✓ Backflush exfiltration pipe to remove sediment and or debris accumulation

Horizontal Exfiltration, Vertical Exfiltration, and Drainage Wells Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Drainage Well	Good APP-14 APP-15	✓ No trash or debris accumulation ✓ System functioning as designed	✓ None
	Fair	✓ Minor damage to inflow structure, but is functioning as designed ✓ Minor amounts of trash, debris, sediment accumulation present, but not impeding flow ✓ System functioning as designed	✓ Proactive maintenance recommended o Remove sediment, trash, and debris o Repair inflow structure
	Poor	✓ Drainage well has collapsed or severely damaged ✓ Damage to inflow structure is preventing flow ✓ Trash, debris, sediment accumulation is impeding flow ✓ System not functioning as designed	✓ Repair inflow structure ✓ Remove trash, debris, and or sediment accumulation from inflow structure ✓ Remove any obstructions ✓ Backflush drainage well pipe to remove sediment and or debris accumulation
Inflow and Outflow Pipes	Good C-1 C-2	✓ Like new with little or no deterioration and functioning as designed ✓ Flap gates present and functioning properly ✓ Up to 25% of pipe opening is obstructed but providing adequate conveyance	✓ None
	Fair	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Minor damage to flap gates not affecting function	✓ Proactive maintenance recommended o Remove obstructions o Repair or replace flap gates
	Poor C-3	✓ Not functioning properly due to damage, e.g., collapsed headwall or outflow pipe ✓ More than 40% of pipe opening is obstructed ✓ Flap gates missing or not functioning as designed	✓ Repair or replace damaged components ✓ Remove obstructions ✓ Other maintenance as needed to correct deficiencies
Skimmer / Baffle (if applicable)	Good C-4	✓ Like new with little or no deterioration ✓ Structurally sound and functioning as designed	✓ None
	Fair	✓ May have minor damage and some deterioration, but structurally sound and functioning as designed ✓ Opening partially blocked by trash and debris, but flow is not impeded, and trash is being prevented from entering outflow pipe	✓ Proactive maintenance recommended ✓ Repair damage ✓ Remove blockages

Horizontal Exfiltration, Vertical Exfiltration, and Drainage Wells Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Skimmer / Baffle (if applicable)	Poor	✓ Missing, detached, or collapsed ✓ Excess trash is impeding flow to outflow pipe and/or causing trash and debris to bypass skimmer ✓ Not functioning as designed	✓ Replace or repair skimmer / baffle device ✓ Remove blockages ✓ Perform other maintenance as needed to correct deficiencies
Hydraulic Recovery Condition			
Overall Recovery	Good C-1 C-2	✓ System appears to recover its treatment volume within the regulatory timeframe ✓ No sediment, trash, debris accumulation preventing flow ✓ No blockage of exfiltration pipe	✓ None
	Fair C-4	✓ System appears to be recovering more slowly than required ✓ Sediment, trash, and debris accumulation causing system to recover more slowly than required ✓ Partial blockage of skimmer or baffle device (if applicable) is slowing recovery ✓ Water at or above invert elevation of exfiltration pipe	✓ Proactive maintenance recommended o Remove sediment, trash, debris accumulation o Remove any observed blockage from skimmer or baffle device (if applicable)
	Poor C-3	✓ System appears to not recover within the regulatory timeframe ✓ Sediment accumulation above pipe invert elevation ✓ Trash and debris accumulation above pipe invert elevation ✓ Water at or above invert elevation of exfiltration pipe	✓ Remove sediment, trash, and debris accumulation ✓ Backflush exfiltration pipe to remove sediment and debris accumulation
Sedimentation	Good C-1	✓ No evidence of sediment accumulation observed	✓ None
	Fair	✓ Sediment accumulation present, but below pipe invert elevation	✓ Proactive maintenance recommended o Remove accumulated sediment
	Poor	✓ Sediment accumulation is above the invert elevation of the exfiltration pipe	✓ Remove accumulated sediment ✓ Backflush exfiltration pipe to remove sediment

Examples of Exfiltration System Rating Criteria

Horizontal French Drain System **C-1**

Rating Summary

- Sump – Good
  - Free of trash and debris
  - No cracks or damage
  - No sign of groundwater intrusion
- Pipes – Good
  - No cracks or obstructions
- Hydraulic Recovery – Good
  - Sump is dry, indicating proper drainage and recovery
- Sedimentation - Good
  - No sediment observed

Maintenance Needs

- None

Return to Rating Table

Horizontal French Drain System **C-2**

Rating Summary

- Sump – Poor
  - More than one-third of sump is covered with trash
  - Top of trash accumulation is less than one foot below pipe invert
  - No cracks or damage
  - No sign of groundwater intrusion
- Pipes – Good
  - No cracks or obstructions
- Hydraulic Recovery – Good
  - Water level is below outflow pipe invert

Maintenance Needs

- Remove trash and debris

Return to Rating Table

Horizontal French Drain System **C-3**

Rating Summary

- Sump – Poor
  - Trash and debris are covering outflow pipe
- Pipes – Poor
  - Outflow pipe is 100 percent obstructed
- Hydraulic Recovery – Poor
  - Obstruction of outflow pipe is affecting system recovery

Maintenance Needs

- Remove trash and debris

Return to Rating Table

Horizontal French Drain System **C-4**

Rating Summary

- Sump – Fair
  - Some trash and debris are present
  - No visible cracks or indication of groundwater intrusion
- Skimmer – Good
  - No damage to skimmer
  - Skimmer is effectively preventing trash from entering pipe
- Hydraulic Recovery – Fair
  - Partial blockage of skimmer is slowing system recovery

Maintenance Needs

- Remove trash and debris

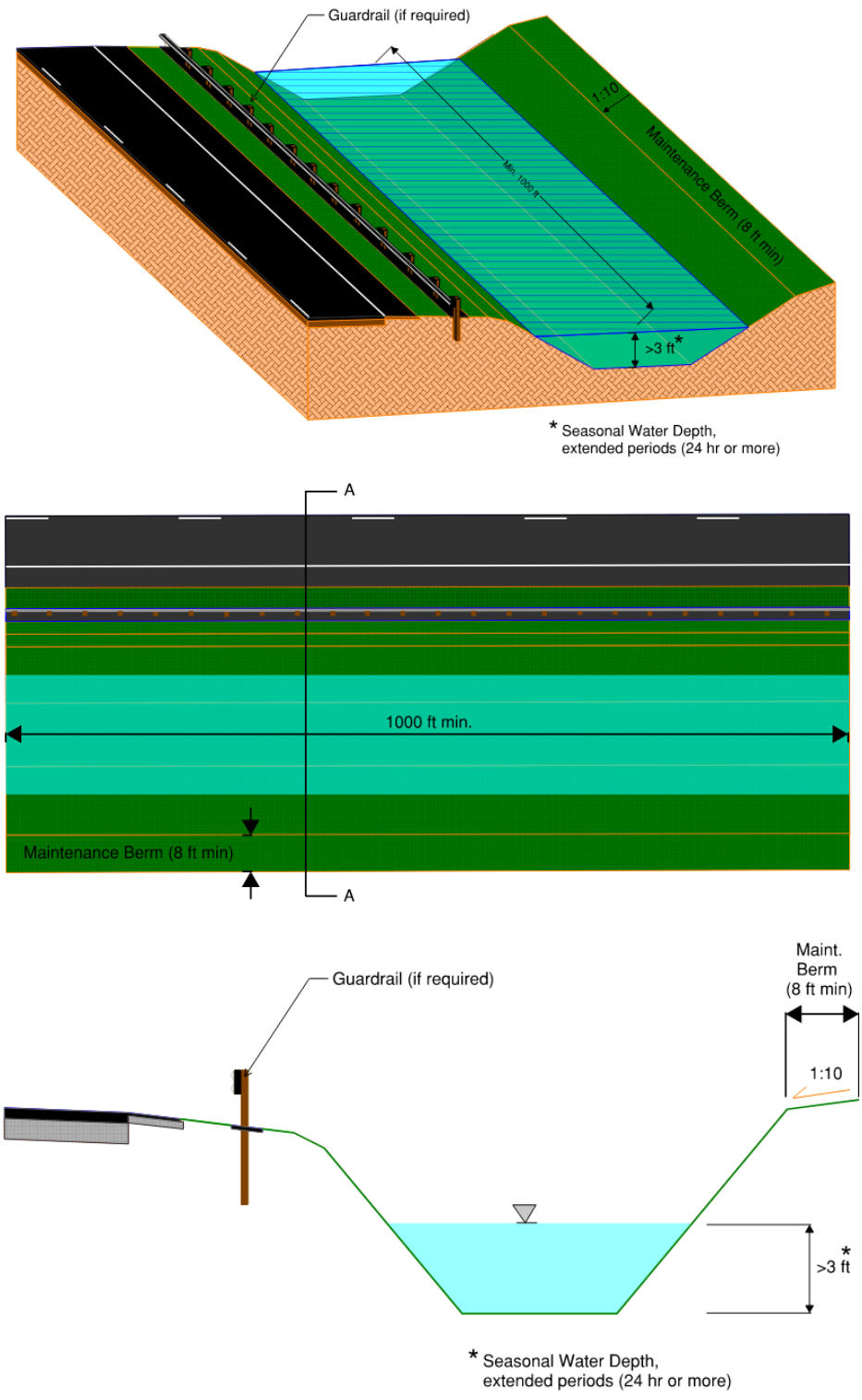
Return to Rating Table

4.2.2 Linear Conveyance Systems

The primary function of linear conveyance systems is to move stormwater quickly to prevent flooding. These systems provide little to no water quality treatment. Linear convenance systems include swales, canals, ditches, and trench drains as described below.

A **conveyance swale** is a vegetated or concrete-lined roadside system that is dry under normal conditions but receives water from roadway runoff during rainfall events. Runoff can be via sheet flow or routed through an inflow pipe. Stormwater is typically discharged from the swale through a ditch bottom inlet or directly to a receiving water.

A **canal** is a manmade system, the bottom of which is typically covered by water with the top edges of its two sides above water (Figure 4-37). Canals are typically larger conveyance systems that accept flows from other drainage components, can be used for flood control, and/or for draining lands to enable specific land use (i.e., agriculture). Unlike conveyance swales and ditches, canals can sometimes be used for navigational purposes. Additionally, canals typically have some type of downstream control structure like a control gate, weir, saltwater intrusion barrier, and/or pump system that will regulate discharge.



SECTION A-A

Figure 4-37. Typical Canal System Return to List of Figures

A **ditch** (also known as a roadside ditch or median ditch) is a manmade system dug for the purpose of draining water from the land or for transporting water and is not built for navigational purposes (Figure 4-38). Ditches are typically components of the overall drainage system and will generally follow the grade of the roadway. Depending on site conditions, ditches can contain water permanently or intermittently following rain events.

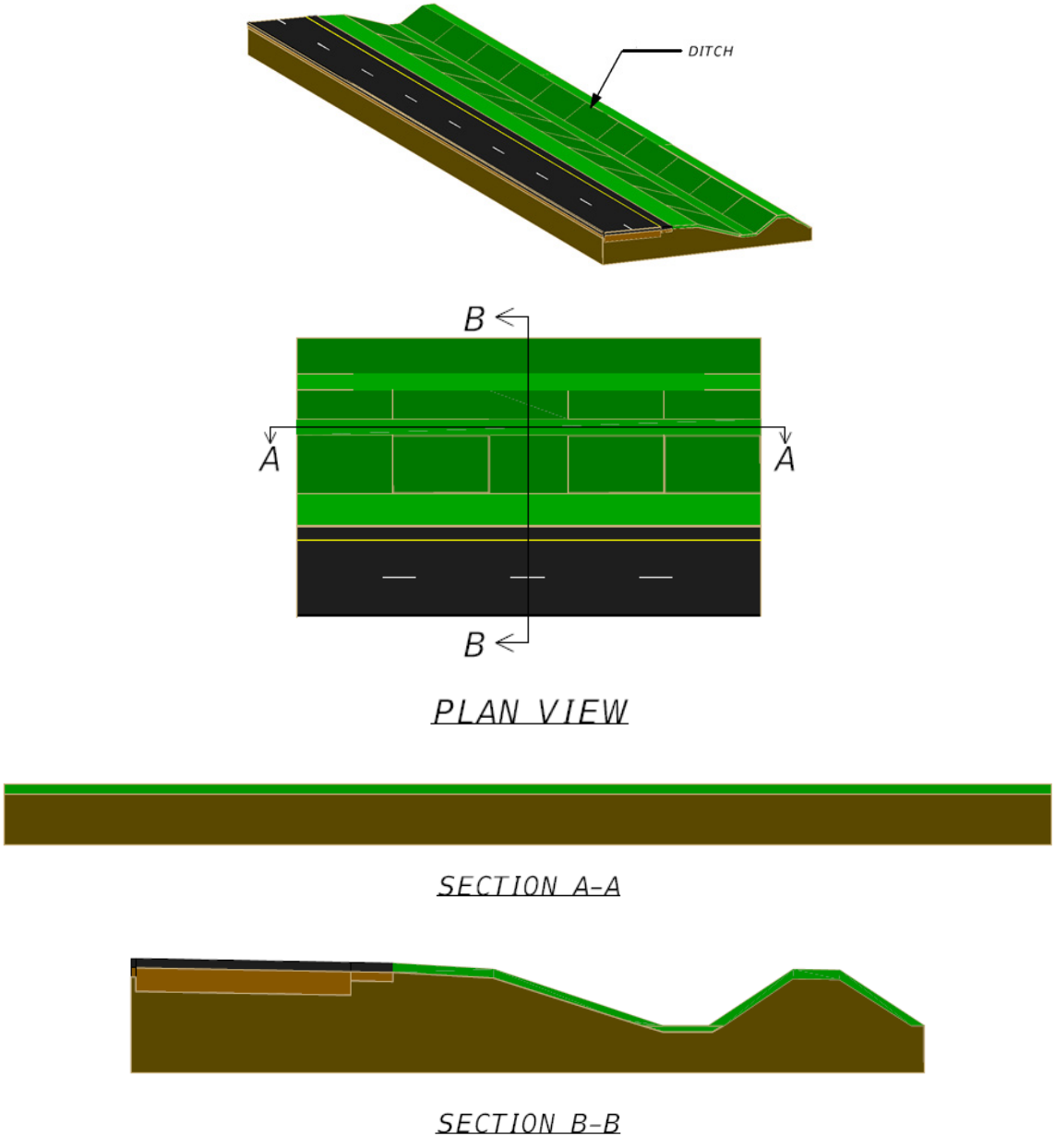
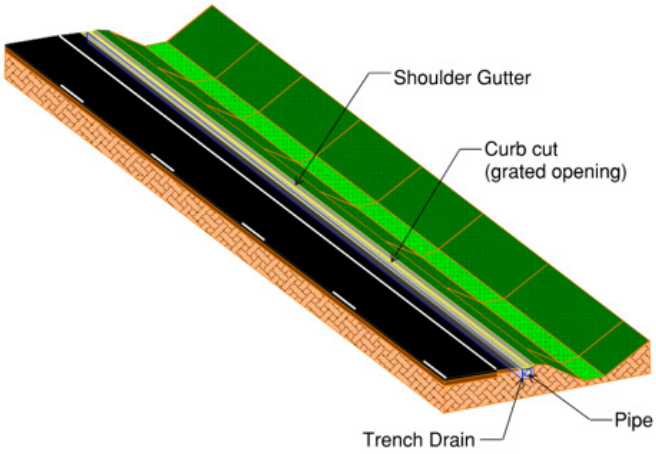
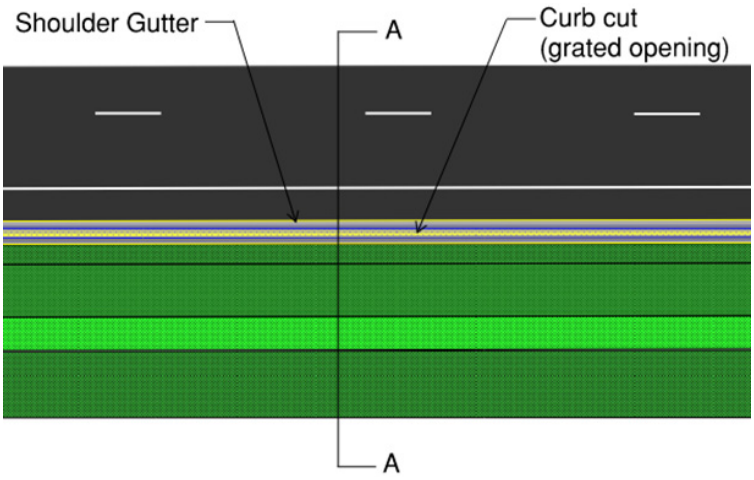


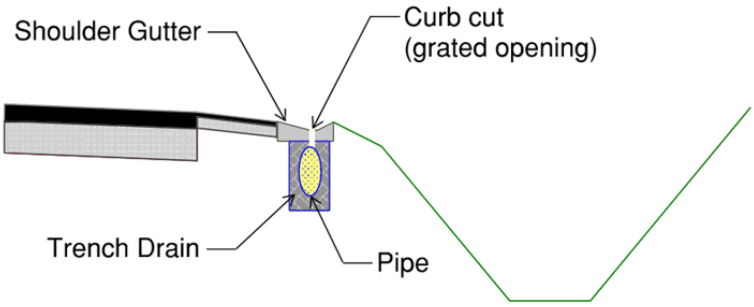
Figure 4-38. Typical Ditch System Return to List of Figures

A **trench drain** (sometimes called a channel drain) is a linear drainage system used to catch, collect, and convey stormwater through an underground drainage system to an outlet or catch basin (Figure 4-39). They are intended for use in gutters or driveways.





PLAN VIEW



SECTION A-A

Figure 4-39. Typical Trench Drain *Return to List of Figures*

Conveyance Swale and Ditch Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
	Good D-1	✓ Slopes and vegetated berm are well maintained, mowed regularly ✓ Free of trash, debris, and graffiti	✓ None
	Fair	✓ Slopes and or vegetated berm need to be mowed ✓ Small amounts of trash and debris	✓ Proactive maintenance recommended o Mow banks and berm o Remove trash and debris
	Poor APP-17	✓ Slopes and vegetated berm not being routinely maintained ✓ Excessive trash and debris present within system ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Mow slopes and berm ✓ Other maintenance as needed to correct deficiencies
Sedimentation			
	Good D-1	✓ No evidence of sedimentation problem observed ✓ Flow is uninhibited	✓ None
	Fair	✓ Some sediment accumulation present, but system is functioning as designed ✓ Flow not inhibited	✓ Proactive maintenance recommended o Remove accumulated sediment o Find/eliminate source of sedimentation
	Poor	✓ Excessive sediment accumulation present, system not functioning as designed ✓ Sediment accumulation is inhibiting flow	✓ Remove accumulated sediment to re-establish bottom to original design elevation ✓ Find/eliminate source of sedimentation

Conveyance Swale and Ditch Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Vegetation Condition			
	Good D-1	✓ The vegetative cover is healthy and well maintained o No nuisance vegetation present o Berms mowed regularly o Free of dead vegetation and bare spots ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair	✓ The vegetative cover is mostly healthy or requires only minor attention o Nuisance vegetation covers less than 25% of vegetated areas o Minor areas of dead vegetation o Some bare areas, but less than 50 cumulative square feet o Berms needs to be mowed ✓ Some vegetation around structures or on water surface but functioning as designed and not inhibiting flow.	✓ Proactive maintenance recommended o Mow side slopes and berms o Harvest nuisance vegetation o Re-establish turf/grass where needed
	Poor APP-19	✓ The vegetative cover is not healthy and/or not being maintained o Nuisance vegetation covers more than 25% of vegetated area o More than 50 cumulative square feet of bare area o Woody vegetation growing within system ✓ Destabilized vegetation on slopes or berms is affecting function ✓ Vegetation on structures or on water surface is affecting flow and system function ✓ Does not meet MRP criteria	✓ Remove invasive and nuisance vegetation ✓ Remove vegetation from around structural controls ✓ Remove vegetation affecting system function ✓ Re-establish turf/grass where needed ✓ Stabilize slopes ✓ Other maintenance as needed to correct deficiencies
Structural Condition			
Ditch Bottom Inlet	Good	✓ Ditch bottom inlet opening area free of obstruction ✓ Like new. Meets MRP criteria.	✓ None

Conveyance Swale and Ditch Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Ditch Bottom Inlet	Fair	✓ Minor damage to inlet grate but not affecting system function ✓ Up to 15% of ditch bottom inlet opening area is obstructed ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Repair or replace inlet grate o Clear vegetation from grate
	Poor D-1 APP-16	✓ Inlet grate missing or damaged to the extent that system function is affected ✓ More than 15% of ditch bottom inlet opening area is obstructed ✓ Does not meet MRP criteria.	✓ Replace inlet grate ✓ Remove obstruction from inlet
Non-Pipe Inflow and Outflow Structures (i.e., Flumes, Spillways)	Good	✓ Like new with little or no deterioration and functioning as designed ✓ Structure opening is not obstructed ✓ No undermining of structure present ✓ Like new. Meets MRP criteria.	✓ None
	Fair	✓ Minor damage observed, but at least 90% of length is functioning as designed and free of trash and debris. ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Fill and stabilize undermining o Remove obstructions
	Poor	✓ More than 10% of structure not functioning as designed ✓ Not functioning properly due to damage, e.g., collapsed apron or flume ✓ Significant undermining of structure(s) is present ✓ Sediment, trash, and debris obstruct more than 10% of total structure length ✓ Does not meet MRP criteria	✓ Repair or replace damaged components ✓ Remove obstructions and/or sediment ✓ Other maintenance as needed to correct deficiencies
Pipes	Good	✓ Like new with little or no deterioration and functioning as designed ✓ Flap gates present and functioning properly (if applicable) ✓ Pipe opening is unobstructed, free of sediment, and providing adequate conveyance ✓ Meets MRP criteria	✓ None

Conveyance Swale and Ditch Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Pipes	Fair	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function (if applicable) ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Remove obstructions
	Poor **APP-18**	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as designed (if applicable) ✓ Does not meet MRP Criteria.	✓ Repair or replace damaged components ✓ Remove obstructions ✓ Other maintenance as needed to correct deficiencies
Erosion Condition			
	Good **APP-20**	✓ No surficial slope, bank, or berm erosion ✓ Vegetation intact with minimal bare areas, low erosion potential ✓ Stable slopes, banks, and berms ✓ Minimal to no undermining of structures is apparent	✓ None
	Fair **D-1**	✓ Minor slope, bank, or berm erosion with small rills present, but system is stable ✓ Minor undermining around system structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion and undermining
	Poor	✓ Substantial slope, bank, or berm erosion compromising stability of the system ✓ Substantial undermining compromising system structures ✓ Large rills and gullies present along slopes, banks, or berms ✓ Large areas of vegetation have become dislodged and slope, bank, or berm is unstable	✓ Regrade and stabilize slopes, banks, and berms ✓ Re-establish turf/grass ✓ Other maintenance as needed to correct deficiencies

Canal Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
	Good	✓ Vegetated berm is well maintained, mowed regularly ✓ Free of trash, debris, and graffiti	✓ None
	Fair D-2	✓ Banks or vegetated berm need to be mowed ✓ Small amounts of trash, debris	✓ Proactive maintenance recommended o Mow banks and berm o Remove trash and debris
	Poor APP-21	✓ Vegetated berm not being routinely maintained ✓ Excessive trash and debris present in canal or along banks and berm ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Mow banks and berm ✓ Other maintenance as needed to correct deficiencies
Sedimentation Condition			
	Good D-2	✓ No evidence of sedimentation problem observed ✓ Flow is not inhibited	✓ None
	Fair	✓ Some sediment accumulation present, but system is functioning as designed ✓ Flow is not inhibited	✓ Proactive maintenance recommended o Remove accumulated sediment o Find/eliminate source of sedimentation
	Poor	✓ Excessive sediment and debris accumulation is inhibiting flow or navigation ✓ Canal not functioning as designed	✓ Remove accumulated sediment to re-establish bottom to original design elevation ✓ Remove sediment and debris inhibiting navigation ✓ Find/eliminate source of sedimentation

Canal Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Vegetation Condition			
	Good APP-22	✓ The vegetative cover is healthy and well maintained o No nuisance vegetation present o Berms mowed regularly o Free of dead vegetation and bare spots ✓ All structures are visible and clear of vegetation growth ✓ Vegetation complies with water management district requirements	✓ None
	Fair APP-23	✓ The vegetative cover is mostly healthy or requires only minor attention o Nuisance vegetation covers less than 25% of vegetated areas o Minor areas of dead vegetation o Some bare areas, but less than 50 cumulative square feet o Berms needs to be mowed ✓ Some vegetation around structures or on water surface, but functioning as designed and not inhibiting flow ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Mow berms o Harvest nuisance vegetation o Re-establish turf/grass where needed
	Poor D-2 APP-24	✓ The vegetative cover is not healthy and/or not being maintained o Nuisance vegetation covers more than 25% of vegetated area o More than 50 cumulative square feet of bare area o Woody vegetation growing within system ✓ Destabilized vegetation on berms is affecting function ✓ Vegetation on structures or water surface is affecting flow and system function ✓ Does not meet MRP criteria	✓ Remove nuisance vegetation ✓ Remove vegetation from around structural controls ✓ Remove vegetation affecting system function ✓ Re-establish turf/grass where needed ✓ Stabilize banks ✓ Other maintenance as needed to correct deficiencies
Structural Condition			
Control Gates, Weirs, Other Control Structures	Good APP-25	✓ No damage to control gate or weir (if applicable) ✓ Like new condition	✓ None

Canal Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Control Gates, Weirs, Other Control Structures	Fair	✓ Minor damage to control gate or weir, but functioning as designed (if applicable)	✓ Proactive maintenance recommended o Repair damage to control gate, weir, and or other control structure
	Poor	✓ Canal not functioning as designed ✓ Significant damage to control gate or weir is impacting function (if applicable)	✓ Repair or replace control gate, weir, or other control structures
Non-Pipe Inflow and Outflow Structures (i.e., Flumes, Spillways)	Good	✓ Like new with little or no deterioration and functioning as designed ✓ Structure opening is not obstructed ✓ No undermining of structure present ✓ Like new. Meets MRP criteria.	✓ None
	Fair	✓ Minor damage observed, but at least 90% of length is functioning as designed and free of trash and debris ✓ Meets MRP criteria.	✓ Proactive maintenance recommended o Fill and stabilize undermining o Remove obstructions
	Poor	✓ More than 10% of structure not functioning as designed ✓ Not functioning properly due to damage, e.g., collapsed apron or flume ✓ Significant undermining of structure(s) is present ✓ Sediment, trash, and debris obstruct more than 10% of total structure length ✓ Does not meet MRP criteria.	✓ Repair or replace damaged components ✓ Remove obstructions and/or sediment ✓ Other maintenance as needed to correct deficiencies
Inflow and Outflow Pipes	Good **APP-26**	✓ Like new with little or no deterioration and functioning as designed ✓ Flap gates present and functioning properly (if applicable) ✓ Pipe opening is unobstructed, free of sediment, and providing adequate conveyance ✓ Meets MRP criteria	✓ None

Canal Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Inflow and Outflow Pipes	Fair	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function (if applicable) ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Remove pipe obstructions o Repair structural damage o Repair or replace flap gates
	Poor	✓ Not functioning properly due to damage, e.g., collapsed headwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as designed (if applicable) ✓ Does not meet MRP Criteria	✓ Repair or replace damaged components ✓ Remove obstructions ✓ Other maintenance as needed to correct deficiencies
Water Condition			
	Good D-2	✓ Water is clear and odor free ✓ Small amount of floatables ✓ No evidence of illicit discharges	✓ None
	Fair	✓ Some turbidity ✓ Moderate amount of floatables ✓ Water is odor free	✓ Proactive trash removal recommended
	Poor APP-27	✓ Significant turbidity ✓ Excessive floatables ✓ Foul odor present ✓ Evidence of illicit discharge.	✓ Remove trash ✓ Identify and remove sources of odor and/or illicit discharges ✓ Contact District NPDES Coordinator if there is evidence of an illicit discharge ✓ Other maintenance as needed to correct deficiencies

Canal Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Erosion Condition			
	Good	✓ No surficial bank or berm erosion ✓ Vegetation intact with minimal bare areas, low erosion potential ✓ Stable banks and berms ✓ Minimal to no undermining of structures is apparent	✓ None
	Fair D-2	✓ Minor bank or berm erosion with small rills or gullies present, but system is stable ✓ Minor undermining around system structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion and undermining
	Poor APP-28	✓ Substantial bank or berm erosion compromising stability of the system ✓ Substantial undermining compromising system structures ✓ Large rills and gullies present along banks or berms ✓ Large areas of vegetation have become dislodged and bank or berm is unstable	✓ Regrade and stabilize banks and berms ✓ Re-establish turf/grass ✓ Other maintenance as needed to correct deficiencies

Trench Drain Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
	Good	✓ Drain and surrounding area are free of trash, debris, and graffiti	✓ None
	Fair	✓ Small amounts of trash and debris are visible on drain or surrounding area	✓ Proactive maintenance recommended o Remove trash and debris
	Poor	✓ Excessive trash and debris are visible on drain or around drain ✓ Any form of unauthorized graffiti is present	✓ Remove trash, debris, and graffiti
Sedimentation			
	Good	✓ No sedimentation in trench channel observed ✓ Like new condition. ✓ Flow is not inhibited	✓ None
	Fair	✓ Some sediment accumulation present in trench channel, but flow is not inhibited ✓ More than 90% of trench depth is open ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Remove accumulated sediment o Find/eliminate source of sedimentation
	Poor	✓ Excessive sediment accumulation in trench channel is affecting system function ✓ Sediment accumulation is inhibiting flow ✓ Less than 90% of trench depth is open ✓ Does not meet MRP criteria	✓ Remove accumulated sediment to restore flow ✓ Find/eliminate source of sedimentation
Vegetation Condition			
	Good	✓ No nuisance vegetation present ✓ Grate and concrete are free of vegetation	✓ None
	Fair	✓ Some vegetation in or around grate is visible but not inhibiting flow	✓ Proactive maintenance recommended o Remove vegetation

Trench Drain Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Vegetation Condition			
	Poor	✓ Excessive vegetation in or around grates is inhibiting flow	✓ Remove vegetation to restore flow
Structural Condition			
Grate, Channel, and Surrounding Concrete	Good	✓ Like new and functioning as designed ✓ No cracks or missing concrete ✓ Grate is present, undamaged, and free of trash and debris ✓ Trench channel is free of sediment and debris ✓ Like new. Meets MRP criteria.	✓ None
	Fair	✓ Minor damage to concrete, but at least 90% of length is functioning as designed ✓ Grate is present and undamaged ✓ At least 90% of grate inflow area is free of vegetation or other obstruction ✓ More than 90% of total trench depth is free of sediment, trash, and debris. ✓ Meets MRP criteria	✓ Proactive maintenance recommended ○ Locate and eliminate source of sedimentation ○ Remove sediment, trash, or debris ○ Remove grate obstructions ✓ Monitor progression of damage noted
	Poor	✓ Less than 90% of length and depth of structure functioning as designed ✓ Sediment, trash, or debris fill more than 10% of total trench depth ✓ Grate is damaged or missing ✓ Does not meet MRP criteria	✓ Repair structure, replace grate ✓ Remove sediment, trash, and debris ✓ Locate and eliminate source of sedimentation ✓ Other maintenance as needed to correct deficiencies

Trench Drain Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Erosion Condition			
	Good	✓ No damage to concrete surrounding structure	✓ None
	Fair	✓ Minor undermining of or damage to concrete surrounding structure, but not sufficient to affecting system function	✓ Proactive maintenance recommended o Repair damage to concrete
	Poor	✓ Undermining of or damage to concrete surrounding structure is affecting system function	✓ Repair structure ✓ Other maintenance as needed to correct deficiencies

Examples of Linear Conveyance System Rating Criteria

Conveyance Swale **D-1**

Rating Summary

- Control Structure – Poor
  - Ditch bottom inlet grate is more than 15% obstructed
- Overall Appearance – Good
  - No trash or debris present
  - Slopes well maintained
- Erosion Condition – Fair
  - Erosion evident at top of slope below road
- Sedimentation Condition – Good
  - No evidence of sedimentation within swale
  - Flow not restricted
- Vegetation Condition – Good
  - Vegetation cover generally intact
  - Slopes mowed regularly
  - Vegetation not inhibiting flow

Maintenance Needs

- Regrade and re-establish turf/sod on eroded area
- Clear vegetation from inlet grate

Return to Rating Table

Conveyance Canal **D-2**

Rating Summary

- Water Condition – Good
  - Water clear, with no floatables
- Overall Appearance – Fair
  - Bank areas bare of vegetation
  - Free of trash and debris
- Erosion Condition – Fair
  - Banks susceptible to erosion due to lack of vegetative cover
- Sedimentation Condition – Good
  - No emergent vegetation
  - No evidence of sediment accumulation
- Vegetation Condition – Poor
  - More than 50 cumulative sq ft of bare ground

Maintenance Needs

- Re-establish bank vegetation or stabilize slope per engineer's direction

Return to Rating Table

4.3 Outfalls

An outfall is the point at which stormwater discharges from FDOT's system.

4.3.1 Closed Conveyance Outfalls

A **closed conveyance outfall** is an outfall located at the discharge point of a closed drainage feature, such as a pipe, culvert, or similar manufactured structure (Figure 4-40).

Figure 4-40. Typical Closed Conveyance Outfall in Good Condition *Return to List of Figures*

4.3.2 Open Conveyance Outfalls

An **open conveyance outfall** is an outfall located at the discharge point of an open drainage feature, which is most commonly a ditch or swale, but can also include a trench, channel, flume, or other open conveyance (Figure 4-41).

Figure 4-41. Typical Open Conveyance Outfall in Good Condition Return to List of Figures

Closed Conveyance Outfall Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
	Good E-1	✓ Free of trash, debris, and graffiti	✓ None
	Fair E-2	✓ Small amounts of trash or debris present	✓ Proactive maintenance recommended o Remove trash and debris
	Poor	✓ Excessive trash and debris present ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Other maintenance as needed to correct deficiencies
Erosion Condition			
	Good E-1 E-2	✓ Minimal to no undermining of mitered end section, endwall, or pipe structures is apparent	✓ None
	Fair APP-29	✓ Minor undermining around mitered end section, endwall, or pipe structures, but not sufficient to cause structural failure	✓ Proactive maintenance recommended o Repair erosion and undermining
	Poor APP-30	✓ Substantial undermining of mitered end section, endwall, or pipe structures is compromising function	✓ Repair erosion and undermining
Structural Condition			
	Good E-1 E-2	✓ Like new with little or no deterioration and functioning as designed ✓ Flap gates present and functioning properly (if applicable) ✓ Manatee exclusion device present and functioning properly (if applicable) ✓ Pipe opening is unobstructed, free of sediment, and providing adequate conveyance ✓ Meets MRP criteria	✓ None

Closed Conveyance Outfall Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Structural Condition			
	Fair **APP-31**	✓ Up to 40% of pipe opening is obstructed but providing adequate conveyance ✓ Concrete structure around a mitered end section has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete structure/slab is crushed or broken ✓ Minor damage to flap gates not affecting function (if applicable) ✓ Minor damage to manatee exclusion device not affecting function (if applicable) ✓ Meets MRP criteria	✓ Proactive maintenance recommended o Remove pipe obstructions o Repair structural damage o Repair or replace flap gates o Repair or replace manatee exclusion devices
	Poor	✓ Not functioning properly due to damage, e.g., collapsed endwall or pipe ✓ More than 40% of pipe opening is obstructed ✓ Concrete structure around a mitered end section has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete structure/slab is crushed or broken, and/or has exposed rebar ✓ Flap gates missing or not functioning as designed (if applicable) ✓ Manatee exclusion device is missing or not functioning as designed (if applicable) ✓ Does not meet MRP Criteria.	✓ Repair or replace damaged and missing components ✓ Remove obstructions ✓ Other maintenance as needed to correct deficiencies
Sedimentation			
	Good	✓ No evidence of sedimentation problem observed in pipe or at point of outfall ✓ Flow is uninhibited	✓ None
	Fair **E-2**	✓ Some sediment accumulation present, but system is functioning as designed ✓ Flow not inhibited	✓ Proactive maintenance recommended o Remove accumulated sediment o Find/eliminate source of sedimentation
	Poor **APP-32**	✓ Excessive sediment accumulation present, system not functioning as designed ✓ Sediment accumulation is inhibiting flow	✓ Remove accumulated sediment ✓ Find/eliminate source of sedimentation

Closed Conveyance Outfall Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Vegetation Condition			
	Good E-1 E-2	✓ Pipe and endwall are visible and clear of nuisance vegetation	✓ None
	Fair APP-33	✓ Some nuisance vegetation around pipe and endwall, but functioning as designed and not inhibiting flow	✓ Proactive maintenance recommended ○ Clear nuisance vegetation from around pipe and endwall
	Poor APP-34	✓ Nuisance vegetation in and around pipe and endwall is affecting flow and system function	✓ Remove nuisance vegetation from around pipe and endwall ✓ Other maintenance as needed to correct deficiencies

Open Conveyance Outfall (Ditches, Swales, Trenches) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Aesthetics Condition			
	Good	✓ Free of trash, debris, and graffiti	✓ None
	Fair	✓ Slopes and/or vegetation around discharge point need to be mowed ✓ Small amounts of trash and debris	✓ Proactive maintenance recommended o Mow slopes and berm o Remove trash and debris
	Poor	✓ Slopes and/or vegetation around discharge point not being routinely maintained ✓ Excessive trash and debris present within system ✓ Any form of unauthorized graffiti is present	✓ Remove trash, graffiti, and debris ✓ Mow slopes and berm ✓ Other maintenance as needed to correct deficiencies
Erosion Condition			
	Good	✓ No surficial slope, bank, or berm erosion ✓ Slopes and banks are stable ✓ No undermining of reinforcement material	✓ None
	Fair	✓ Minor slope, bank, or berm erosion with small rills present, but system is stable ✓ Minor undermining of reinforcement material, but system is stable	✓ Proactive maintenance recommended o Repair erosion and undermining
	Poor	✓ Substantial slope, bank, or berm erosion compromising stability of the system ✓ Substantial undermining of reinforcement material causing instability	✓ Regrade and stabilize slopes, banks, and berms ✓ Repair erosion and undermining ✓ Other maintenance as needed to correct deficiencies
Structural Condition			
Earthen Conveyance	Good	✓ Like new with little or no deterioration and functioning as designed ✓ Discharge area is not obstructed, free of sediment, and providing adequate conveyance	✓ None
	Fair	✓ Some obstruction of outfall, but providing adequate conveyance ✓ Minor damage at point of discharge	✓ Proactive maintenance recommended o Repair damage o Remove obstructions
	Poor	✓ Obstruction of outfall is reducing conveyance ✓ Not functioning properly due to damage, e.g., significant erosion, or obstruction	✓ Repair or replace damaged components ✓ Remove obstructions and/or sediment ✓ Other maintenance as needed to correct deficiencies

Open Conveyance Outfall (Ditches, Swales, Trenches) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Hardened Conveyance	Good APP-35	✓ Like new with little or no deterioration and functioning as designed ✓ Discharge area is unobstructed, free of sediment, and providing adequate conveyance	✓ None
	Fair	✓ Some obstruction of outfall, but providing adequate conveyance ✓ Minor damage to concrete lining or non-concrete reinforcement, but functioning as designed ✓ Concrete lining has less than 3 cracks greater than ½ inch in width and 1 foot in length ✓ Less than 33% of concrete apron at discharge is crushed or broken	✓ Proactive maintenance recommended o Repair damage o Remove obstructions
	Poor	✓ Obstruction of outfall is reducing conveyance ✓ Not functioning properly due to damage at discharge point ✓ Concrete lining has 3 or more cracks greater than ½ inch in width and 1 foot in length ✓ More than 33% of concrete apron at discharge is crushed or broken, and/or has exposed rebar	✓ Repair or replace damaged components ✓ Remove obstructions ✓ Other maintenance as needed to correct deficiencies
Sedimentation			
	Good	✓ No evidence of sedimentation problem observed ✓ Flow is uninhibited	✓ None
	Fair	✓ Some sediment accumulation present, but system is functioning as designed ✓ Flow not inhibited	✓ Proactive maintenance recommended o Remove accumulated sediment o Find/eliminate source of sedimentation
	Poor	✓ Excessive sediment accumulation present, system not functioning as designed ✓ Sediment accumulation is inhibiting flow	✓ Remove accumulated sediment ✓ Find/eliminate source of sedimentation

Open Conveyance Outfall (Ditches, Swales, Trenches) Rating Table			
Asset Component	**Inspection Rating**	**Description of Condition**	**Maintenance Needs**
Vegetation Condition			
	Good	✓ Point of discharge is clear of nuisance vegetation	✓ None
	Fair	✓ Some nuisance vegetation at point of discharge, but functioning as designed and not inhibiting flow	✓ Proactive maintenance recommended o Clear nuisance vegetation from discharge area
	Poor	✓ Nuisance vegetation at discharge point is affecting flow and system function	✓ Clear nuisance vegetation from discharge area ✓ Other maintenance as needed to correct deficiencies

Examples of Outfall Rating Criteria

Closed Conveyance Outfall **E-1**

Rating Summary

- Aesthetics Condition – Good
  - Free of trash
- Erosion Condition – Good
  - No bank erosion or undermining of headwall
- Structural Condition – Good
  - No visible cracks or damage to pipe or headwall
  - No visible blockage of the pipe
- Vegetation Condition – Good
  - Front of pipe is free of vegetation

Maintenance Needs

- None

Return to Rating Table

Closed Conveyance Outfall **E-2**

Rating Summary

- Aesthetics Condition – Fair
  - Small amount of trash
- Erosion Condition – Good
  - No bank erosion or undermining of headwall
- Structural Condition – Good
  - No visible cracks or damage to pipe or headwall
  - No visible blockage of the pipe
- Sedimentation Condition – Fair
  - Sediment accumulation near the outfall
- Vegetation Condition – Good
  - Front of pipe is free of vegetation

Maintenance Needs

- Remove accumulated sediment from in front of outfall
- Investigate potential source of sediment

Return to Rating Table

APPENDIX A

Examples of SAMS Inspection and Maintenance Needs Reports

Example Pond Inspection and Maintenance Needs Reports

STORMWATER FACILITY INSPECTION REPORT

FDOT District Five

Inspection Date:	5/10/2022	**Statewide Facility ID:**	D5SWF77000-00469
Primary Inspector Name:	Craig Eudell	**District Facility ID:**	77040-3521-01
Secondary Inspector Name:		**FM Number:**	240163
Date Last Precipitation:	5/8/2022	**County:**	SEMINOLE
Quantity Last Precipitation:	0.22000000	**State Road Number:**	46
Permit Agency:	SJRWMD	**Facility Type:**	Wet Detention
ERP Permit Number:	40-117-95925-5	**Facility Name:**	Pond 1
FDEP MS4 Permit Number:	FLS000038	**Maintenance Yard:**	Oveido Maintenance
State Project Number:	77040-3521	**Side of Road:**	Left

INSPECTION FINDINGS

Parameter:	Result:	Comments:
Aesthetics Condition	Good	The side slopes appear to be well maintained and mowed regularly.
Hydraulic Recovery Condition	Good	The hydrologic fluctuations appear normal.
Vegetation Condition	Good	The vegetative cover is in good condition and well maintained.
Structural Condition	Fair	Repair damaged skimmer on the control structure for Pond 1.
Erosion Condition	Good	No erosion present at the time of inspection.
Water Condition	Good	The water present was clear and odor free at the time of inspection.
Suspected IDDE	No	N/A
Public Safety Hazard	No	N/A

INSPECTION SUMMARY

Parameter:	Result:
Overall Facility Rating	Fair
Maintenance Required	Yes
Inspection Result	Not performing as designed and permitted
Inspection Notes / Comments:	
Maintenance items were identified during this inspection.	

STORMWATER FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	5/10/2022	**State Road Number:**	46
Statewide Facility ID:	D5SWF77000-00469	**County:**	SEMINOLE
District Facility ID:	77040-3521-01	**Facility Type:**	Wet Detention
FM Number:	240163	**Facility Name:**	Pond 1

Photo Name : 1.JPG

STORMWATER FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	5/10/2022	**State Road Number:**	46
Statewide Facility ID:	D5SWF77000-00469	**County:**	SEMINOLE
District Facility ID:	77040-3521-01	**Facility Type:**	Wet Detention
FM Number:	240163	**Facility Name:**	Pond 1

Photo Name : 2.JPG

STORMWATER FACILITY INSPECTION

LOCATION MAP

Inspection Date:	5/10/2022 10:58:40 AM	**State Road Number:**	46
Statewide Facility ID:	D5SWF77000-00469	**County:**	SEMINOLE
District Facility ID:	77040-3521-01	**Facility Type:**	Wet Detention
FM Number:	240163	**Facility Name:**	Pond 1

District Five Pond

STORMWATER FACILITY MAINTENANCE NEED

FDOT District Five

Inspection Date:	5/10/2022 10:58:40 AM	**State Road Number:**	46
Statewide Facility ID:	D5SWF77000-00469	**County:**	SEMINOLE
District Facility ID:	77040-3521-01	**Facility Type:**	Wet Detention
FM Number:	240163	**Facility Name:**	Pond 1

MAINTENANCE NEED

Maintenance Need:	MMS Code (Not Required)	Date Ordered	Date Due	Date Completed
Repair damaged skimmer on the control structure for Pond 1.		5/10/2022	7/11/2022	Not Completed

STORMWATER FACILITY MAINTENANCE NEED

FDOT District Five

Inspection Date:	5/10/2022	**State Road Number:**	46
Statewide Facility ID:	D5SWF77000-00469	**County:**	SEMINOLE
District Facility ID:	77040-3521-01	**Facility Type:**	Wet Detention
FM Number:	240163	**Facility Name:**	Pond 1

Photo Name : 2

STORMWATER FACILITY INSPECTION

LOCATION MAP

Inspection Date:	5/10/2022 10:58:40 AM	**State Road Number:**	46
Statewide Facility ID:	D5SWF77000-00469	**County:**	SEMINOLE
District Facility ID:	77040-3521-01	**Facility Type:**	Wet Detention
FM Number:	240163	**Facility Name:**	Pond 1

District Five Pond

Example Linear Facility Inspection and Maintenance Needs Reports

LINEAR TREATMENT FACILITY INSPECTION REPORT

District Seven

Inspection Date:	6/21/2022	**Statewide Facility ID:**	D7SWF08000-00876
Primary Inspector Name:	Jason Drizd	**District Facility ID:**	F08020-3515-01
Secondary Inspector Name:		**FM Number:**	2547931
Date Last Precipitation:	6/20/2022	**County:**	HERNANDO
Quantity Last Precipitation:	1.07000000	**State Road Number:**	55
Permit Agency:	SWFWMD	**Facility Type:**	Ditch Block System
ERP Permit Number:	44005084.003, .004	**Facility Name:**	
FDEP MS4 Permit Number:	FLR04E017	**Maintenance Yard:**	Brooksville Operations
State Project Number:	08020-3515	**Side of Road:**	L

INSPECTION FINDINGS

Parameter:	Result:	Comments:
Aesthetics Condition	Good	Minor trash throughout system.
Hydraulic Recovery Condition	Good	
Vegetation Condition	Good	
Structural Condition	Poor	Damaged lintel at DB-8. Damaged skimmer at DB-13. DB-21, DB-22, and DB-23 lost to construction.
Erosion Condition	Poor	Sediment accumulation observed on DB-1 and DB-9. Sediment accumulation observed in treatment area of DB-7 and DB-19 resulting in a loss of treatment volume. Erosion observed at STA 463+10 LT, north of DB-13, and along the west edge of DB-13.
Water Condition	Not Applicable	System is dry.
Suspected IDDE	No	
Public Safety Hazard	No	

INSPECTION SUMMARY

Parameter:	Result:
Overall Facility Rating	Fair
Maintenance Required	Yes
Inspection Result	Performing as designed and permitted
Inspection Notes / Comments:	

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 21 LOOKING EAST AT DB-13 SKIMMER (DAMAGED).JPG

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LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 26 LOOKING NORTH AT DB-9 STA 432+80 LT (SEDIMENT ACCUMULATION).JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 34 LOOKING NORTH AT DB-1 STA 411+80 LT (SEDIMENT ACCUMULATION).JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 4 LOOKING AT EROSIONAL AREAS EAST OF SKIMMER AT STA 463+10 LT.JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 19 LOOKING AT EROSIONAL AREA NORTH OF DB-13.JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 22 LOOKING AT EROSIONAL AREA WHERE WATER IS BYPASSING DB-13 ON WEST ED.JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 20 LOOKING AT DB-13 STA 439+35 LT.JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 27 LOOKING AT DB-8 STA 431+60 LT (LINTEL DAMAGED).JPG

LINEAR TREATMENT FACILITY INSPECTION REPORT

PHOTO LOG

Inspection Date:	6/21/2022	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

PHOTO 28 LOOKING NORTH AT DB-7 STA 431+80 LT (LOSS OF TREATMENT VOLUME).JPG

LINEAR TREATMENT INSPECTION

LOCATION MAP

Inspection Date:	6/21/2022 5:39:32 PM	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

Linear Treatment Facility Location Map

LINEAR TREATMENT MAINTENANCE NEED

District Seven

Inspection Date:	6/21/2022 5:39:32 PM	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

MAINTENANCE NEED

Maintenance Need:	MMS Code (Not Required)	Date Ordered	Date Due	Date Completed
Regrade and stabilize erosional areas west of DB-13, north of DB-13, and at STA 463+10 LT.	437 - Miscellaneous Slope and Ditch Repair (cubic yards)	7/11/2022	9/9/2022	Not Completed

LINEAR TREATMENT MAINTENANCE NEED

District Seven

Inspection Date:	6/21/2022 5:39:32 PM	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

MAINTENANCE NEED

Maintenance Need:	MMS Code (Not Required)	Date Ordered	Date Due	Date Completed
Repair damaged lintel at DB-8.	451 - Clean Repair Drainage Structures (linear feet)	7/11/2022	8/10/2022	Not Completed

LINEAR TREATMENT MAINTENANCE NEED

District Seven

Inspection Date:	6/21/2022 5:39:32 PM	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

MAINTENANCE NEED

Maintenance Need:	MMS Code (Not Required)	Date Ordered	Date Due	Date Completed
Regrade and stabilize area upstream of DB-7 and DB-19 to restore treatment volume.	437 - Miscellaneous Slope and Ditch Repair (cubic yards)	7/11/2022	9/9/2022	Not Completed

LINEAR TREATMENT MAINTENANCE NEED

District Seven

Inspection Date:	6/21/2022 5:39:32 PM	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

MAINTENANCE NEED

Maintenance Need:	MMS Code (Not Required)	Date Ordered	Date Due	Date Completed
Remove accumulated sediment from under the skimmer of DB-1 and DB-9.	451 - Clean Repair Drainage Structures (linear feet)	7/11/2022	9/9/2022	Not Completed

LINEAR TREATMENT MAINTENANCE NEED

District Seven

Inspection Date:	6/21/2022 5:39:32 PM	**State Road Number:**	55
Statewide Facility ID:	D7SWF08000-00876	**County:**	HERNANDO
District Facility ID:	F08020-3515-01	**Facility Type:**	Ditch Block System
FM Number:	2547931	**Facility Name:**	

MAINTENANCE NEED

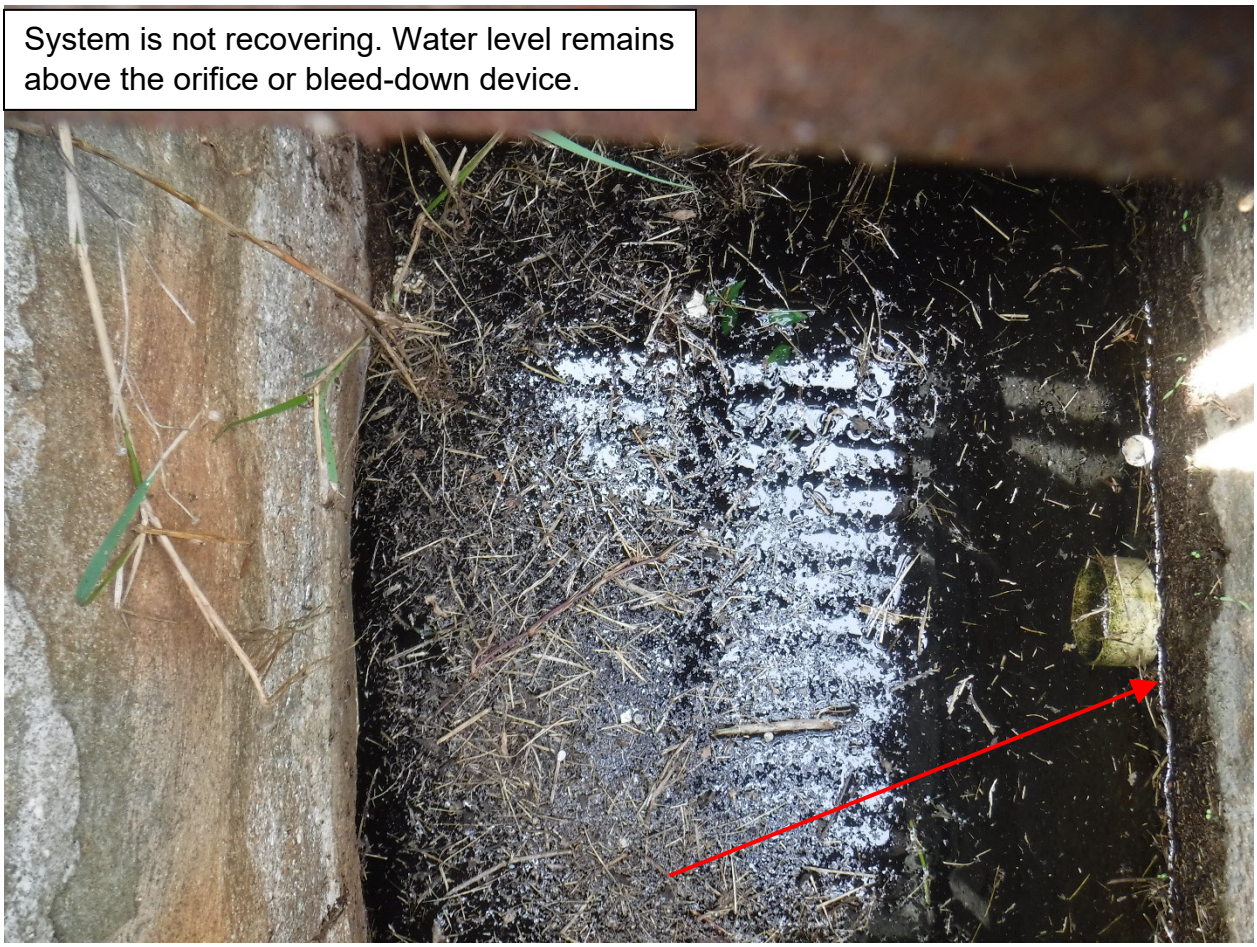
Maintenance Need:	MMS Code (Not Required)	Date Ordered	Date Due	Date Completed
Repair damaged skimmer at DB-13.	451 - Clean Repair Drainage Structures (linear feet)	7/11/2022	8/10/2022	Not Completed

Linear Treatment Facility Location Map

APPENDIX B

Additional Examples of Rating Criteria

Wet Detention Pond – Hydraulic Recovery Condition – Poor



Return to Rating Table

Wet Detention Pond – Erosion Condition – Poor

Return to Rating Table

Dry Detention Pond – Control Structure – Poor Condition

Return to Rating Table

Dry Detention Pond – Orifice – Good

Orifice is free of obstructions.

Return to Rating Table

Dry Detention Pond– Orifice – Fair

Orifice is partially blocked but still allowing full recovery.

Return to Rating Table

Dry Retention – Overflow Weir – Good

Return to Rating Table

Inflow/Outflow Pipe – Good Condition

No damage to pipe or endwall; less than 25% of pipe opening is obstructed.

Return to Rating Table

Inflow/Outflow Pipe – Fair Condition

More than 25%, but less than 40% of pipe opening is obstructed.

Return to Rating Table

Treatment Swale – Hydraulic Recovery Condition – Fair

System does not fully recover treatment volume within the required timeframe.

Return to Rating Table

Treatment Swale – Vegetation Condition – Fair

Return to Rating Table

Treatment Swale with Control Structure – Structural Condition - Poor

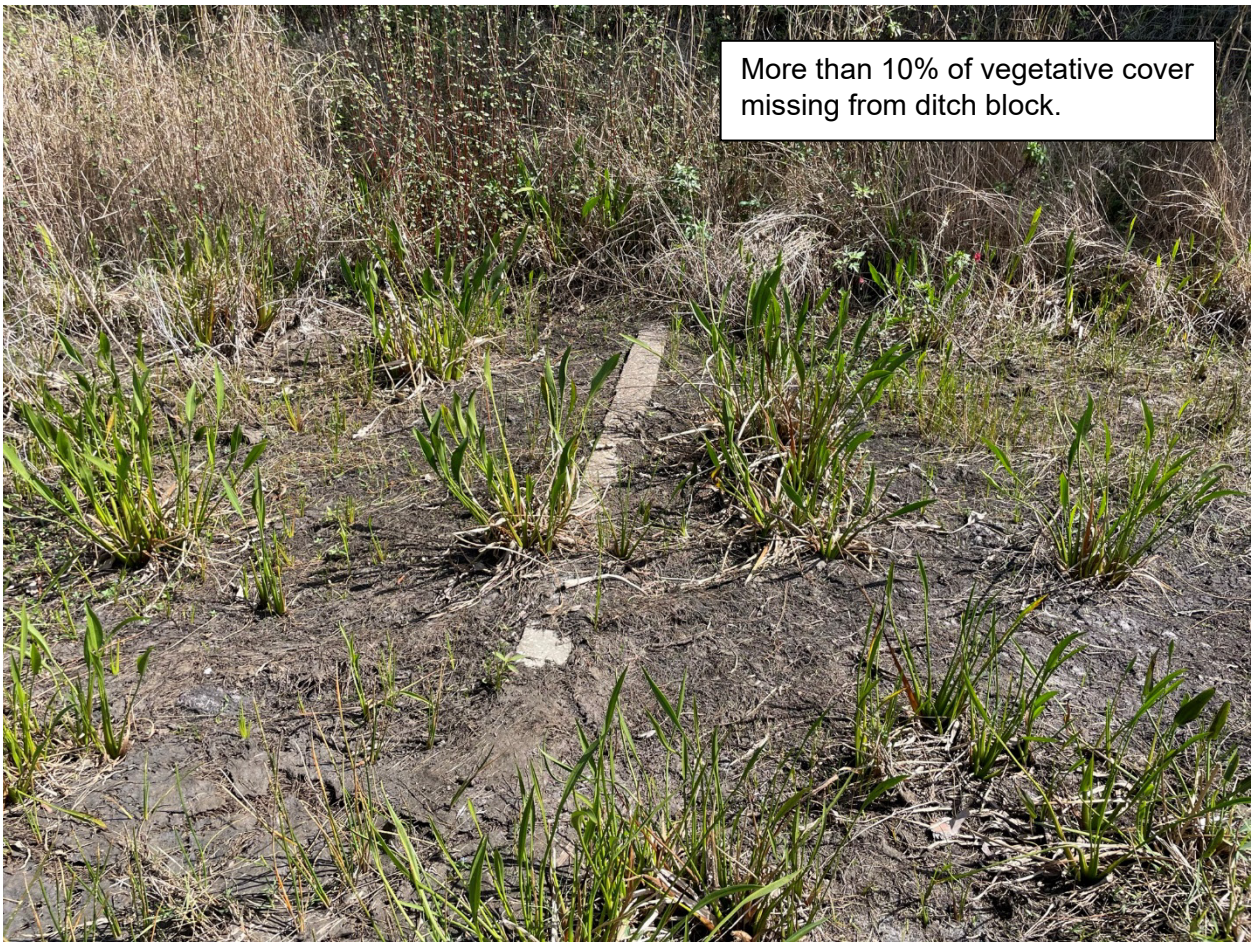
Excess sediment and vegetation are inhibiting system recovery. More than 25% of grate is blocked by debris.

Return to Rating Table

Concrete Ditch Block with Skimmer – Structural Condition – Fair

Return to Rating Table

Earthen Ditch Block with Concrete Core – Structural Condition – Poor



Return to Rating Table

Drainage Well – Structural Condition – Good

Return to Rating Table

Drainage Well – Structural Condition – Good

No visible damage to well; free of trash and debris.

Return to Rating Table

Conveyance Swale – Ditch Bottom Inlet – Poor Structural Condition

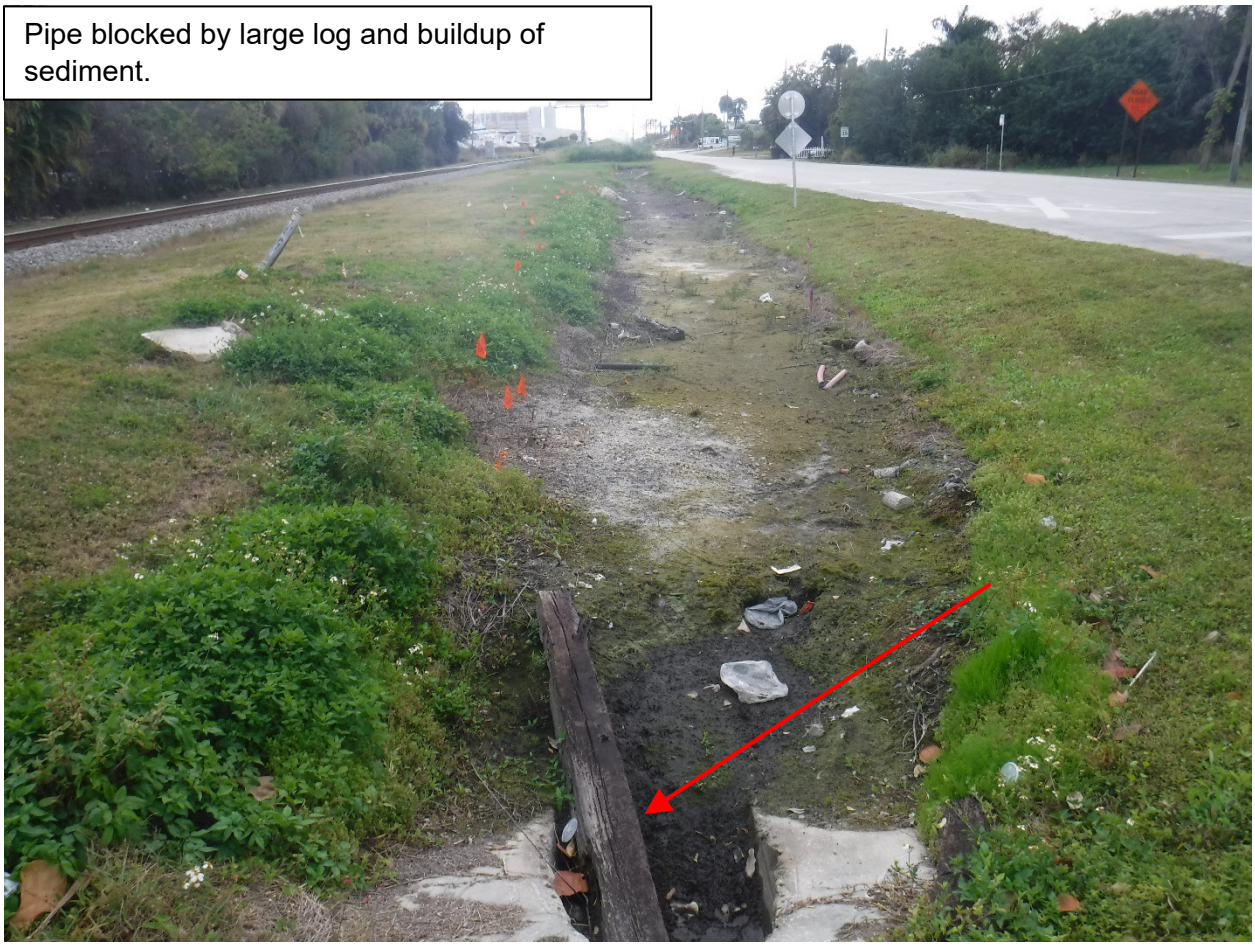
Return to Rating Table

Conveyance Swale – Aesthetic Condition – Poor

Return to Rating Table

Conveyance Swale – Pipes – Poor Condition

Pipe blocked by large log and buildup of sediment.



Return to Rating Table

Conveyance Ditch – Vegetation Condition – Poor

Vegetation on water surface is inhibiting system function.

Return to Rating Table

Conveyance Swale – Erosion Condition – Good

Return to Rating Table

Canal – Aesthetics Condition – Poor

Return to Rating Table

Canal – Vegetation Condition – Good

Vegetative cover intact, no bare spots.

Vegetative cover intact, no bare spots.

Return to Rating Table

Canal – Vegetation Condition – Fair

Return to Rating Table

Canal – Vegetation Condition – Poor

Vegetative cover is not healthy and not being maintained.

Return to Rating Table

Canal – Control Structure – Good

No visible damage, flow is not obstructed.

Return to Rating Table

Canal – Inflow/Outflow Pipe – Good Condition

Pipe opening is unobstructed, free of sediment, and providing adequate conveyance.

Return to Rating Table

Canal – Water Condition – Poor

Water has significant turbidity.

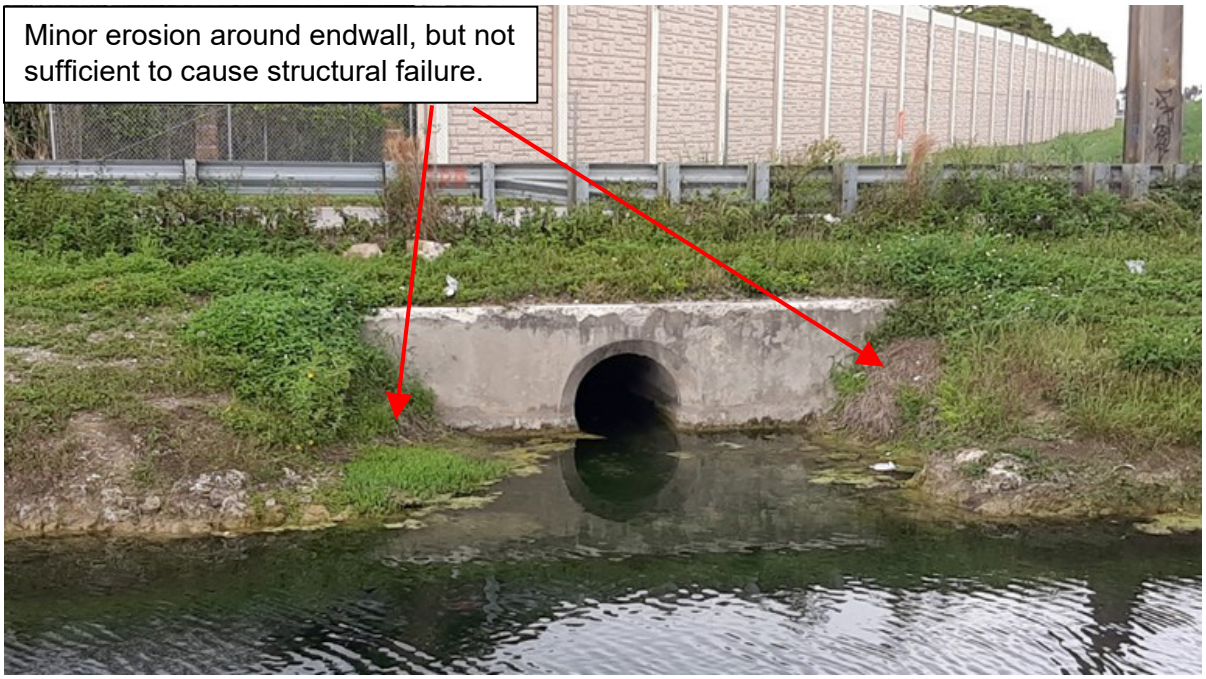
Return to Rating Table

Canal – Erosion Condition – Poor

Erosion is compromising bank stability.

Return to Rating Table

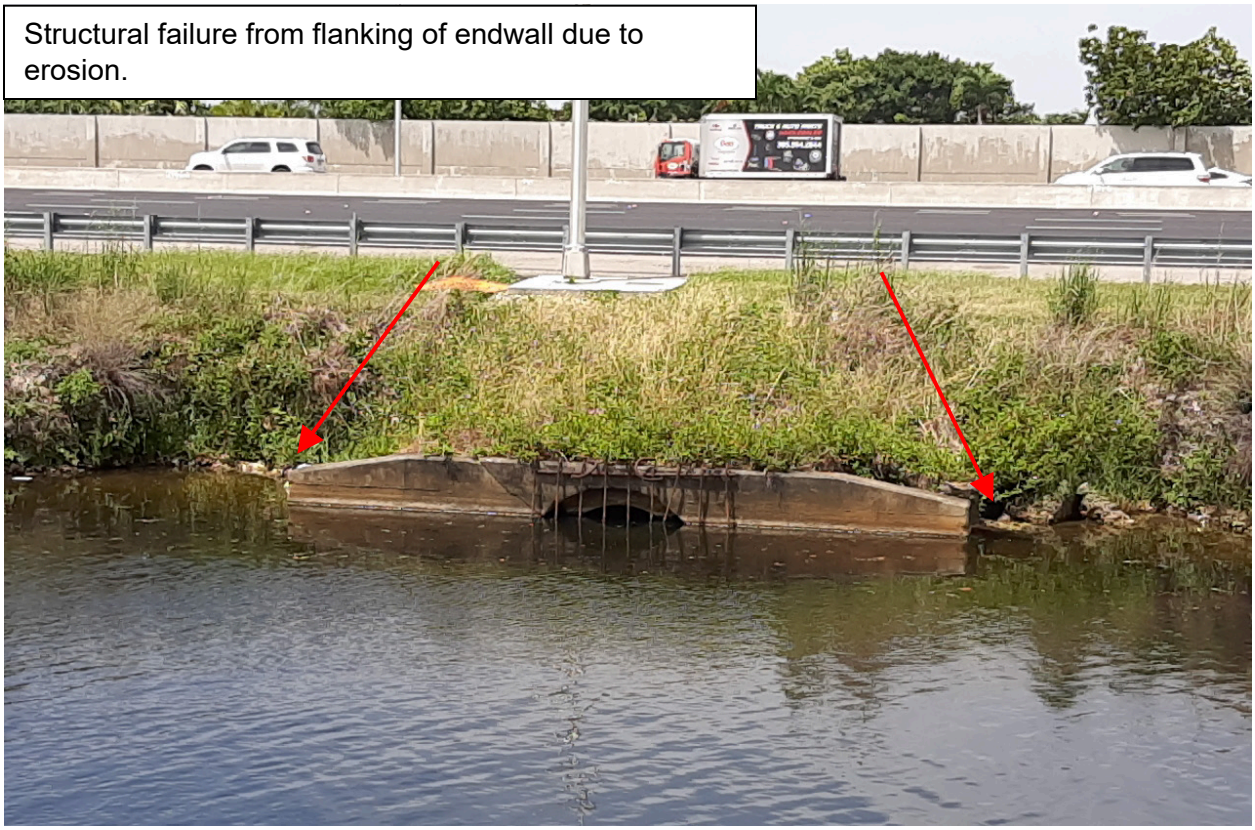
Closed Conveyance Outfall – Erosion Condition – Fair



Return to Rating Table

Closed Conveyance Outfall – Erosion Condition - Poor

Structural failure from flanking of endwall due to erosion.



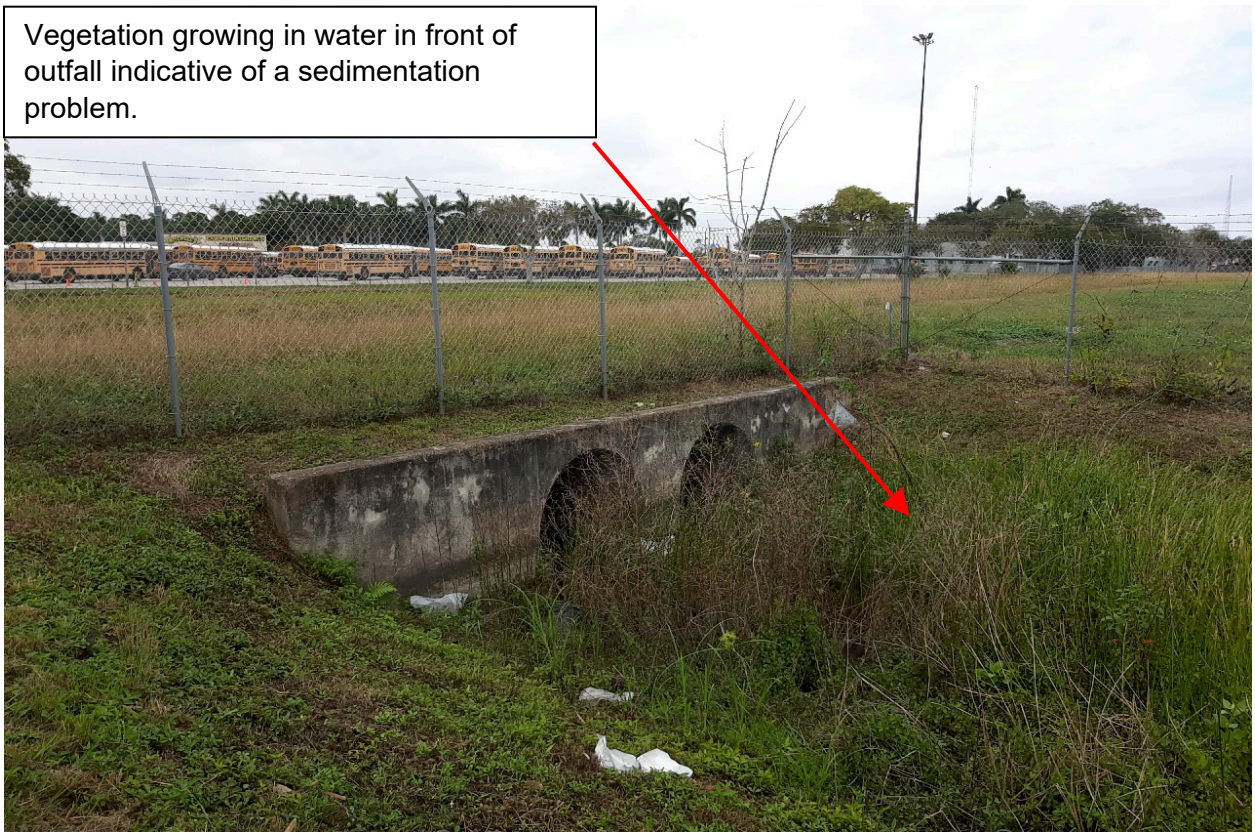
Return to Rating Table

Closed Conveyance Outfall – Structural Condition – Fair

Grate is damaged, but not inhibiting function.

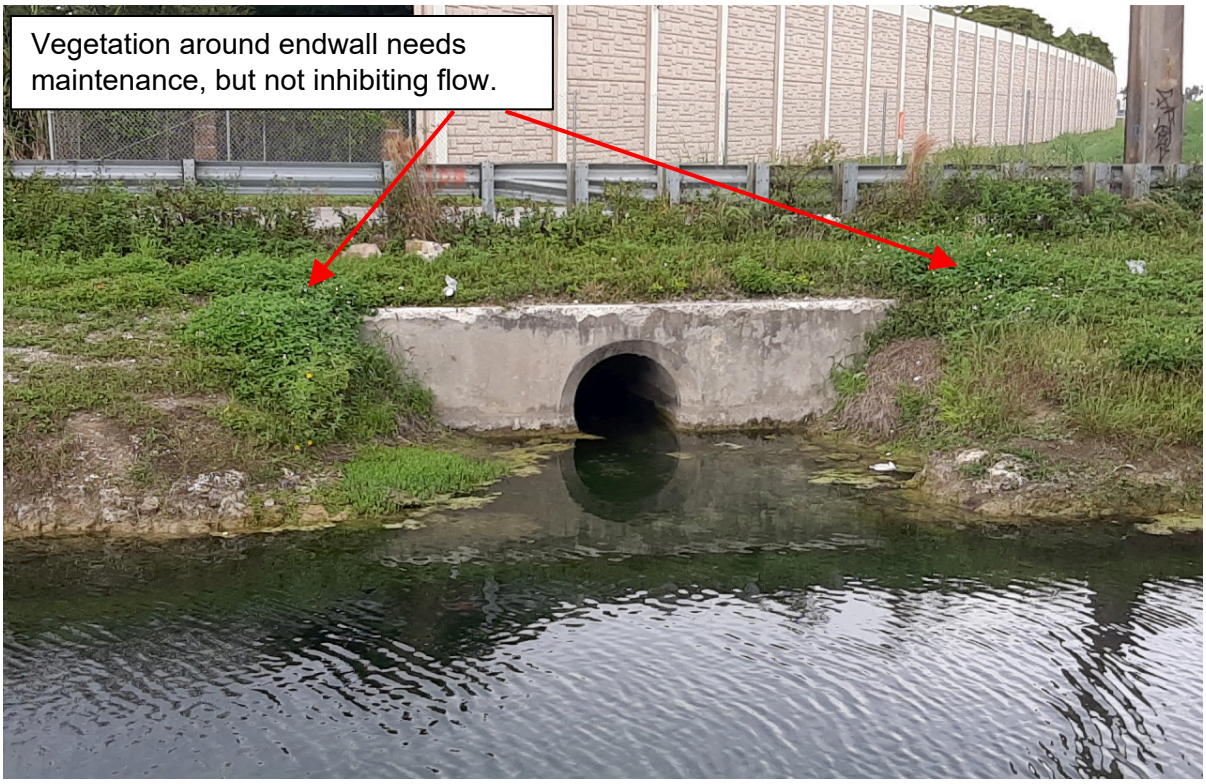
Return to Rating Table

Closed Conveyance Outfall – Sedimentation – Poor



Rating Table Return

Closed Conveyance Outfall – Vegetation Condition – Fair



(continued next page)

Closed Conveyance Outfall – Vegetation Condition - Fair

Return to Rating Table

Closed Conveyance Outfall – Vegetation Condition – Poor

Return to Rating Table

Open Conveyance Outfall – Structural Condition – Good

No visible damage or sediment accumulation. Flow is not obstructed.

Return to Rating Table