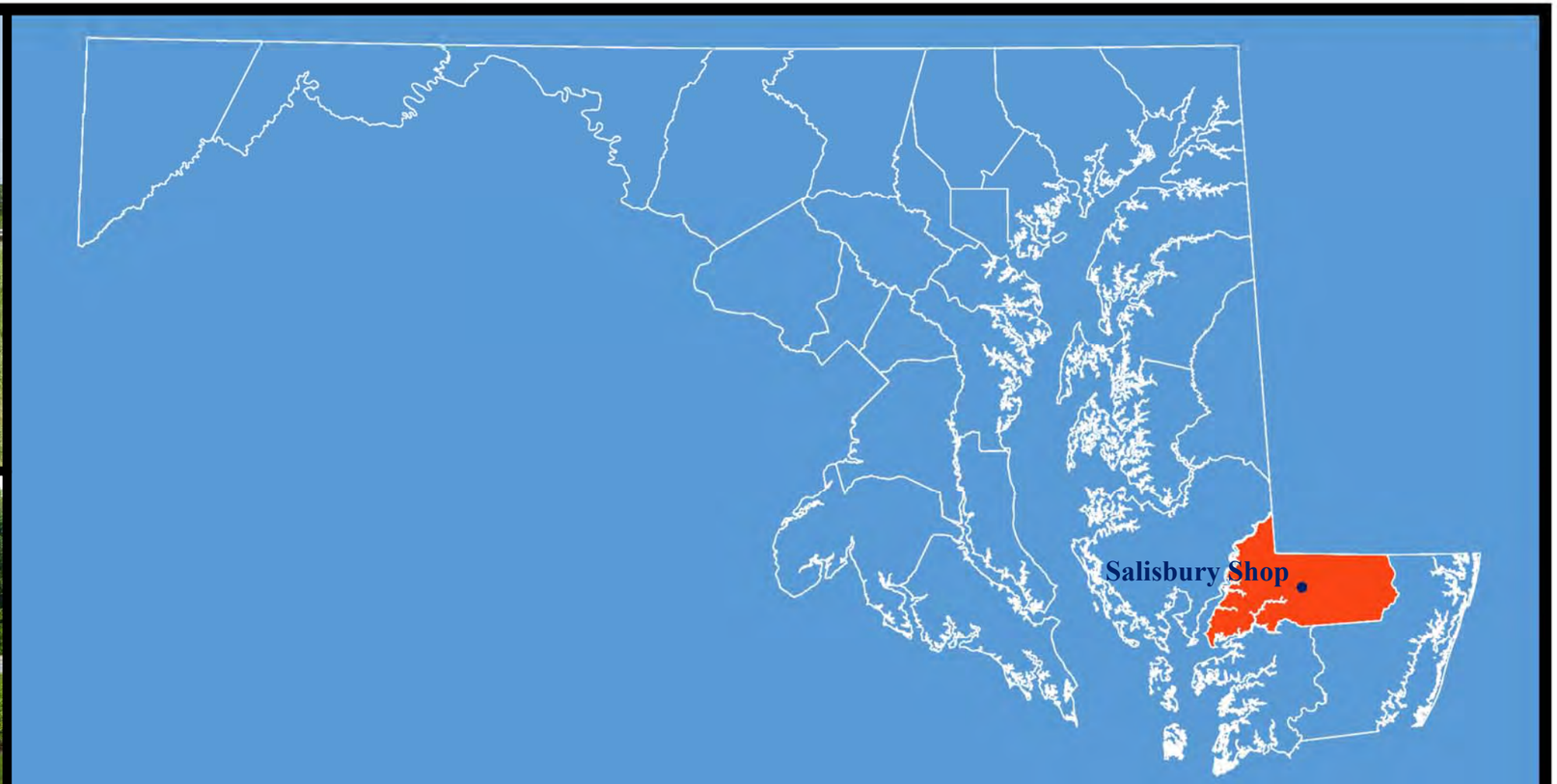

Stormwater Management Facility Routine Maintenance Manual
District 1 – Salisbury Shop

Version 1.1

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division

Stormwater and Drainage Asset Management Program

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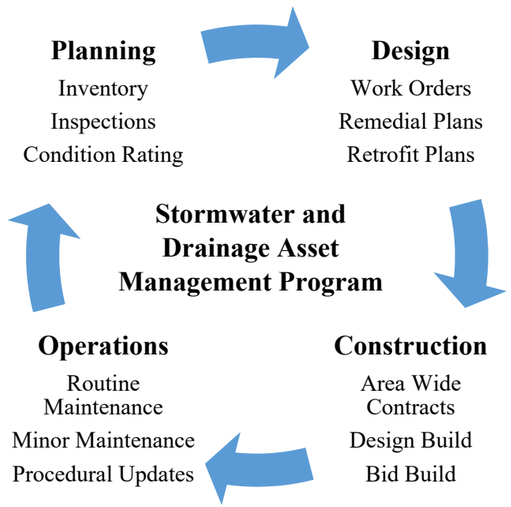
I. INTRODUCTION

The Maryland State Highway Administration (SHA) Highway Hydraulics Division (HHD) has established the Stormwater and Drainage Asset Management Program to guide the operation and remediation of the numerous permanent stormwater and drainage assets owned by SHA that convey and treat highway runoff. The program goal is to provide preventive care, and remedial solutions when problems are identified, for the stormwater and drainage infrastructure within the right-of-way. The program applies a life-cycle approach to its management of stormwater and drainage assets. Operations of these assets, especially routine maintenance, is a critical phase in this life-cycle. Routine maintenance is necessary to ensure that these assets function effectively, and to prevent the need for costly and time-consuming repairs and retrofits.



This Stormwater Management Facility Routine Maintenance Manual has been developed by HHD to aid and inform SHA maintenance personnel who work out of SHA maintenance shops to perform routine maintenance on stormwater and drainage assets. Of SHA's numerous assets, this manual specifically addresses the routine maintenance of stormwater management (SWM) facilities. SWM facilities are structural and non-structural practices designed to manage the volume, flow rate, and quality of stormwater runoff before that water enters natural waterways or groundwater. These SWM facilities play an important role in protecting Maryland's water and land resources.

This manual has been prepared specifically for the **District 1 Salisbury Shop** (Shop). The manual serves two main purposes:

1. To define the location and type of all SWM facilities in the Shop area, and

2. To provide guidelines on recommended routine maintenance activities for these SWM facilities.

The following narrative identifies and describes the routine maintenance categories of SHA SWM facilities, recommended guidelines for routine maintenance of these facilities, and solutions for commonly-occurring minor maintenance issues. Routine Maintenance Guidelines are included in Appendix A of this manual. A map of each SWM facility in the Shop area is provided in Appendix B, and an index summarizing all of the SWM facilities is provided in Appendix C.

How to Use This Manual

Follow these steps to determine the maintenance requirements of a particular SWM facility:

1. **Identify the SWM facility number.** If the SWM facility number is unknown, use the overview map and tile maps in Appendix B to navigate to the SWM facility by its location. Both the tile maps and detail maps identify the SWM facility number.

2. **Identify the SWM facility routine maintenance category.** Using the Index of Stormwater Management Facilities in Appendix C, locate the identified SWM facility number in the table and read across the row to determine its routine maintenance category. Section III of this manual describes how SWM facilities are divided into routine maintenance categories.

3. **Follow the Routine Maintenance Guidelines applicable to the identified category.** Routine Maintenance Guidelines for SWM facilities can be found in Appendix A, along with sample schematics and photographs. Note that some routine maintenance categories, as described in Section III, either should be maintained per SHA Turfgrass Management Guidelines or require specialized maintenance that will be directed by HHD.

II. GLOSSARY

The following terms are used within this manual to describe the components of SHA stormwater management facilities and their associated routine maintenance activities. Portions of this glossary were adapted from the *"2000 Maryland Stormwater Design Manual"* produced by the Maryland Department of the Environment, Water Management Administration.

Aquatic Perimeter Planting – Vegetation generally living within 15 feet from the edge of the permanent pool in Wet Ponds. Aquatic perimeter planting is not mowed as part of SWM facility routine maintenance.

Basin – A land feature that holds water, with slopes on all sides. A basin may be constructed by excavating a pit in the ground or by constructing a dam or fill embankment.

Berm – A mound or bank of earth, compacted and stabilized on an uninterrupted continuous slope that is used as a barrier for water.

Check Dam – A small dam (typically 6" to 12" in height) constructed across a bio-swale or other linear SWM facility that holds water in order to give it time to soak into the ground. A check dam may be constructed out of earth, timber or concrete.

Cleanout – A capped vertical pipe (typically 6" dia. PVC) that extends from the underdrain of a Filtration Facility to above the ground surface. Cleanouts are only present if the Filtration Facility has an underdrain.

The cleanout allows the underdrain to be accessed from the surface in order to clean the underdrain. From the surface, a cleanout may appear identical to an observation well – the two can only be distinguished by removing the cap and investigating belowground to determine if the vertical pipe is connected to an underdrain.

Concentrated Flow – Stormwater runoff that accumulates or converges into well-defined channels.

Dam – A barrier against the flow of water intended to: confine or raise water for storage or diversion; slow the speed of runoff; reduce erosion potential; and/or encourage sediment to settle out of water.

Dewatering Pipe – A small pipe running from the bottom of a forebay to the main treatment area of a SWM facility in order to allow water in the forebay to drain out.

Embankment – The side slope areas of SWM facilities. There are two main types of embankments: fill embankments and cut embankments. Fill embankments are created by placing fill material above existing ground to hold water in the facility. Some fill embankments contain a buried structural component to add stability and prevent seepage. Cut embankments are the side slopes of a facility that was created by excavating below existing ground.

End Structure – Any structure located at the end of a pipe where the pipe is open to a ditch, stream, or other natural land feature (i.e. where the pipe daylights). Examples of end structures include end walls and flared end sections.

Erosion – The process of water wearing away the soil surface.

Filter Bed – The section of a Filtration Facility below the ground that contains filter media and the underdrain pipe, if present.

Filter Media – Layers of sand, organic matter, soil, gravel and/or other media in a Filtration Facility used to remove pollutants and sediment from water soaking into the ground. The filter media cleans water before it reaches a stream or other natural body of water.

Filtration – The separation or removal of pollutants and sediment from stormwater runoff as water moves downward through filter media.

Footprint – The general area of land covered by a SWM facility.

Forebay – Storage space where runoff enters a SWM facility at an inflow point. The forebay traps incoming sediment before it can accumulate in the main treatment area of a SWM facility. It is often separated from the main treatment area by an earthen or stone weir. The forebay may be designed to be dry or may be designed to have a permanent pool of water. A dry forebay may include a dewatering pipe.

Herbaceous Vegetation – Plants that have non-woody stems which die down to the soil level at the end of the growing season; excludes trees and shrubs.

Infiltration – The downward movement of water into the ground.

Inflow/Outflow Protection – A device or material (usually riprap, gabions or a concrete structure) placed at inflow and outflow points and used to protect the soil surface from erosion caused by concentrated flows.

Inflow Point – Any place where a concentrated flow of water enters a SWM facility. Examples of inflow points include pipes, end structures, curb openings, and ditches.

Inlet – A structure at ground level with an opening that intercepts water and directs it into a pipe. An inlet is typically a concrete structure with a metal grate covering the opening. An inlet may also be called a catch basin.

Maintenance Access – A permanent entrance or access way into a SWM facility that is stabilized and graded to allow vehicular access.

Major Sediment Accumulation – Sediment that has accumulated in a large enough quantity that mechanical equipment must be used to remove it.

Minor Sediment Accumulation – Accumulated sediment that can be easily removed with a shovel.

Observation Well – A capped vertical pipe (typically 6” dia. PVC) that extends from the bottom of a Filtration Facility’s filter bed or an Infiltration Facility’s stone reservoir to above the ground surface. Observation wells are not connected to other pipes. By removing the cap and looking in the observation well, an inspector is able to measure the level of water below the ground at any given time. From the surface, an observation well may appear identical to a cleanout – the two can only be distinguished by removing the cap and investigating belowground to determine if the vertical pipe is connected to an underdrain.

Outfall – The place where water leaves a pipe or ditch carrying water away from a SWM facility; located outside of the SWM facility footprint and downstream of an outflow point. An outfall is typically a ditch or stream.

Outflow Point – Any structure or place where a concentrated flow of water leaves a SWM facility; located within the SWM facility footprint. Examples of outflow points include riser structures, inlets, pipes, and weirs.

Permanent Pool – An area within a SWM facility that is intentionally designed to permanently hold some volume of water at all times. Generally, any water that is *not* in a permanent pool is supposed to soak into the ground within 72 hours after a storm. After a storm it may be difficult to determine in the field whether standing water is intended to be a permanent pool, so maintenance personnel may need to reference design plans to identify permanent pools.

Pond Drain – A small pipe that runs from the bottom of a SWM facility to the bottom of a riser structure. A pond drain can be used to dewater a SWM facility. In Wet Ponds, this opening in the riser may be intentionally sealed or blocked to maintain the permanent pool. Pond drains may be outfitted with locks or valves where they connect to the riser structure.

Retrofit – Changes made to an existing SWM facility in order to improve the overall function. Retrofits generally involve more design and permitting than typical maintenance activities. SWM facilities that are intended to be retrofitted or are undergoing retrofit may be excluded from routine maintenance activities.

Riser Structure – A vertical corrugated metal pipe or concrete box structure which extends above the bottom of a SWM facility. The riser structure is the main outflow point that allows water to flow out of the facility.

Runoff – Water from rain, snow or other precipitation that does not soak into the ground, but instead flows over the land surface.

Sediment – Solid material, such as soil particles, that is carried by (and eventually settles out of) water.

Seepage – The process of water moving through or emerging from a fill embankment. Seepage is a sign that the embankment may potentially be failing. This problem may be indicated by wet soil on the outside of a fill embankment. Any signs of seepage should be reported to HHD.

Stone Reservoir – The section of an Infiltration Facility below the ground that is filled with stone. The stone reservoir serves as short-term storage-space for water that has soaked into the facility, in order to hold that water until it can infiltrate into the ground below the stone reservoir.

Stormwater Management (SWM) Facility – A structural or non-structural practice designed to manage the volume, flow rate, and quality of stormwater runoff before that water enters natural waterways or groundwater. SWM facilities may be located belowground or at the land surface.

SWM Facility Number – A unique identification number assigned to a SWM facility by HHD for the purpose of tracking activities and functions associated with that facility.

Toe (of Embankment) – Typically where the embankment slope stops, levels out, or meets existing grade; generally the bottom of the slope. It may be difficult to determine in the field where the outer toe of a fill embankment is if the SWM facility is located on a slope, so maintenance personnel may need to reference design plans in order to determine this location.

Trash Rack – A metal grill, grate, or other device installed at the point where water flows into a riser structure, meant to prevent oversized debris from entering the structure.

Underdrain – A horizontal perforated or slotted pipe that lies at the bottom of a filter bed in a Filtration Facility. Most Filtration Facilities have underdrains. The underdrain allows water that has soaked all the way through the filter bed to flow to the outfall.

Weir – A barrier that holds ponded water until the water depth reaches the height of the barrier, at which point water then flows over the weir. Examples of weirs include a barrier between the forebay and the main treatment area of a SWM facility (resembling a small dam), a low point in the top of an embankment through which excess water flows away from the facility, or a wall that limits or controls the flow of water into a riser structure.

III. TYPES OF STORMWATER MANAGEMENT FACLITIES

As of 2017, the State Highway Administration (SHA) owns and maintains more than 6,000 permanent stormwater management (SWM) facilities throughout the state of Maryland, and this number is increasing each year. The **Salisbury Shop** (Shop) area contains 57 SWM facilities, all of which must be routinely maintained in order to preserve their ability to perform effectively. These SWM facilities play an important role in managing both the quantity and quality of stormwater runoff entering Maryland's waterways. Title 4, Subtitle 2 of the Environment Article of the Annotated Code of Maryland states that "…the management of stormwater runoff is necessary to reduce stream channel erosion, pollution, siltation and sedimentation, and local flooding, all of which have adverse impacts on the water and land resources of Maryland."

As part of the Stormwater and Drainage Asset Management program, HHD has developed a geodatabase inventory that identifies all SHA infrastructure that captures, treats, and conveys stormwater runoff within SHA right-of-way. This geodatabase defines the location, facility number, and type of all SWM facilities owned by SHA in the state of Maryland. There are 48 different types of SWM facilities in the HHD geodatabase, all varying widely in design and function. Some SWM facilities are ponds, traditionally designed according to older guidelines. Many of the newer facilities are smaller in footprint, but greater in number, and are designed according to Environmental Site Design (ESD) guidelines. These newer ESD facility types are indicated below with "*(ESD)*".

SWM Facility Routine Maintenance Categories

There are three defining characteristics of SWM facilities relating to routine maintenance requirements: (1) how the SWM facility functions, (2) how it appears at the land surface, and (3) how it should be maintained. Based on these three characteristics, the 48 SHA SWM facility types have each been classified into one of seven routine maintenance categories. This manual provides routine maintenance guidelines for five of the seven categories (Categories 1-5). Routine maintenance of SWM facilities in the other two categories (Categories 6-7) is either guided by SHA Turfgrass Management Guidelines or will be directed on a case-by-case basis by HHD. The routine maintenance categories are as follows:

1. **Dry Pond** – A Dry Pond is a SWM facility that is designed to hold stormwater runoff, then release the runoff over a period of time. The purpose of a Dry Pond is to allow time for pollutants and sediment to settle out of water, and to manage the volume of stormwater runoff in order to prevent floods. A Dry Pond generally appears to be a grass basin. It is not designed have a permanent pool of water, and therefore should not have standing water during dry weather conditions. Dry Ponds should be maintained by following the Dry Pond Routine Maintenance Guidelines in Appendix A. The category of Dry Pond includes the following SWM facility types:

    - Dry Pond
    - Dry Extended Detention Pond

Example Dry Pond

2. **Wet Pond** – Similar to a Dry Pond, a Wet Pond is a SWM facility that is designed to hold stormwater runoff, then release the runoff over a period of time, with the purpose of removing pollutants and sediment from water and providing flood protection. Unlike a Dry Pond, however, a Wet Pond is designed to permanently hold some volume of water at all times. A Wet Pond generally includes a grassed embankment and aquatic perimeter planting around a pool of water. Wet Ponds should be maintained by following the Wet Pond Routine Maintenance Guidelines in Appendix A. The category of Wet Pond includes the following SWM facility types:

   - Wet Pond
   - Wet Swale *(ESD)*
   - Wet Extended Detention Pond
   - Shallow Marsh
   - Micropool Extended Detention Pond
   - ED Shallow Wetland
   - Pond/Wetland System
   - Pocket Pond
   - Pocket Wetland
   - W-1 *(Shallow Wetland)*
   - P-4 *(Multiple Pond System)*

Example Wet Pond

   Note that wetland SWM facility types in this category are not considered jurisdictional wetlands or natural resources protected by the Maryland Department of the Environment (MDE). Wetland SWM facility types may be accessed and maintained without an MDE permit.

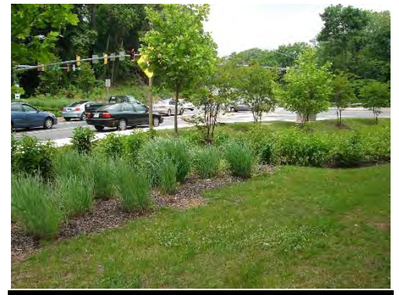
3. **Infiltration Facility** – An Infiltration Facility is a SWM facility that is designed to temporarily hold stormwater runoff while allowing the water to soak into the ground over time. The purpose of an Infiltration Facility is to reduce the amount of stormwater runoff flowing on top of the land surface by redirecting that water into the ground. An Infiltration Facility may be in the form of a basin or a ditch. It may have a stone or grass bottom, and typically includes an observation well. Infiltration Facilities may also have stone reservoirs belowground. Infiltration Facilities should be maintained by following the Infiltration Facility Routine Maintenance Guidelines in Appendix A. The category of Infiltration Facility includes the following SWM facility types:

   - Infiltration Trench
   - Infiltration Basin
   - Dry Well *(ESD)*

Example Infiltration Facility

4. **Filtration Facility** – A Filtration Facility is a SWM facility that is designed to temporarily hold stormwater runoff above a filter bed. Over time, the water soaks through the filter media, which removes pollutants and sediment from the water. A Filtration Facility often includes an underdrain and cleanout(s) extending above the surface of the ground. The facility may be fully vegetated, or have only mulch on the bottom, or be landscaped with both vegetation and mulch. Filtration Facilities should be maintained by following the Filtration Facility Routine Maintenance Guidelines in Appendix A. The category of Filtration Facility includes the following SWM facility types:

   - Micro-Bioretention *(ESD)*
   - Bioretention
   - Surface Sand Filter
   - Submerged Gravel Wetland *(ESD)*
   - Rain Garden *(ESD)*
   - Landscape Infiltration *(ESD)*
   - Organic Filter
   - Enhanced Filter *(ESD)*


Example Filtration Facility

5. **Bio-swale** – A Bio-swale is a specific type of Filtration Facility that is located in a ditch with a 2 to 8 foot wide flat bottom. Like a Filtration Facility, the purpose of a Bio-swale is to remove pollutants from stormwater runoff. A Bio-swale typically includes check dams spaced evenly along the length of the facility. The check dams are intended to create ponding of water for a period of time while the water soaks through the filter media. Note that Bio-swales are identified as a separate category from the Filtration Facility category because they make up a relatively large percentage of SHA SWM facilities. Bio-swales should be maintained by following the Bio-swale Routine Maintenance Guidelines in Appendix A. Dry swales are functionally and physically very similar to bio-swales and can be maintained the same way. The category of Bio-swale includes the following SWM facility types:

   - Bio-swale *(ESD)*
   - Dry Swale

Example Bio-Swale

6. **Turfgrass Maintenance** – Some SWM facilities do not have visible features that distinguish them from other grassed areas that SHA maintenance personnel routinely mow and maintain. SHA maintenance personnel *are* responsible for the routine maintenance of these simple turfgrass SWM facilities. However, guidelines for such routine maintenance are not provided in this manual. Instead, follow SHA Turfgrass Management Guidelines to maintain the following SWM facility types:

   - Grass Swale *(ESD)*
   - Grass Channel Credit
   - Disconnection of Non-Rooftop Runoff *(ESD)*
   - Disconnection of Rooftop Runoff *(ESD)*
   - Infiltration Berm *(ESD)*
   - Sheetflow to Conservation Areas *(ESD)*

Example Turfgrass SWM Facility

7. **Specialized Maintenance** – Guidelines for routine maintenance of the following SWM facility types are not provided in this manual at this time. Instead, SHA maintenance personnel should contact HHD for specific instructions on routine maintenance of the following SWM facility types if present in the Shop area:

   - Underground Detention
   - Underground Sand Filter
   - Permeable Pavement *(ESD)*
   - Porous Pavement
   - Rainwater Harvesting *(ESD)*
   - Oil Grit Separator
   - Stream Restoration
   - Other
   - Other Pond
   - Other Wetland
   - Other Infiltration
   - Other Filtering
   - Other Open Channel System
   - X-1
   - X-2
   - Y-1

How to Identify Routine Maintenance Categories

The routine maintenance category that any SWM facility falls into can be identified as follows:

Option A: Given a known SWM facility number, the SWM facility type and routine maintenance category can be read from the Index of Stormwater Management Facilities in Appendix C.

Option B: Read the SWM facility type at the top right corner of a detail map in Appendix B. Then return to this section (pages 3 through 5) to determine which routine maintenance category the identified SWM facility type is listed under.

IV. ROUTINE MAINTENANCE OF SWM FACILITIES

There are four levels of stormwater management (SWM) facility maintenance: (1) routine, (2) minor, (3) major, and (4) retrofit. Effective routine maintenance of SWM facilities will typically ensure good function and pleasing aesthetics of the facilities, and can be essential in the minimization of minor and major maintenance needs over time. Failure of SWM facilities to perform as designed can negatively affect both SHA SWM permit compliance and achievement of Chesapeake Bay TMDL goals.

The SHA maintenance shops are generally responsible for routine maintenance of SWM facilities, and for repair or correction of any minor issues that occur. HHD is committed to providing the shops with support in these operational activities. When performing routine and minor maintenance activities, contact HHD if any questions or concerns are raised regarding SWM facilities or other stormwater and drainage assets.

Major maintenance issues and SWM facility retrofits are the responsibility of HHD. Consequently, any SWM facilities that are in need of major maintenance or are designated as retrofit facilities will not be the responsibility of the SHA shops while the repair or retrofit is occurring. HHD will annually provide a list to the **Salisbury Shop** (Shop) that clearly identifies all SHA SWM facilities in the Shop area, along with who is responsible for their maintenance. Note that the mapping provided in Appendix B may include SWM facilities that do not need to be routinely maintained by the Shop. Therefore, in order to effectively plan routine and minor maintenance to be completed by the Shop, this mapping should be used in conjunction with the annual list of facilities and personnel responsible for maintenance.

Routine Maintenance Guidelines

Routine Maintenance Guidelines for five of the SWM facility routine maintenance categories are provided in Appendix A of this manual. Each set of guidelines is accompanied by a sample schematic of a SWM facility type associated with that category, along with sample photographs of such facilities. For all five of these SWM facility routine maintenance categories, it is recommended that that routine maintenance of a facility be performed at least twice a year: once in the spring between March 15th and May 15th and once in the fall between September 15th and November 15th.

In order to simplify the routine maintenance requirements for maintenance personnel, mowing guidelines have been standardized for the five SWM facility routine maintenance categories (Categories 1-5). Herbaceous SWM facility vegetation, excluding aquatic perimeter planting, should be mowed to a height of 6-inches once each year in the fall. Facilities should be mowed using an articulated or side arm mower. Boom-axe, flail or rotary heads should be attached for proper mowing based on the type of vegetation being cut. Equivalent equipment, as available to the maintenance crew for safe mowing procedures, is acceptable.

In general, SWM facilities should be mowed according to the guidelines presented in this manual within the limits of 15 feet beyond the top of a cut embankment; 15 feet beyond the outer toe of a fill embankment; or the ditch bottom for a linear SWM facility located in a ditch. Refer to the SWM Facility Limits of Mowing in Appendix A for profiles of these mowing limits. Note that mowing according to this manual's guidelines may be in addition to mowing according to other guidelines. For example, a Bio-swale should

be mowed according to the Bio-Swale Routine Maintenance Guidelines within the limits of the flat ditch bottom, and should generally also be mowed according to SHA Turfgrass Management Guidelines outside of those limits along the ditch side slopes.

Other routine maintenance activities that should be performed each year include removing trash and debris, stabilizing eroded areas, and re-seeding sparsely vegetated areas. While performing this routine maintenance, maintenance personnel should also inspect the SWM facility to identify potential issues that may require minor or major maintenance. Check for deterioration or damage to any structures associated with the facility; soft spots, depressions, water seepage or any other signs of potential structural failure in the embankment; and/or a build-up of sediment. Identification of and responses to such issues are further explained in Section V of this manual.

Of the five SWM facility routine maintenance categories for which guidelines are provided in this manual, only Wet Ponds should have a permanent pool of water during dry weather conditions. Any SWM facility classified as one of the other four maintenance categories is not functioning properly if water remains in the facility more than 72 hours after a storm. Actions that maintenance personnel can perform to solve the issue of undesirable ponding water include clearing clogs or obstructions to outflow points, removing accumulated sediment and debris, and cleaning out the underdrain, if present. See Page 9 for further information. Regardless of whether the undesirable ponding water issue is solved, report any actions taken to remediate the issue and the results to HHD.

In order to function properly, Filtration and Infiltration Facilities depend on the infiltration of water into and through soil layers at specific rates, per the design of the SWM facility. When soil and/or filter media become compacted, the rate of infiltration through the media is reduced. Therefore, it is important to perform all maintenance activities on Filtration and Infiltration facilities (including Bio-swales) in a manner that prevents compaction of the facility bottom. Do not drive equipment over the bottoms of Infiltration facilities, Filtration facilities, or Bio-swales at any time. If compacted soil is ever observed in a Filtration or Infiltration facility, report the condition to HHD.

Do not perform maintenance on any portions of a SWM facility that contain saturated or wet soil at the surface. If saturated soils are observed, the routine maintenance activities for the affected areas should be rescheduled to occur when drier conditions are present, during the same season, if possible.

V. IDENTIFYING AND SOLVING COMMON PROBLEMS

While major issues with SWM facilities are the responsibility of, and should be reported to HHD, minor issues are typically handled by Shop maintenance personnel. The following pages define common issues that may be observed at SWM facilities, along with their solutions. Portions of this Section V were adapted from Chapter 7, "Best Management Practice Assessment Guidelines for Maintenance and Remediation," of the *"Stormwater NPDES Program Standard Procedures Manual"* produced by SHA.

Erosion

A common problem that occurs at many SWM facilities is erosion, often along an unstable ditch or embankment slope. Erosion can occur when soils are not properly compacted during construction, or when vegetation does not establish properly along a slope or channel. It is important to repair minor erosion immediately because bare soil that is exposed by erosion becomes even more susceptible to additional erosion, and thus minor erosion can quickly become a major problem.

Problem	Solution
Minor erosion	Fill the eroded area with Furnished Topsoil as necessary to restore the original ground surface. If the eroded area is adjacent to existing riprap, stabilize the repaired area with Class I Riprap. Otherwise, re-seed the repaired area with SHA Turfgrass Seed Mix and install Type 'A' Soil Stabilization Matting.
Major erosion	Report to HHD.

Minor Erosion in Grass Swale

Minor Erosion Behind End Structure

Major Erosion Along Pond Bank

Major Erosion at Inflow Point

Sediment Accumulation

Sediment is carried into SWM facilities with stormwater runoff, and as the water is held in the facility the sediment settles out of the water. Many SWM facilities have forebays to allow most of the sediment to settle out before the water reaches the main treatment area. Sediment can also accumulate in a SWM facility as a result of erosion upstream of the facility. Sediment accumulation in the main treatment area is a problem because it can slow infiltration of water into the ground, reduce the volume of water that can be stored in the facility, and/or clog outflow points. If identified, maintenance personnel should remove minor accumulated sediment from forebays, outfalls and other areas.

Problem	Solution
Minor sediment accumulation	Remove minor accumulated sediment with a shovel. If necessary, re-seed the affected area with SHA Turfgrass Seed Mix and install Type 'A' Soil Stabilization Matting.
Major sediment accumulation	Report to HHD.

Minor Sediment Accumulation in Inflow Ditch

Minor Sediment Accumulation

Major Sediment Accumulation at Outfall

Major Sediment Accumulation in Forebay

Lack of Vegetation

Lack of vegetation is most commonly identified by areas of visible bare soil, and is a problem because bare soil is vulnerable to erosion. While small areas of bare soil are not uncommon in the life-cycle of a SWM facility, large areas of bare soil may indicate that permanent or reoccurring conditions are not favorable for plant growth. In such cases, the condition should be reported to HHD so that HHD can assess the facility and determine whether there is an underlying issue causing the lack of vegetation.

Problem	Solution
Small area of bare soil	Re-seed the bare area with SHA Turfgrass Seed Mix and install Type 'A' Soil Stabilization Matting.
Large area of bare soil	Report to HHD.

Small Area of Bare Soil in Grass Swale

Small Area of Bare Soil Caused By Tire Rut

Large Area of Bare Soil on Pond Bottom

Large Area of Bare Soil on Pond Bottom

Excessive Vegetation

The growth of excessive vegetation over time can adversely impact a SWM facility by blocking pipes, structures, and weirs or by growing into and interfering with the proper function of filter media. Excessive vegetation can also interfere with an inspector's ability to perform required periodic inspections of facilities and structures. In most cases, vegetation should be controlled by routine mowing of SWM facilities. However, if excessive vegetation is encountered it should be removed.

Problem	Solution
Excessive vegetation	Clear the vegetation with a weed trimmer.

Vegetation Obstructing Outflow Point

Vegetation Obstructing Riser Structure

Excessive Vegetation in Infiltration Trench

Vegetation Growing in Riprap

Damaged or Deteriorated Structure or Pipe

Structures and pipes in SWM facilities are occasionally damaged by large debris, ice, soil settlement, or other conditions. These critical components of SWM facilities also deteriorate over time. It is important to maintain structures and pipes in good condition to ensure that water is collected and conveyed to the intended location. If maintenance personnel encounter a damaged or deteriorated structure or pipe, inform the Shop Resident Maintenance Engineer to determine how to repair the structure or pipe.

Problem	Solution
Damaged or deteriorated structure or pipe	Report to Resident Maintenance Engineer.

Deteriorated CMP End Structure

Broken Observation Well

End Structure Separated From Pipe

Water Leaking into Pipe

Unstable Embankment

The embankment of a SWM facility holds water in the facility. Failure of an embankment results in water leaving the facility in problematic ways and locations, and is an indication that the facility cannot manage stormwater runoff as intended. Unmanaged runoff can lead to downstream flooding. It is therefore important to identify signs of potential embankment failure, including soft spots or depressions in the embankment, as well as seepage of water through a fill embankment. Erosion and holes, such as animal burrows, could also contribute to embankment failure.

Problem	Solution
Animal burrows or other holes	Eliminate holes by filling them with soil.
Erosion	See Identifying and Solving Erosion on page 6.
Soft spots, depressions, seepage, or other problem.	Report to HHD.

Animal Burrow in Embankment

Eroded Embankment

Eroded Embankment Exposing Pipe

Frozen Seepage Through Embankment

Undesirable Ponding Water

For all routine maintenance categories except Wet Ponds, no ponding water should be visible in the facility 72 hours after a storm. Only a Wet Pond should have a permanent pool of water during dry weather conditions. Undesirable ponding water may indicate that outflow point(s) are clogged; accumulated sediment/debris or clogged/compacted filter media is reducing the rate of infiltration; or the underdrain of a Filtration Facility is blocked. Regardless of whether the issue of undesirable ponding water is solved, report the actions taken to remediate the issue and the results to HHD.

Problem	Solution
Outflow point(s) are clogged	Clear clogs in or obstructions to the outflow point(s).
Leaves/sediment/debris has accumulated on the facility bottom	Remove minor leaf/sediment/debris buildup from the bottom of the facility. Report major buildup to HHD.
Underdrain is blocked	Clean out the underdrain with a vacuum truck.
Filter media is clogged or compacted, or other problem.	Report to HHD.

Accumulated Sediment Blocking Outflow Point

Accumulated Debris Blocking Outflow Point

Saturated Infiltration Trench

Surface Sand Filter Not Draining

VI. MAPPING AND INDEX DESCRIPTION

To effectively maintain all of the SWM facilities in the **Salisbury Shop** (Shop) area, Shop personnel must know the location and type of each facility. HHD has therefore developed maps of each of the existing SHA-owned SWM facilities in the Shop area, specifying the locations and types of the facilities. These maps are contained in Appendix B of this manual, and were prepared utilizing March 2017 geodatabase data. There are three types of maps provided:

1. An overview map of the entire Shop area, defining the limits of the Shop area within a reference grid.

2. Tile maps corresponding to the reference grid on the overview map, showing portions of the Shop area in greater detail. These tile maps show the general locations of the SWM facilities. Each SWM facility is labeled with a unique identification number.

3. One detail map for each SWM facility in the Shop area, defining the specific location and type of the facility, as well as the approximate layout of the facility.

The following information and features are displayed on the detail maps:

- The SWM facility number.
- The SWM facility type, corresponding to the facility types listed in Section III of this manual.
- The approximate facility footprint. A diamond or circle may be shown if the actual facility footprint was not available in the HHD geodatabase.
- SHA-owned pipes and drainage structures in the vicinity of the SWM facility, as defined in the HHD geodatabase. Structure numbers and pipe sizes and materials are labeled, if the information was available in the HHD geodatabase. Pipes are labeled as “UNK” if the pipe size and material was not available.
- The approximate SHA Right-of-Way line. This line is approximate and does not define ownership.
- Mile points along SHA-owned roads.
- Names of roadways in the immediate vicinity of the SWM facility, for location reference.
- The Shop boundary, if applicable.

Note that some detail maps show multiple SWM facilities, for cases where facilities are in close proximity to each other. In such cases, the SWM facility corresponding to the facility number and type written in the top right corner of the sheet is shown with a blue outline and red label, while other nearby facilities are shown with a yellow outline and gray label.

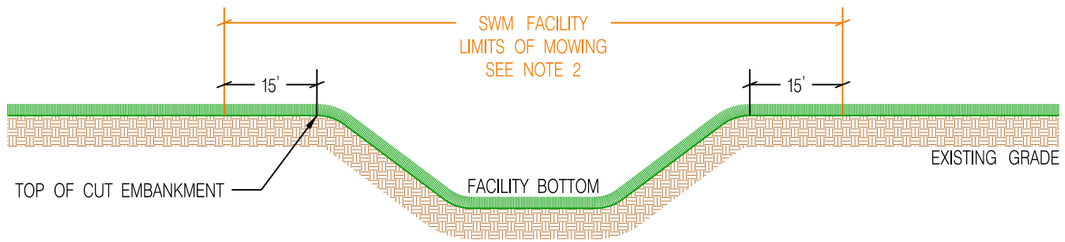
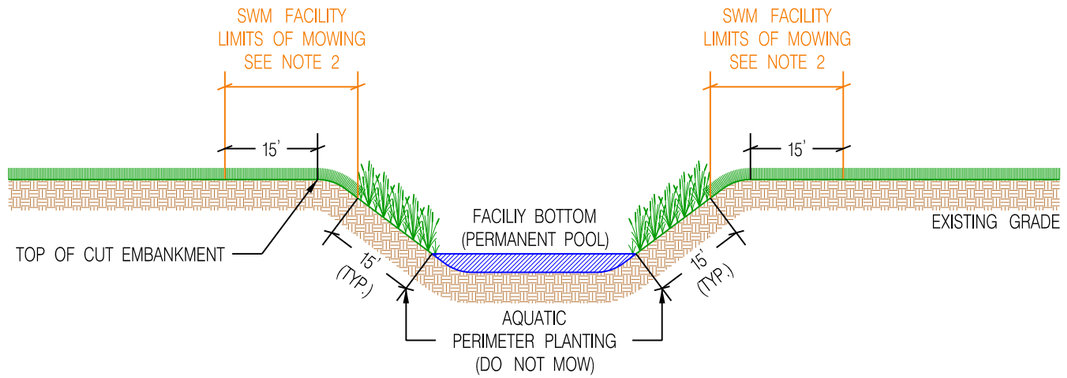
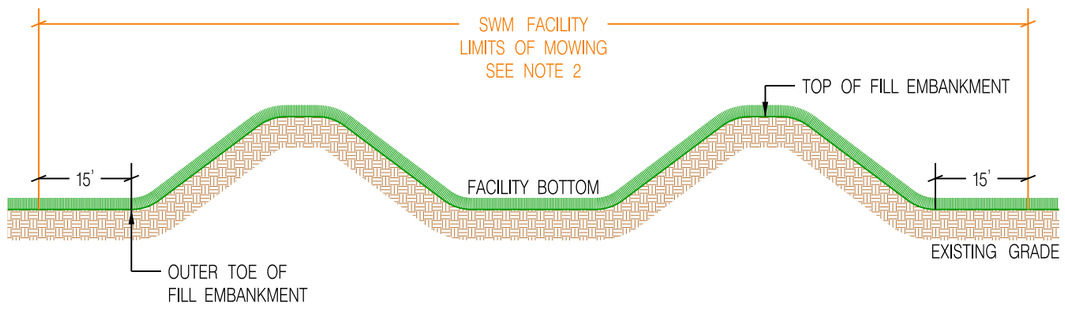
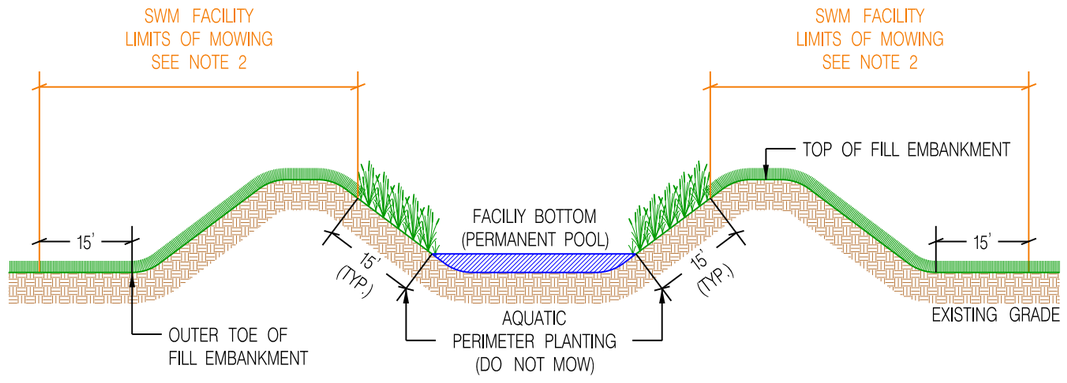
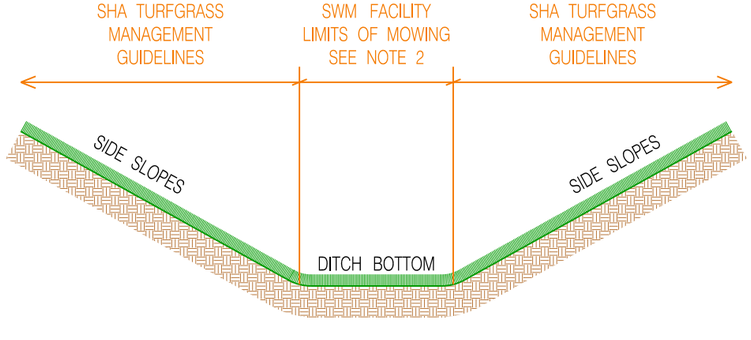
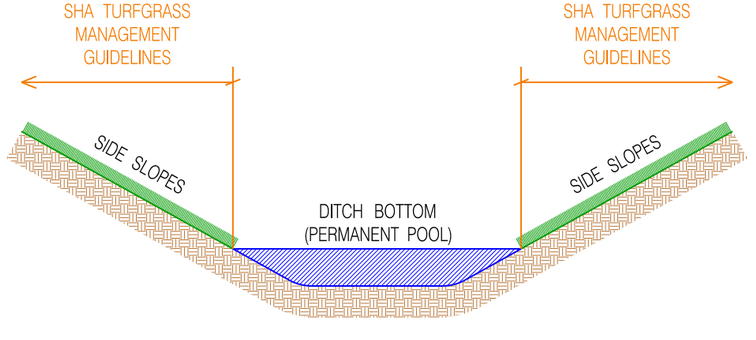
The locations and types of all of the SWM facilities in the Shop area have been summarized in the Index of Stormwater Management Facilities, found in Appendix C. This Index lists the SWM facility number, facility type, and routine maintenance category of all of the SWM facilities mapped in Appendix B, along with the number of the tile map that the SWM facility can be found on. This Index is presented in three forms: one sorted by SWM facility number, one sorted by SWM facility type, and one sorted by tile map.

This manual is a living document. Please provide comments and feedback to Kiona A. Leah at 410-545-8044 or at kleah@sha.state.md.us.

APPENDIX A

Routine Maintenance Guidelines

SWM Facility Limits of Mowing

	DRY SWM FACILITY	WET SWM FACILITY
CUT EMBANKMENT		
FILL EMBANKMENT		
DITCH		

NOTES:
1. SOME SWM FACILITIES MAY BE A COMBINATION OF CUT AND FILL EMBANKMENTS.
2. "SWM FACILITY LIMITS OF MOWING" ARE LIMITS OF MOWING ACCORDING TO GUIDELINES PRESENTED IN THIS STORMWATER MANAGEMENT FACILITY ROUTINE MAINTENANCE MANUAL. THERE MAY BE ADDITIONAL MOWING OUTSIDE OF THESE LIMITS ACCORDING TO OTHER GUIDELINES, SUCH AS SHA TURFGRASS MANAGEMENT GUIDELINES, WHERE APPLICABLE.

Dry Pond Routine Maintenance Guidelines

Maintaining Dry Ponds

Description and Purpose: Aesthetic and structural maintenance of Dry Ponds.

Scheduling: Once each spring (March 15 – May 15) and fall (September 15 – November 15).

Team:

Facility Maintenance Technician IV	1
Facility Maintenance Technician	3

Equipment:

MOT/Safety Equipment	A
Pick-Up Truck	B
Shovel	C
Weed Trimmer	D
Articulated or Side Arm Mower	E
Spreader	F

Material:

Furnished Topsoil	G
SHA Turfgrass Seed Mix	H
Type 'A' Soil Stabilization Matting	I
Class I Riprap	J

Unit of Measure:
Each Dry Pond

Payment:
Maintaining Dry Ponds should be charged to Activity [TBD], with the approval of the Office of Highway Design – Highway Hydraulics Division (HHD). When inspecting/supporting the work of contractors, the Agency Code [TBD] should also be used.

Notes:
Follow guidelines for recommended personal protective equipment. Place signs and other safety devices in accordance with MUTCD and WZTC.

Do not perform maintenance on portions of the facility with saturated soil.

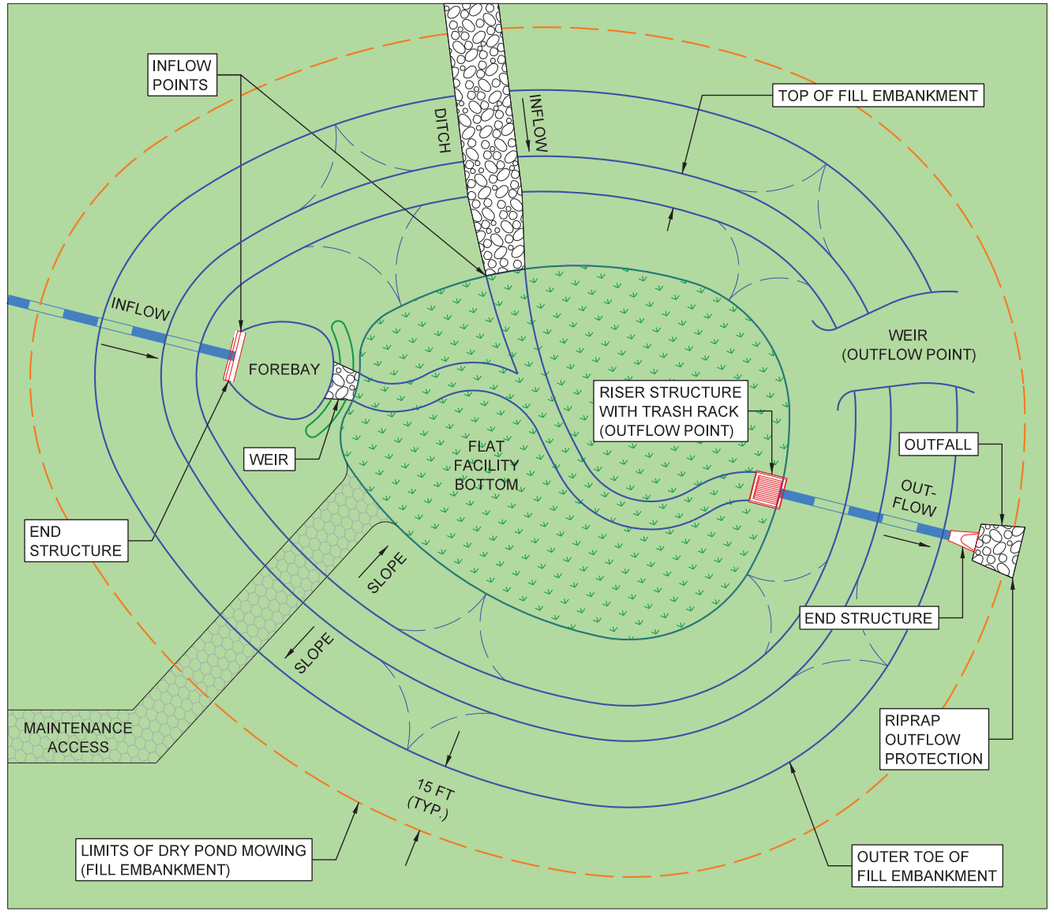
Spring Maintenance Work Method:	**Equip./ Material**
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the pond, trash rack, and other structure(s).	(B, C)
3. Check for deterioration or damage to structure(s). Notify Resident Maintenance Engineer if repair work is needed.	
4. Check for clogs and clear vegetation obstructing the structure(s).	(D)
5. Remove accumulated sediment from the facility.	(B, C)
6. Check each side of the embankment, if present. Eliminate any animal burrows/holes by filling them with soil. Report any soft spots, depressions, or water seepage to HHD.	(C, G)
7. Haul removed trash, debris, vegetation, and sediment to designated disposal area.	(B)
8. Remove MOT devices.	

Fall Maintenance Work Method:	
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the pond, trash rack, and other structure(s).	(B, C)
3. Mow herbaceous vegetation within the SWM facility limits of mowing to a height of 6-inches.	(D, E)
4. Seed sparsely vegetated areas and install matting.	(F, H, I)
5. Fill eroded areas with topsoil as necessary to restore the original ground. Stabilize eroded areas adjacent to existing riprap with riprap. Else, seed and install matting.	(C, F, G, H, I, J)
6. Haul removed trash, leaves, and debris to designated disposal area.	(B)
7. Remove MOT devices.	

Troubleshooting:
If water is still ponding in the facility 72 hours after a storm, determine the cause and resolve in the following order:

1. Check for clogs and clear any obstructions to the outflow point(s).
2. Report to HHD.

SAMPLE DRY POND SCHEMATIC



SAMPLE DRY POND PHOTOS

Wet Pond Routine Maintenance Guidelines

Maintaining Wet Ponds

Description and Purpose: Aesthetic and structural maintenance of Wet Ponds.

Scheduling: Once each spring (March 15 – May 15) and fall (September 15 – November 15).

Team:

Facility Maintenance Technician IV	1
Facility Maintenance Technician	3

Equipment:

MOT/Safety Equipment	A
Pick-Up Truck	B
Shovel	C
Weed Trimmer	D
Articulated or Side Arm Mower	E
Spreader	F

Material:

Furnished Topsoil	G
SHA Turfgrass Seed Mix	H
Type 'A' Soil Stabilization Matting	I
Class I Riprap	J

Unit of Measure:
Each Wet Pond

Payment:
Maintaining Wet Ponds should be charged to Activity [TBD], with the approval of the Office of Highway Design – Highway Hydraulics Division (HHD). When inspecting/supporting the work of contractors, the Agency Code [TBD] should also be used.

Notes:
Follow guidelines for recommended personal protective equipment. Place signs and other safety devices in accordance with MUTCD and WZTC.

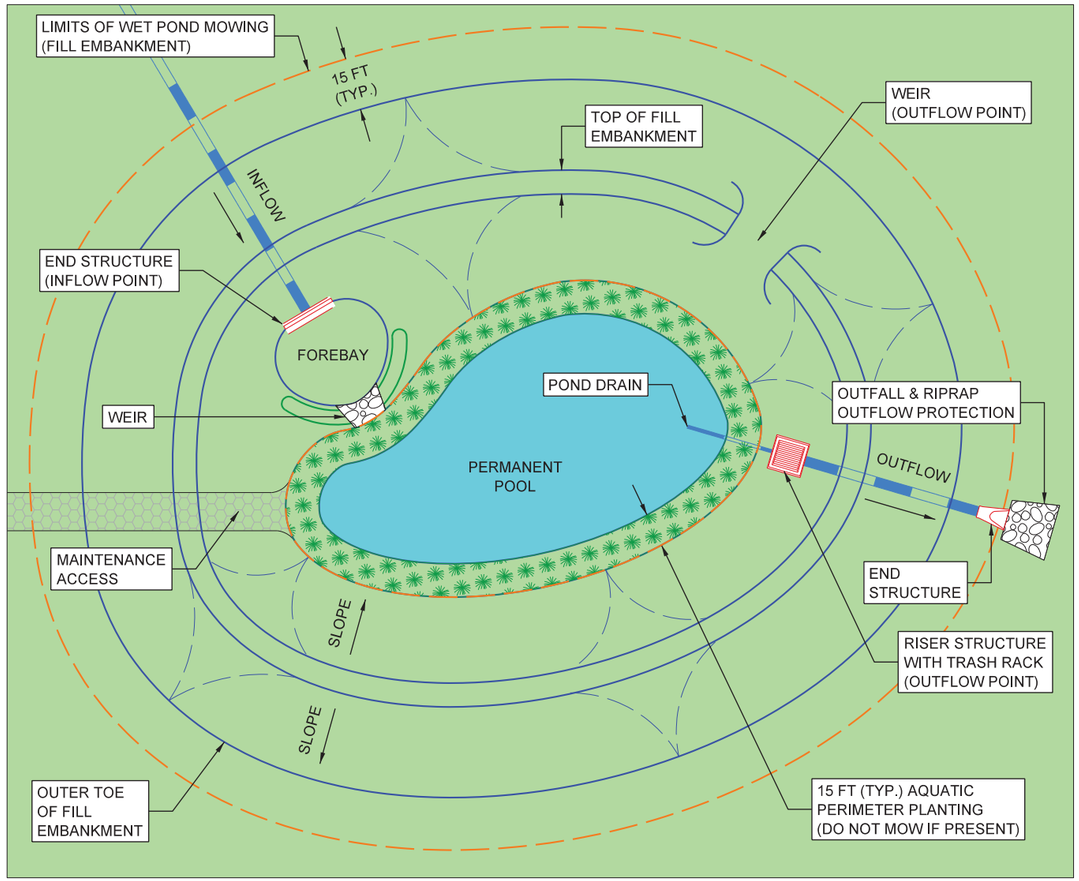
Do not perform maintenance on portions of the facility with saturated soil.

Spring Maintenance Work Method:	**Equip./ Material**
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the pond, trash rack, and other structure(s).	(B, C)
3. Check for deterioration or damage to structure(s). Notify Resident Maintenance Engineer if repair work is needed.	
4. Check for clogs and clear vegetation obstructing the structure(s).	(D)
5. Remove accumulated sediment from the facility.	(B, C)
6. Check each side of the embankment, if present. Eliminate any animal burrows/holes by filling them with soil. Report any soft spots, depressions, or water seepage to HHD.	(C, G)
7. Haul removed trash, debris, vegetation, and sediment to designated disposal area.	(B)
8. Remove MOT devices.	
Fall Maintenance Work Method:	
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the pond, trash rack, and other structure(s).	(B, C)
3. Mow herbaceous vegetation within the SWM facility limits of mowing to a height of 6-inches.	(D, E)
4. Seed sparsely vegetated areas and install matting.	(F, H, I)
5. Fill eroded areas with topsoil as necessary to restore the original ground. Stabilize eroded areas adjacent to existing riprap with riprap. Else, seed and install matting.	(C, F, G, H, I, J)
6. Haul removed trash, leaves, and debris to designated disposal area.	(B)
7. Remove MOT devices.	

Troubleshooting:
If the Wet Pond is dry and has no standing water, determine the cause and resolve in the following order:

1. Check that the pond drain opening in the riser is completely sealed.
2. Report to HHD.

SAMPLE WET POND SCHEMATIC



SAMPLE WET POND PHOTOS

Infiltration Facility Routine Maintenance Guidelines

Maintaining Infiltration Facilities

Description and Purpose: Aesthetic and structural maintenance of Infiltration Facilities.

Scheduling: Once each spring (March 15 – May 15) and fall (September 15 – November 15).

Team:

Facility Maintenance Technician IV	1
Facility Maintenance Technician	3

Equipment:

MOT/Safety Equipment	A
Pick-Up Truck	B
Shovel	C
Weed Trimmer	D
Articulated or Side Arm Mower	E
Spreader	F

Material:

No. 2 Stone or Class 0 Riprap	G
Screw Caps Sizes 4 and 6	H
Furnished Topsoil	I
SHA Turfgrass Seed Mix	J
Type 'A' Soil Stabilization Matting	K
Class I Riprap	L

Unit of Measure:
Each Infiltration Facility

Payment:
Maintaining Infiltration Facilities should be charged to Activity [TBD], with the approval of the Office of Highway Design – Highway Hydraulics Division (HHD). When inspecting/supporting the work of contractors, the Agency Code [TBD] should also be used.

Notes:
Follow guidelines for recommended personal protective equipment. Place signs and other safety devices in accordance with MUTCD and WZTC.

Perform all maintenance activities in a manner to prevent compaction of the facility bottom. Do not drive on the facility bottom. Report observed compaction to HHD.

Do not perform maintenance on portions of the facility with saturated soil.

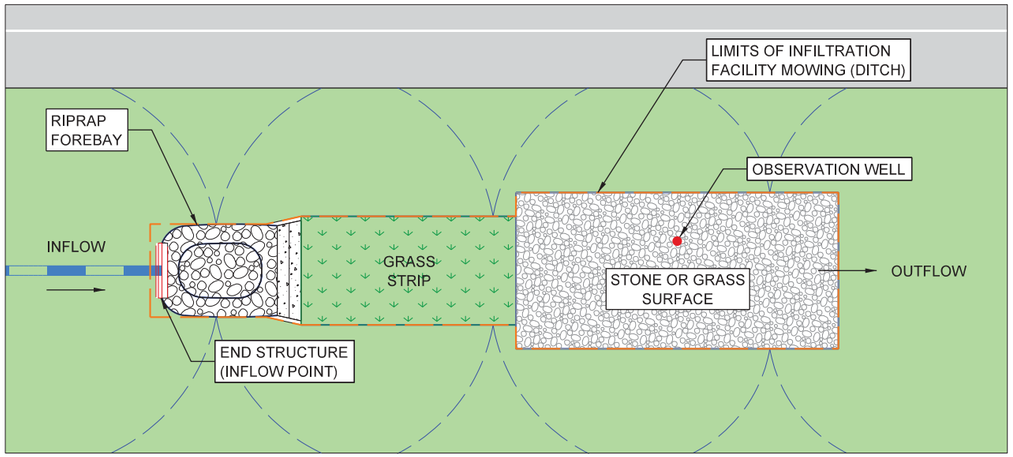
Spring Maintenance Work Method:	**Equip./ Material**
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the facility and associated structure(s).	(B, C)
3. Replenish stone, if necessary.	(G)
4. Check for deterioration or damage to structure(s). Notify Resident Maintenance Engineer if repair work is needed.	
5. Check for clogs and clear vegetation obstructing the structure(s).	(D)
6. Replace any broken/missing observation well caps.	(H)
7. Remove accumulated sediment from the facility.	(B, C)
8. Check each side of the embankment, if present. Eliminate any animal burrows/holes by filling them with soil. Report any soft spots, depressions, or water seepage to HHD.	(C, I)
9. Haul removed trash, debris, vegetation, and sediment to designated disposal area.	(B)
10. Remove MOT devices.	

Fall Maintenance Work Method:	
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the facility and associated structure(s).	(B, C)
3. Mow herbaceous vegetation within the SWM facility limits of mowing to a height of 6-inches.	(D, E)
4. Seed sparsely vegetated areas and install matting.	(F, J, K)
5. Fill eroded areas with topsoil as necessary to restore the original ground. Stabilize eroded areas adjacent to existing riprap with riprap. Else, seed and install matting.	(C, F, I, J, K, L)
6. Haul removed trash, leaves, and debris to designated disposal area.	(B)
7. Remove MOT devices.	

Troubleshooting:
If water is still ponding in the facility 72 hours after a storm, determine the cause and resolve in the following order:

1. Check for clogs and clear any obstructions to the outflow point(s).	
2. Remove leaf/sediment/debris buildup from the bottom of the facility.	(B, C)
3. Report to HHD.	

SAMPLE INFILTRATION FACILITY SCHEMATIC



SAMPLE INFILTRATION FACILITY PHOTOS

Filtration Facility Routine Maintenance Guidelines

Maintaining Filtration Facilities

Description and Purpose: Aesthetic and structural maintenance of Filtration Facilities.

Scheduling: Once each spring (March 15 – May 15) and fall (September 15 – November 15).

Team:

Facility Maintenance Technician IV	1
Facility Maintenance Technician	3

Equipment:

MOT/Safety Equipment	A
Pick-Up Truck	B
Shovel	C
Weed Trimmer	D
Articulated or Side Arm Mower	E
Spreader	F
Vacuum Truck	G

Material:

Shredded Hardwood Mulch	H
Screw Caps Sizes 4 and 6	I
Furnished Topsoil	J
SHA Turfgrass Seed Mix	K
Type 'A' Soil Stabilization Matting	L
Class I Riprap	M

Unit of Measure:
Each Filtration Facility

Payment:
Maintaining Filtration Facilities should be charged to Activity [TBD], with the approval of the Office of Highway Design – Highway Hydraulics Division (HHD). When inspecting/supporting the work of contractors, the Agency Code [TBD] should also be used.

Notes:
Follow guidelines for recommended personal protective equipment. Place signs and other safety devices in accordance with MUTCD and WZTC.

Perform all maintenance activities in a manner to prevent compaction of the filter bed. Do not drive on the filter bed. Report observed compaction to HHD.

Do not perform maintenance on portions of the facility with saturated soil.

Spring Maintenance Work Method:	**Equip./ Material**
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the facility and associated structure(s).	(B, C)
3. Replenish mulch, if present.	(C, H)
4. Check for deterioration or damage to structure(s). Notify Resident Maintenance Engineer if repair work is needed.	
5. Check for clogs and clear vegetation obstructing the structure(s).	(D)
6. Replace any broken/missing cleanout caps.	(I)
7. Remove accumulated sediment from the facility.	(B, C)
8. Check each side of the embankment, if present. Eliminate any animal burrows/holes by filling them with soil. Report any soft spots, depressions, or water seepage to HHD.	(C, J)
9. Haul removed trash, debris, vegetation, and sediment to designated disposal area.	(B)
10. Remove MOT devices.	

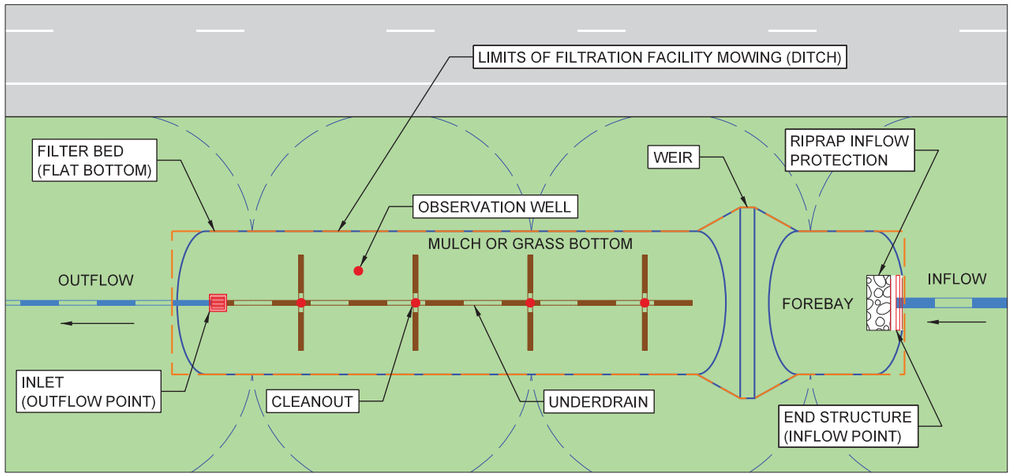
Fall Maintenance Work Method:

1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the facility and associated structure(s).	(B, C)
3. Mow herbaceous vegetation within the SWM facility limits of mowing to a height of 6-inches.	(D, E)
4. Seed sparsely vegetated areas and install matting.	(F, K, L)
5. Fill eroded areas with topsoil as necessary to restore the original ground. Stabilize eroded areas adjacent to existing riprap with riprap. Else, seed and install matting.	(C, F, J, K, L, M)
6. Haul removed trash, leaves, and debris to designated disposal area.	(B)
7. Remove MOT devices.	

Troubleshooting:
If water is still ponding in the facility 72 hours after a storm, determine the cause and resolve in the following order:

1. Check for clogs and clear any obstructions to the outflow point(s).	
2. Remove leaf/sediment/debris buildup from the bottom of the facility.	(B, C)
3. Check for and clear underdrain obstructions.	(G)
4. Report to HHD.	

SAMPLE FILTRATION FACILITY SCHEMATIC



SAMPLE FILTRATION FACILITY PHOTOS

Bio-Swale Routine Maintenance Guidelines

Maintaining Bio-Swales

Description and Purpose: Aesthetic and structural maintenance of Bio-swales.

Scheduling: Once each spring (March 15 – May 15) and fall (September 15 – November 15).

Team:

Facility Maintenance Technician IV	1
Facility Maintenance Technician	3

Equipment:

MOT/Safety Equipment	A
Pick-Up Truck	B
Shovel	C
Weed Trimmer	D
Articulated or Side Arm Mower	E
Spreader	F
Vacuum Truck	G

Material:

Screw Caps Sizes 4 and 6	H
SHA Turfgrass Seed Mix	I
Type 'A' Soil Stabilization Matting	J
Furnished Topsoil	K
Class I Riprap	L

Unit of Measure:
Each Bio-swale

Payment:
Maintaining Bio-swales should be charged to Activity [TBD], with the approval of the Office of Highway Design – Highway Hydraulics Division (HHD). When inspecting/supporting the work of contractors, the Agency Code [TBD] should also be used.

Notes:
Follow guidelines for recommended personal protective equipment. Place signs and other safety devices in accordance with MUTCD and WZTC.

Perform all maintenance activities in a manner to prevent compaction of the filter bed. Do not drive on the filter bed. Report observed compaction to HHD.

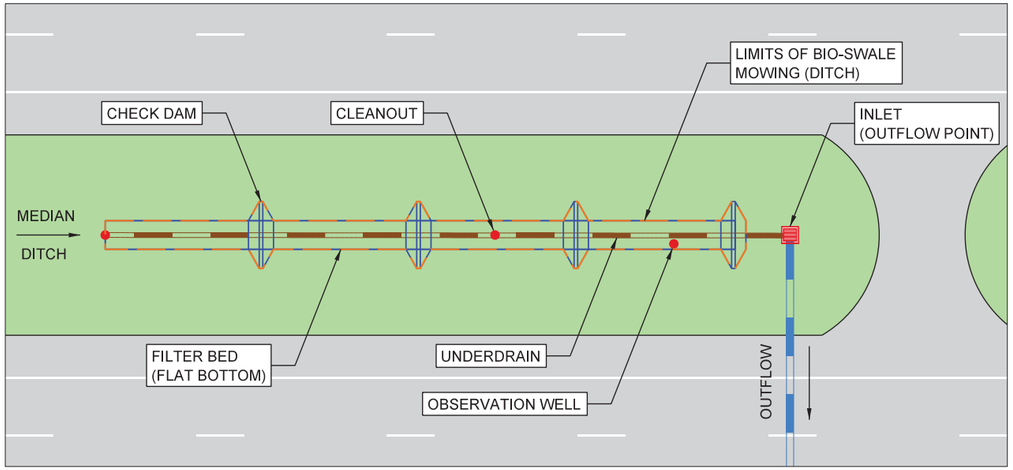
Do not perform maintenance on portions of the facility with saturated soil.

Spring Maintenance Work Method:	**Equip./ Material**
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the facility and associated structure(s).	(B, C)
3. Check for deterioration or damage to structure(s). Notify Resident Maintenance Engineer if repair work is needed.	
4. Check for clogs and clear vegetation obstructing the structure(s).	(D)
5. Replace any broken/missing cleanout caps.	(H)
6. Remove accumulated sediment from the facility.	(B, C)
7. Haul removed trash, debris, vegetation, and sediment to designated disposal area.	(B)
8. Remove MOT devices.	
Fall Maintenance Work Method:	
1. Install MOT devices.	(A)
2. Remove trash, leaves, and debris from the facility and associated structure(s).	(B, C)
3. Mow herbaceous vegetation within the SWM facility limits of mowing to a height of 6-inches.	(D, E)
4. Seed sparsely vegetated areas and install matting.	(F, I, J)
5. Fill eroded areas with topsoil as necessary to restore the original ground. Stabilize eroded areas adjacent to existing riprap with riprap. Else, seed and install matting.	(C, F, I, J, K, L)
6. Haul removed trash, leaves, and debris to designated disposal area.	(B)
7. Remove MOT devices.	

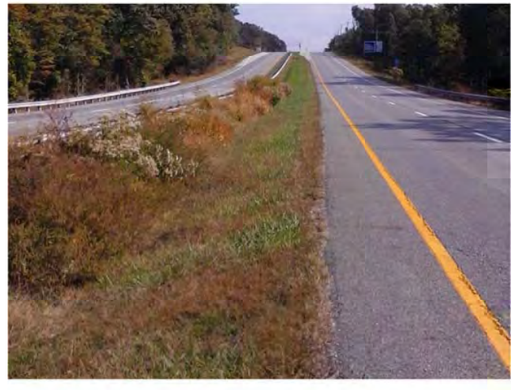
Troubleshooting:
If water is still ponding in the facility 72 hours after a storm, determine the cause and resolve in the following order:

1. Check for clogs and clear any obstructions to the outflow point(s).	
2. Remove leaf/sediment/debris buildup from the bottom of the facility.	(B, C)
3. Check for and clear underdrain obstructions.	(G)
4. Report to HHD.	

SAMPLE BIO-SWALE SCHEMATIC



SAMPLE BIO-SWALE PHOTOS



APPENDIX B

Stormwater Management Facility Mapping

SHA SWM Facility Overview Map

Salisbury

No. SWM Facilities: 57

1 inch = 15,000 feet

A1 A2
B1 B2 B3 B4 B5 B6
C1 C2 C3 C4 Facilties: 38 C5 C6 C7
D1 D2 D3 D4 Facilties: 13 D5 Facilties: 4 D6 Facilties: 1 D7
E1 E2 E3 E4 Facilties: 1 E5 E6 E7
F1 F2 F3 F4 F5

- SHA Maintenance Shop
- SWM Facility Location
- Tile (with SWM Facilities)
- Tile (without SWM Facilites)
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division

Esri Topo Basemap
Maps Prepared June, 2017

SHA SWM Facility Tile Map C4

Salisbury

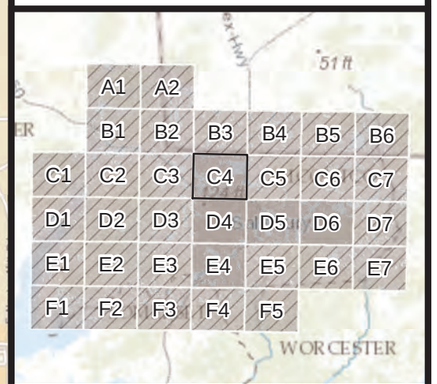
No. SWM Facilities: 38

1 inch = 2,000 feet

- SWM Facility Location
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



Esri Streets Basemap
Maps Prepared June, 2017

B3
C3
C5
D4

220155
220152
220153
220151
220154
220166
220156
220157
220163
220158
220159
220164
220172
220176
220175
220174
220173
220178
220177
220160
220165
220179
220161
220180
220181
220182
220188
220190
220183
220184
220191
220192
220193
220187
220194
220197
220196

SHA SWM Facility Tile Map D4

Salisbury

No. SWM Facilities: 13

1 inch = 2,000 feet

220167
220168
220169
220170
220171
220195
220198
220002
220001
220148
220213
220214
220241

C4
D3
D5
E4

SWM Facility Location

Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division

	A1	A2				
	B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6	C7
D1	D2	D3	D4	D5	D6	D7
E1	E2	E3	E4	E5	E6	E7
F1	F2	F3	F4	F5		

Esri Streets Basemap
Maps Prepared June, 2017

SHA SWM Facility Tile Map D5

Salisbury

No. SWM Facilities: 4

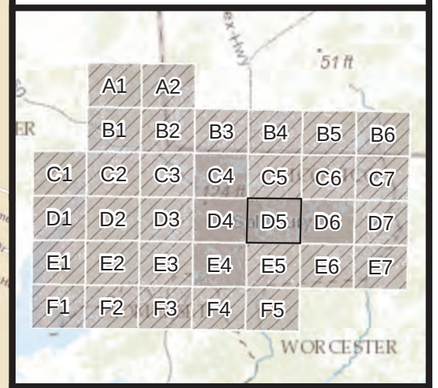
1 inch = 2,000 feet

SWM Facility Location

Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



Esri Streets Basemap

Maps Prepared June, 2017

SHA SWM Facility Tile Map D6

Salisbury

No. SWM Facilities: 1

1 inch = 2,000 feet

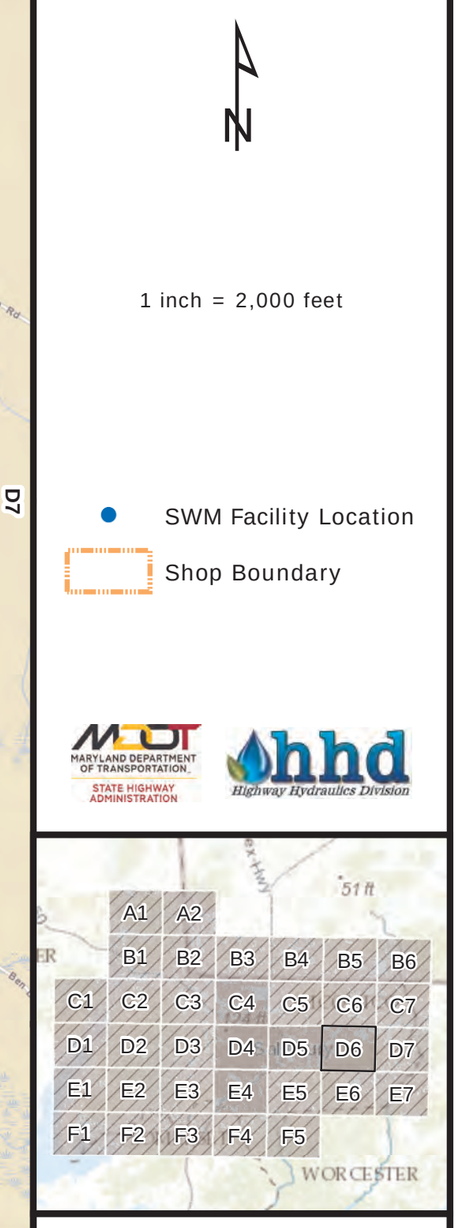
220236

SWM Facility Location

Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



Esri Streets Basemap
Maps Prepared June, 2017

SHA SWM Facility Tile Map E4

Salisbury

No. SWM Facilities: 1

1 inch = 2,000 feet

220242

D4

E3

E5

F4

Lakewood

Fruitland

Walnut

Crows Nest

Eden

Salisbury

Princess Anne

Salisbury Byp

US-13BR S

US-13BR N

Ocean Hwy

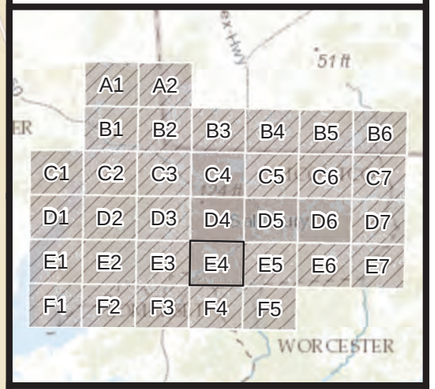
Fruitland Recreation Park

SWM Facility Location

Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



Esri Streets Basemap

Maps Prepared June, 2017

SHA SWM Facility 220001

Surface sand filter

0 25 50
Feet

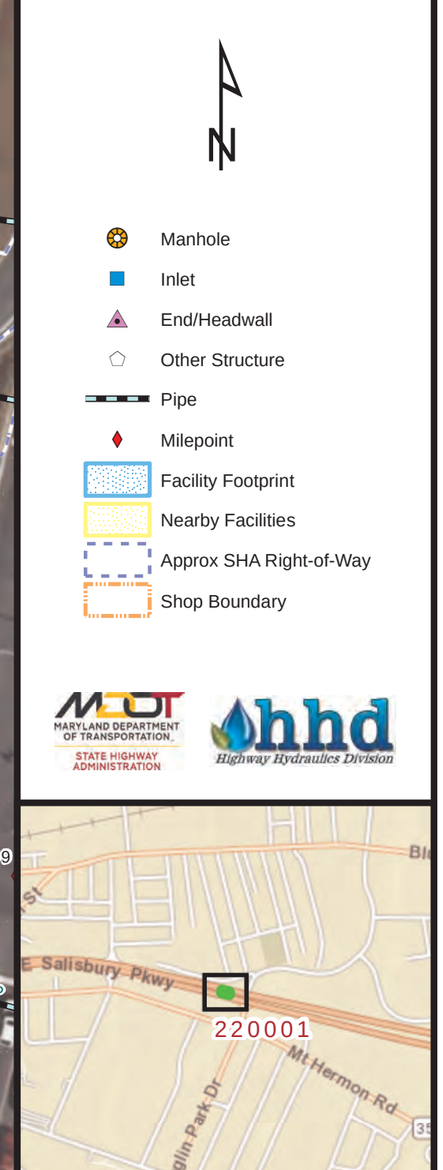
1 inch = 50 feet

N

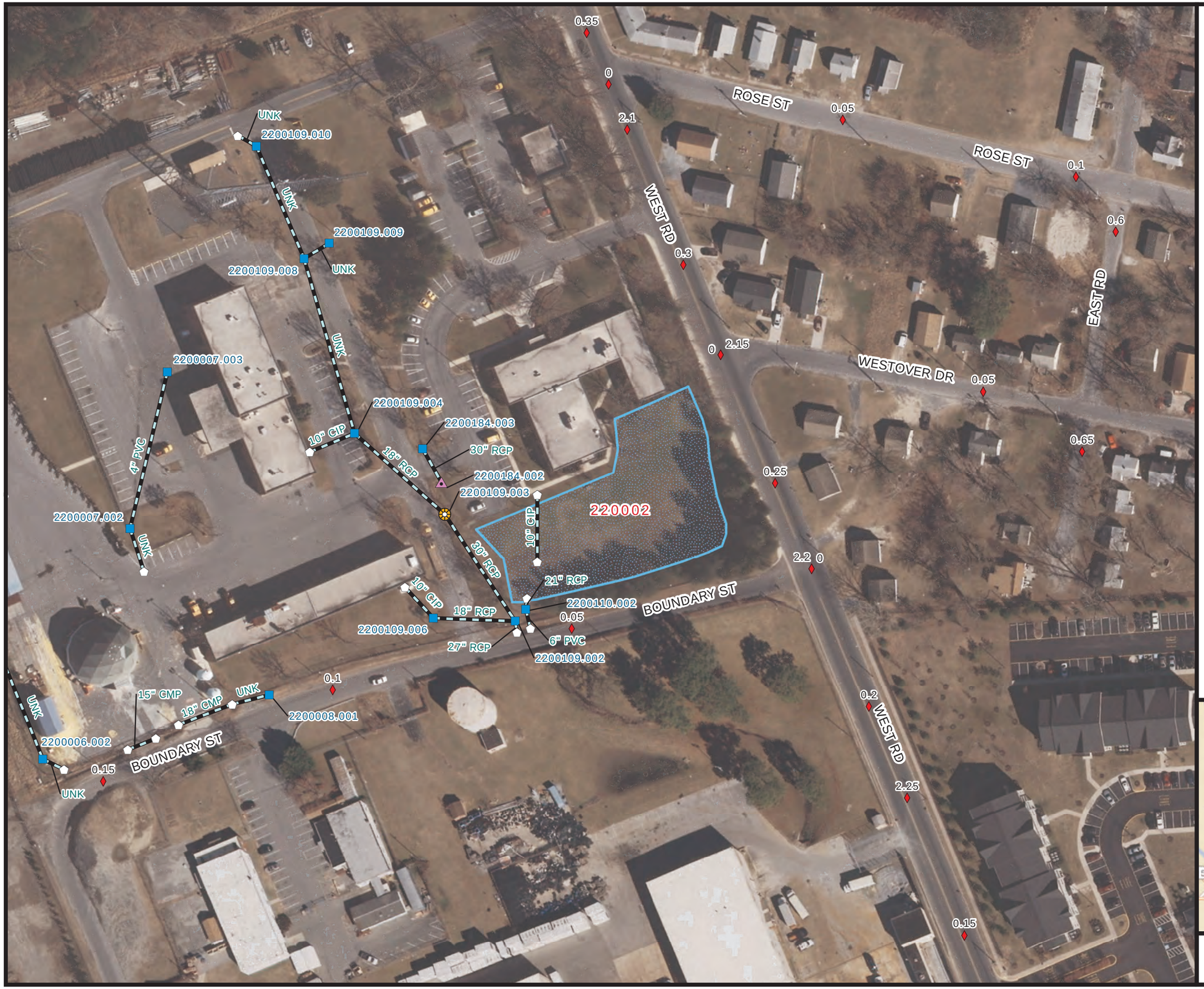
- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017



SHA SWM Facility 220002

Dry pond

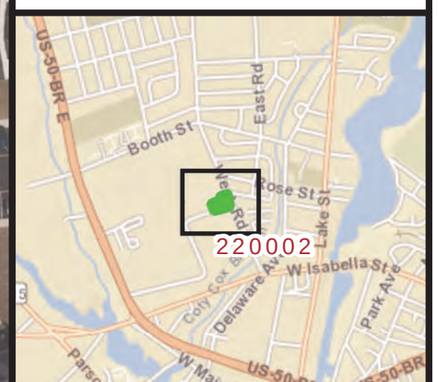
0 25 50
Feet

1 inch = 100 feet

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220148

Wet pond

0 25 50
Feet

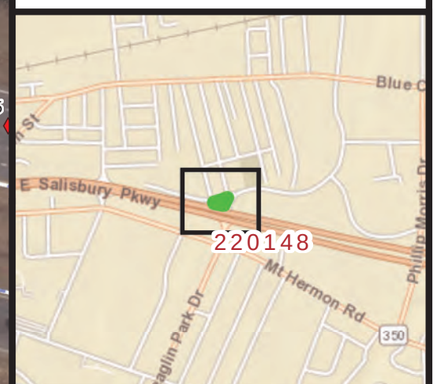
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220149

Dry pond

0 25 50
Feet

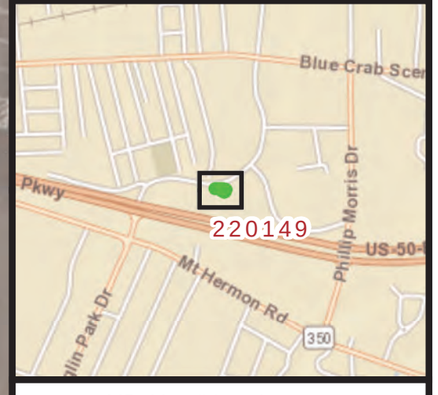
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220150

Wet pond

0 25 50
Feet

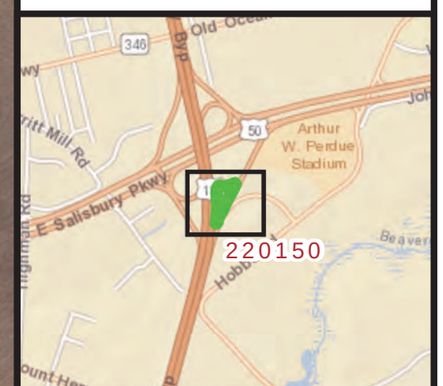
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220151

Wet pond

0 25 50

Feet

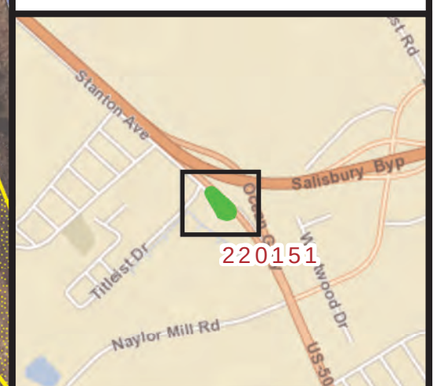
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220152

Dry pond

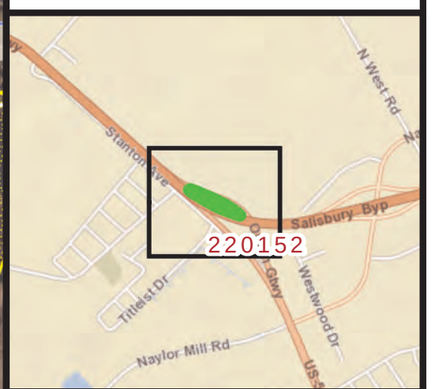
0 25 50 100
Feet

1 inch = 200 feet

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220153

Dry pond

0 25 50 100
Feet

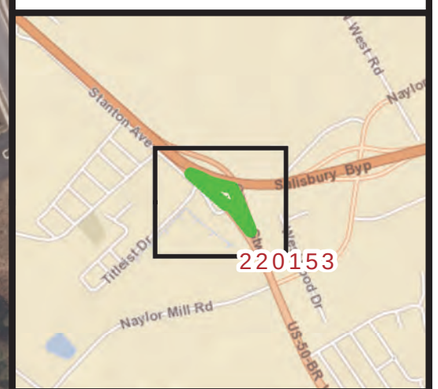
1 inch = 200 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220154

Infiltration basin

0 25 50 100
Feet

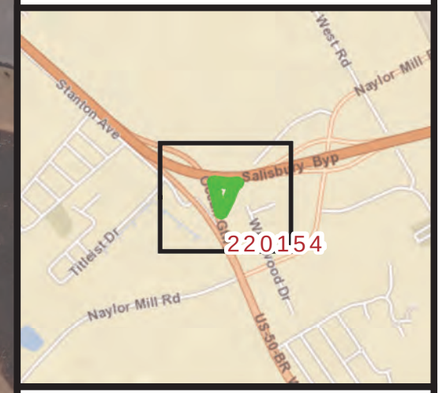
1 inch = 200 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220155

Dry pond

0 25 50
Feet

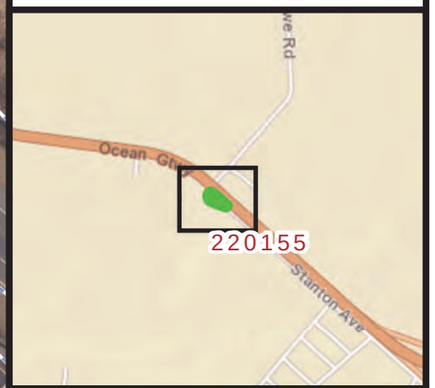
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220156

Wet extended detention pond

0 25 50
Feet

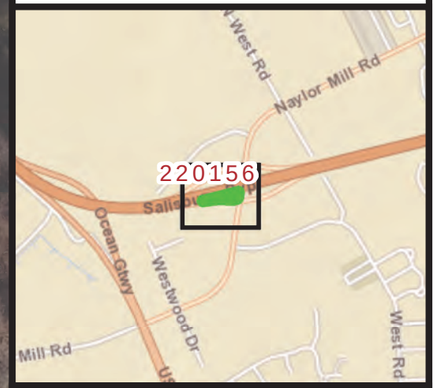
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220157

Wet pond

0 25 50 100
Feet

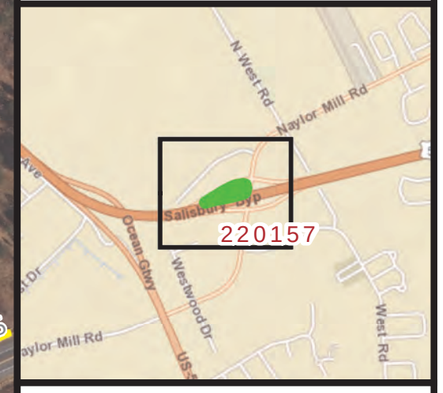
1 inch = 200 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220158

Wet pond

0 25 50
Feet

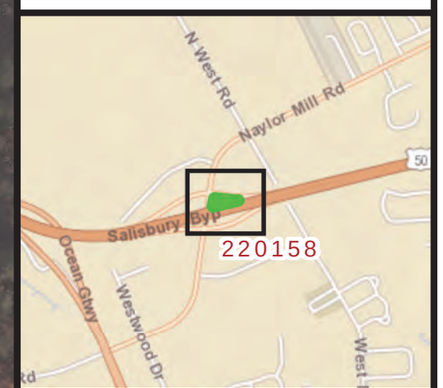
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220159

Wet extended detention pond

0 25 50
Feet

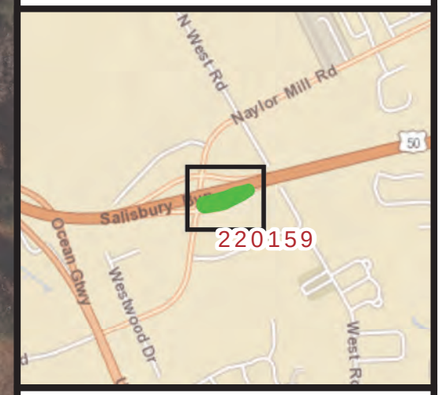
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220160

Wet pond

0 25 50 100
Feet

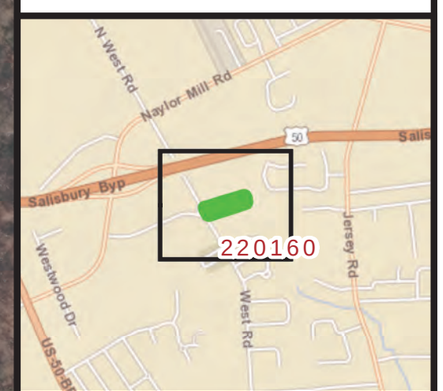
1 inch = 200 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220161

Wet extended detention pond

0 25 50

Feet

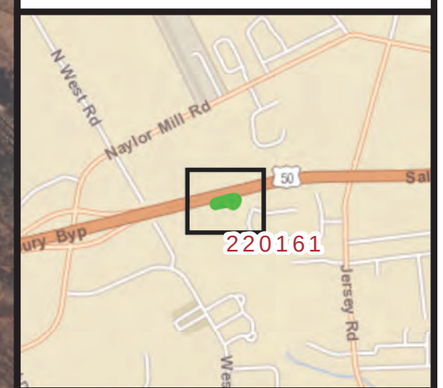
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220162

Infiltration trench

0 25 50
Feet

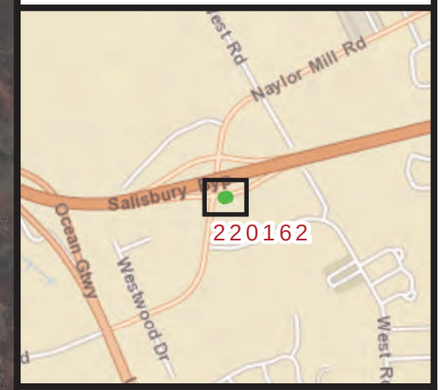
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220163

Infiltration trench

0 25 50
Feet

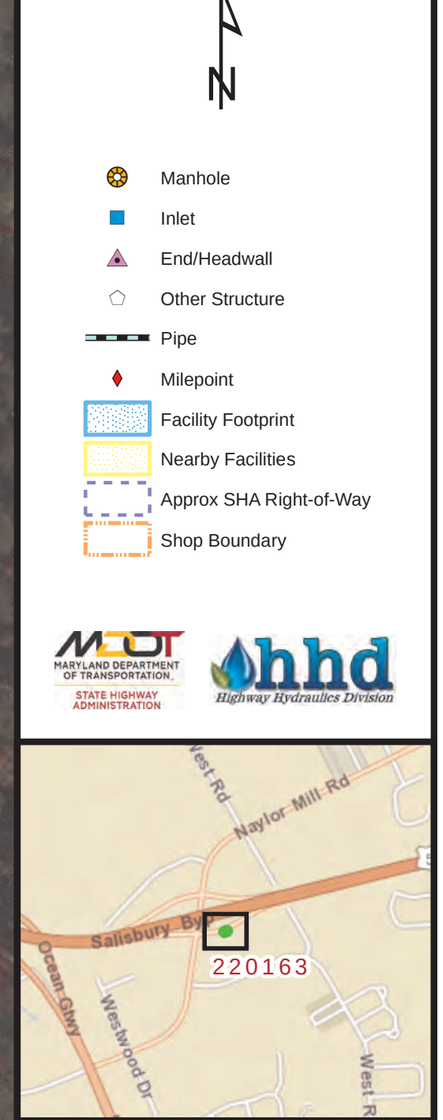
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220164

Infiltration trench

0 25 50
Feet

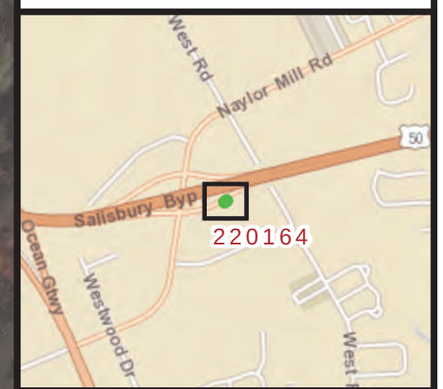
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220165

Infiltration trench

0 25 50
Feet

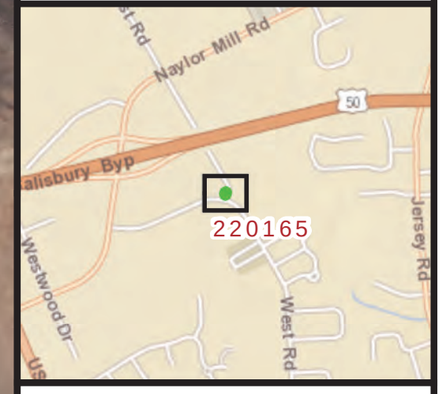
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

ED TAYLOR RD
0.05
30" RCP
2200127.001
2200127.007
30" RCP
220165
ED TAYLOR RD
220160
220179
WEST RD
2.1
0.3
18" RCP
0.35
0
30" RCP
18" RCP
WEST RD
220177
220178
0.4
0.75

SHA SWM Facility 220166

Infiltration trench

0 25 50
Feet

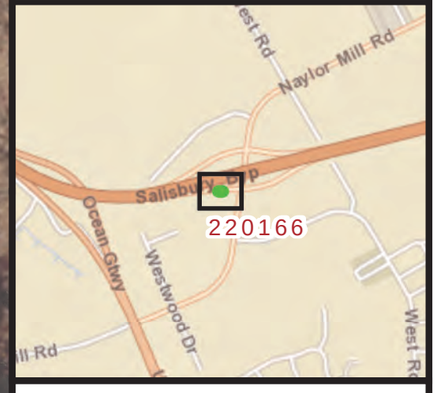
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220167

Infiltration trench

0 25 50
Feet

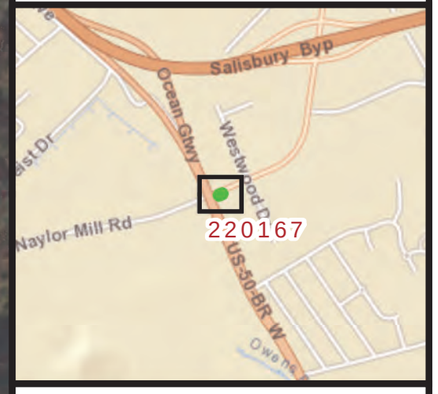
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220168

Infiltration trench

0 25 50
Feet

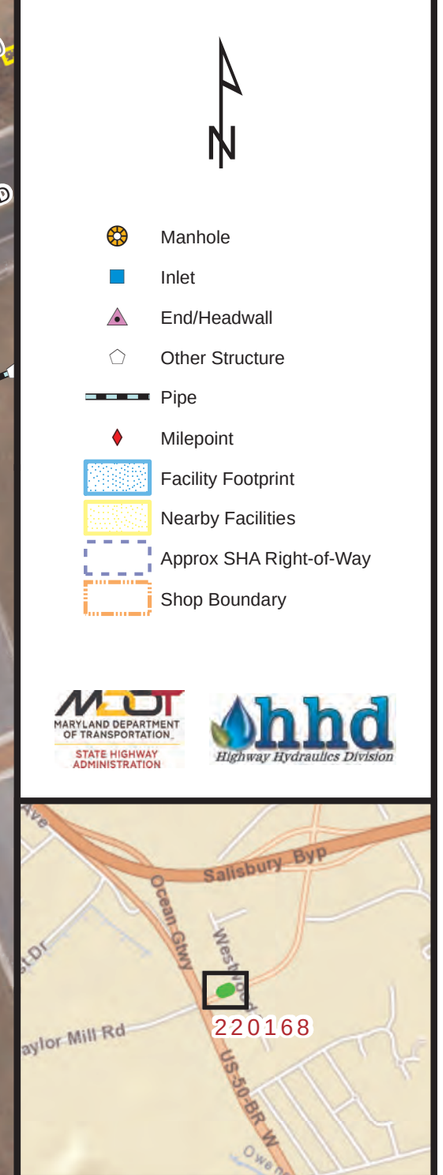
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220169

Infiltration trench

0 25 50
Feet

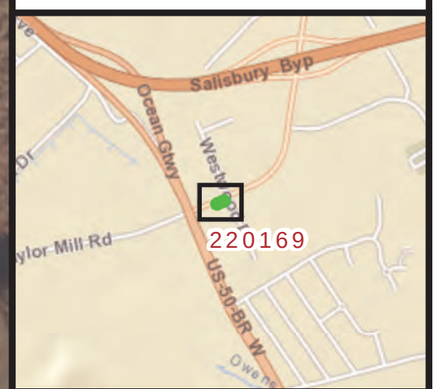
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220170

Infiltration trench

0 25 50
Feet

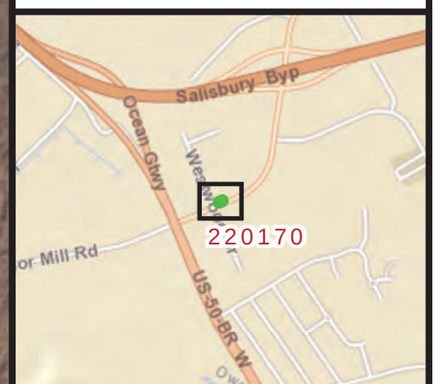
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220171

Infiltration trench

0 25 50
Feet

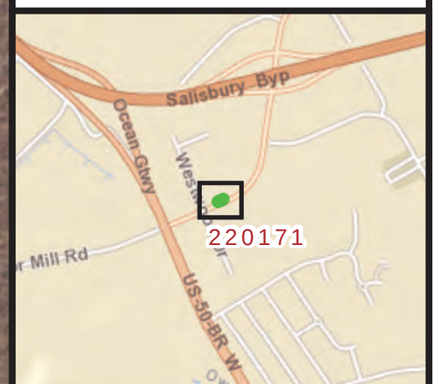
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220172

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

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STATE HIGHWAY ADMINISTRATION

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Highway Hydraulics Division

MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220173

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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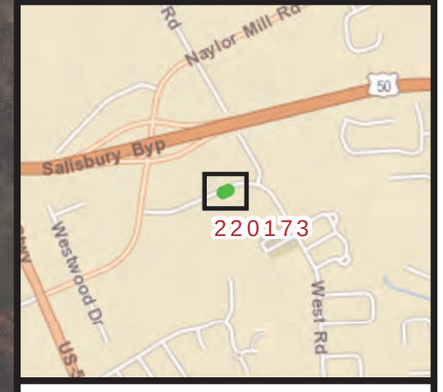
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220174

Infiltration trench

0 25 50

Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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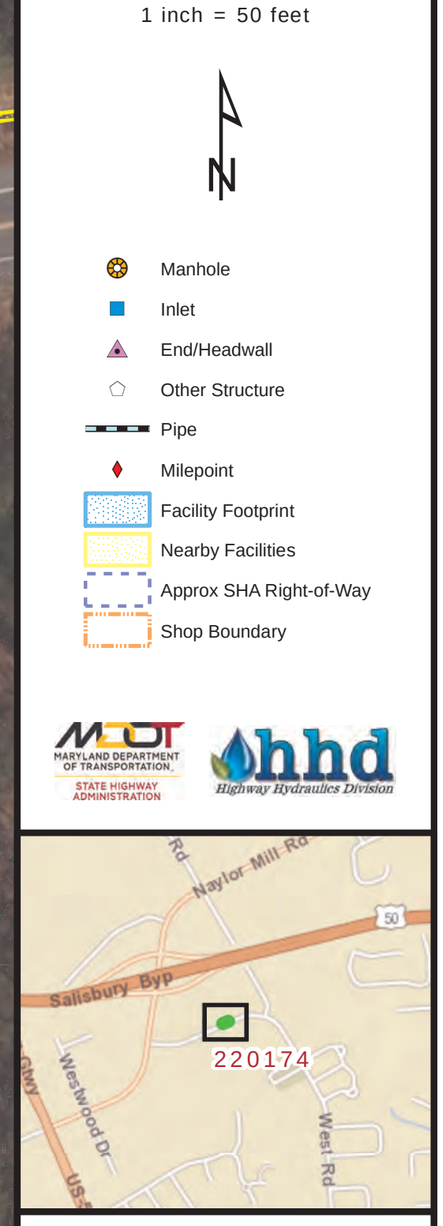
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220175

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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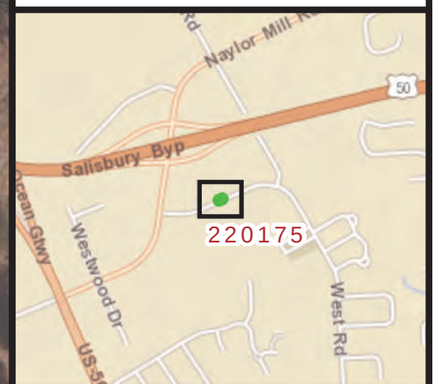
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220176

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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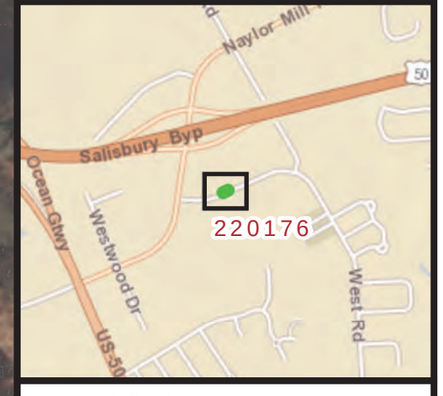
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220177

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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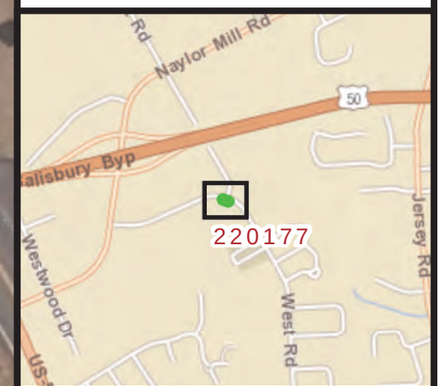
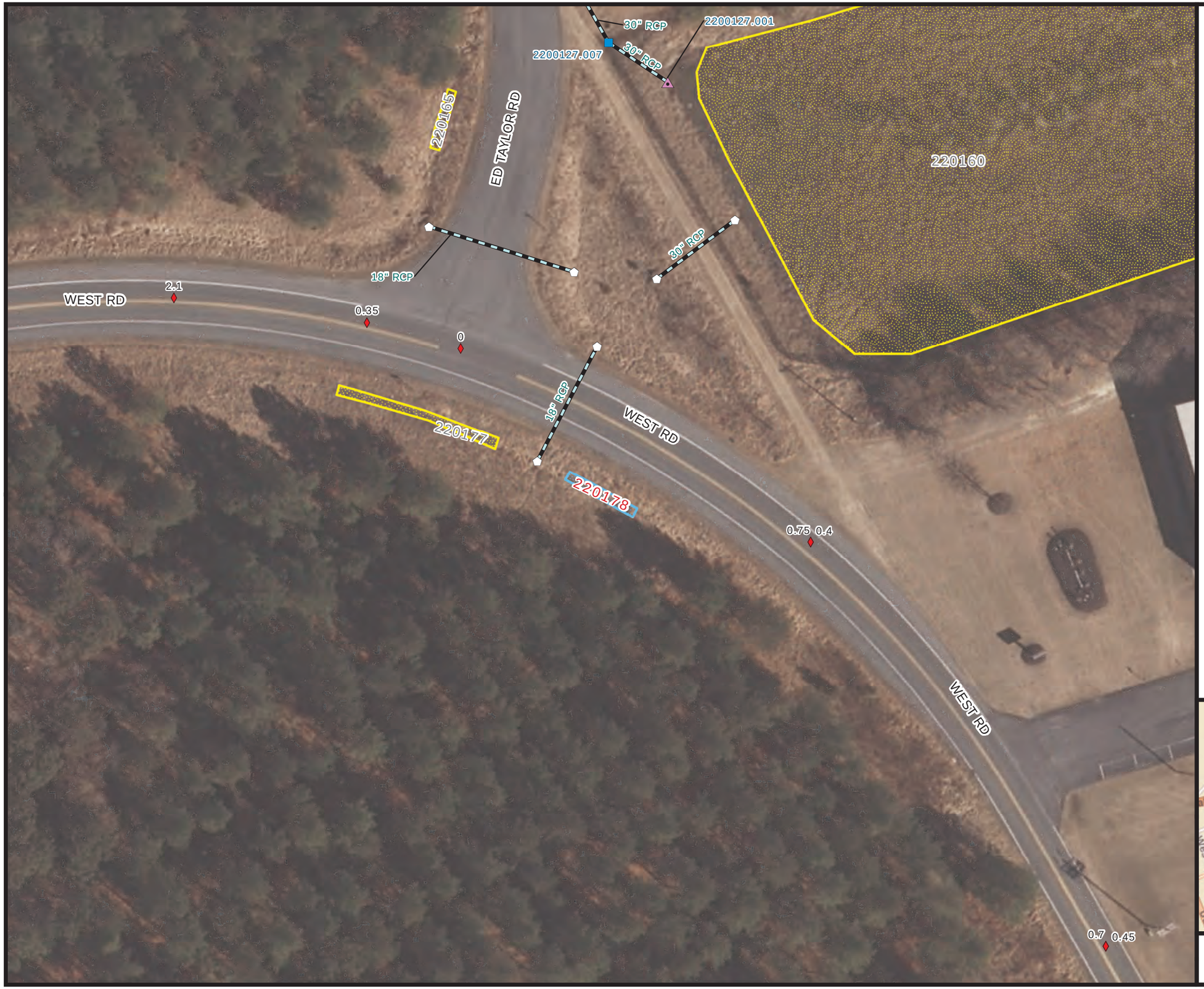
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017



SHA SWM Facility 220178

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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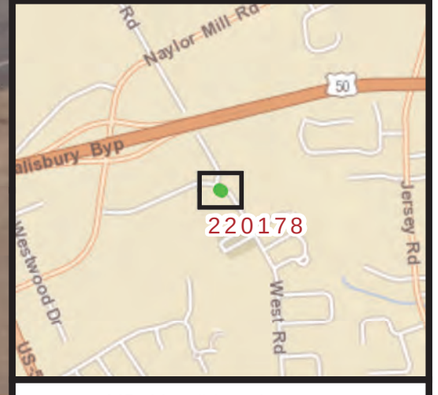
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220179

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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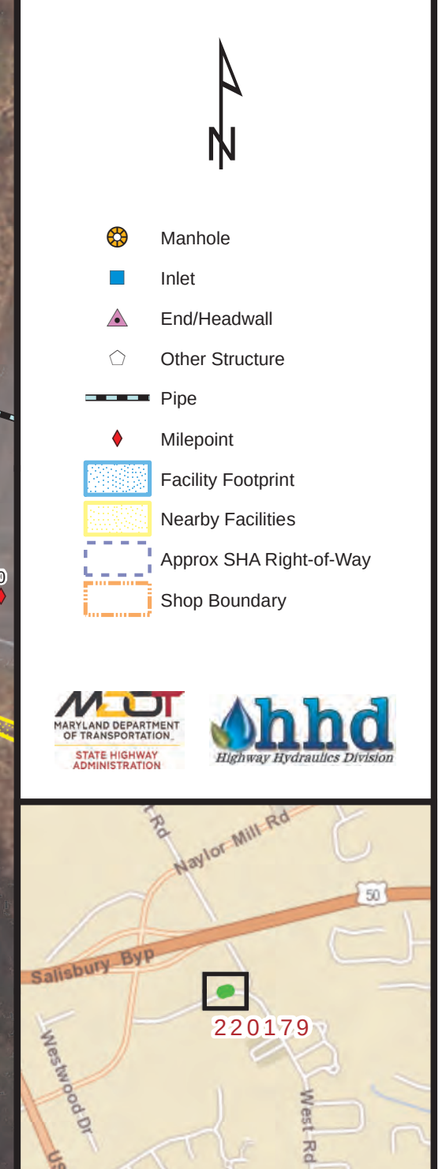
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220180

Wet extended detention pond

0 25 50
Feet

1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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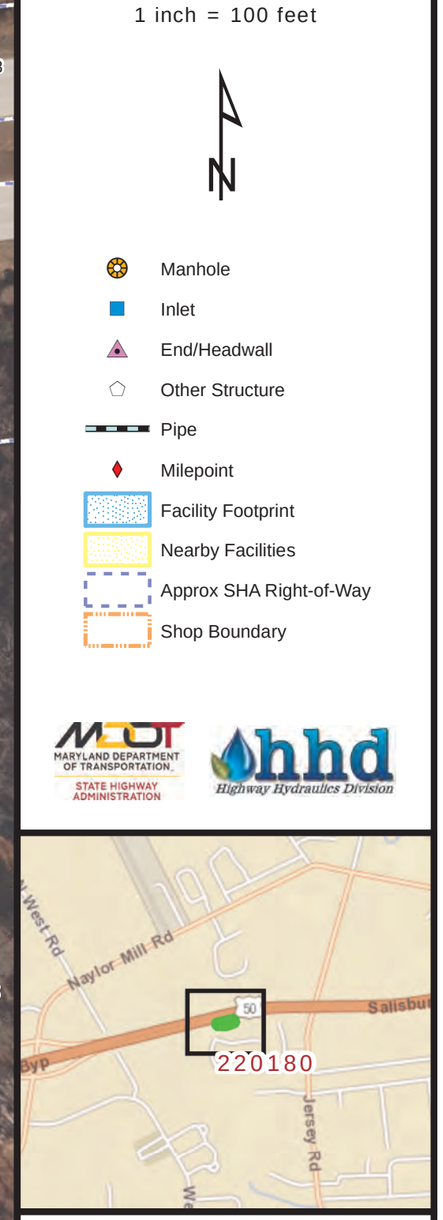
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220181

Dry extended detention pond

0 25 50
Feet

1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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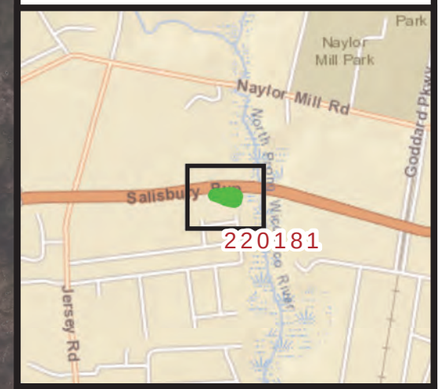
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220182

Infiltration trench

0 25 50
Feet

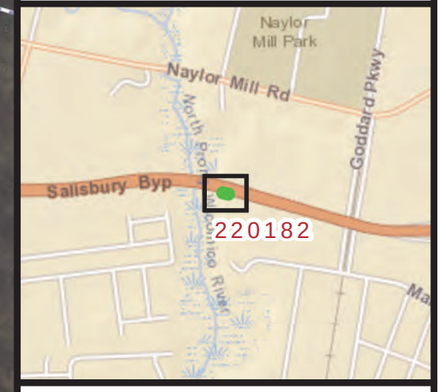
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220183

Infiltration trench

0 25 50
Feet

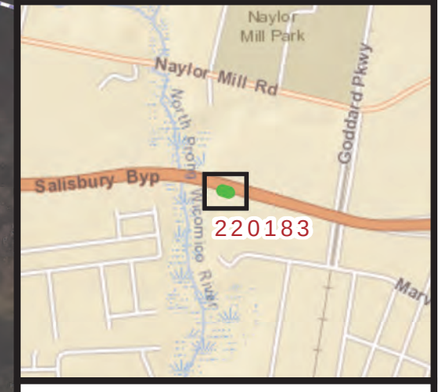
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220184

Infiltration trench

0 25 50
Feet

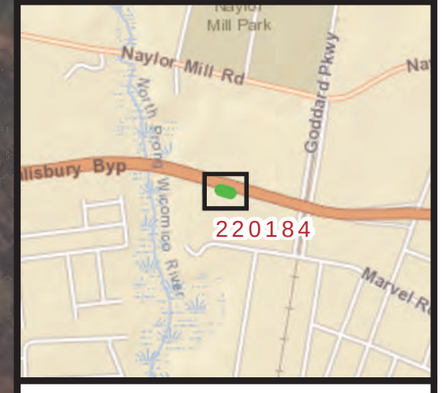
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220187

Wet pond

0 25 50
Feet

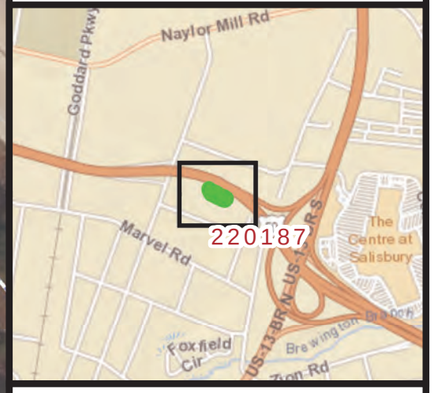
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

KILEY DR
SALISBURY BYPASS
SALISBURY BYPASS
LEONARD LA
ALLEN DR
50
50
50
50
220187
2200161-004
2200160.002
2200159.001
2200162.003
18" RCP
18" RCP
18" RCP
18" RCP
15.2
15.55
15.15
15.6
15.65
15.05
0.299
15
0.25
15.7
14.95
15.75
0.25
0.2
0.2

SHA SWM Facility 220188

Infiltration trench

0 25 50
Feet

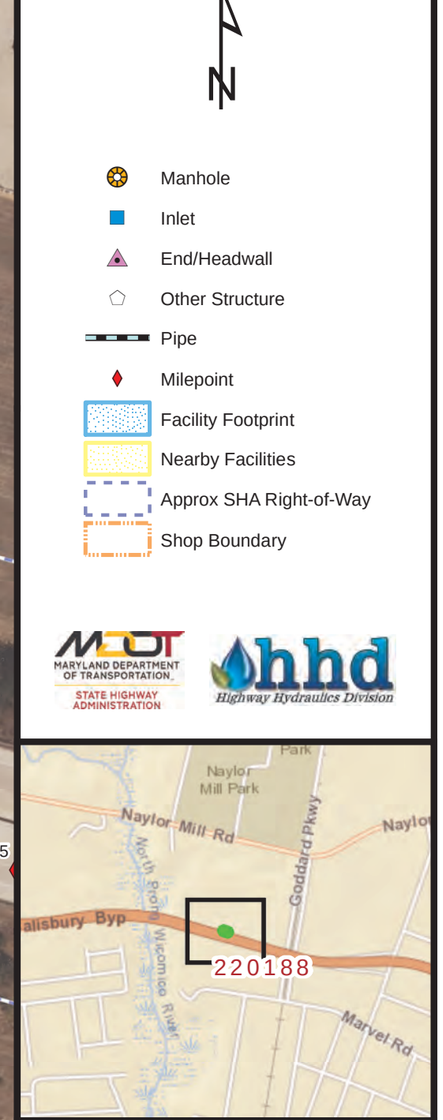
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220190

Infiltration trench

0 25 50
Feet

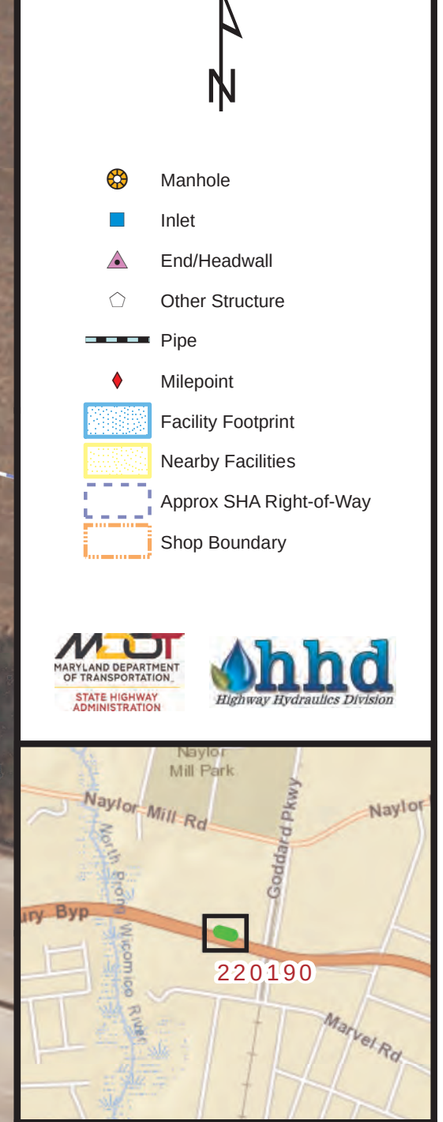
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220191

Infiltration trench

0 25 50
Feet

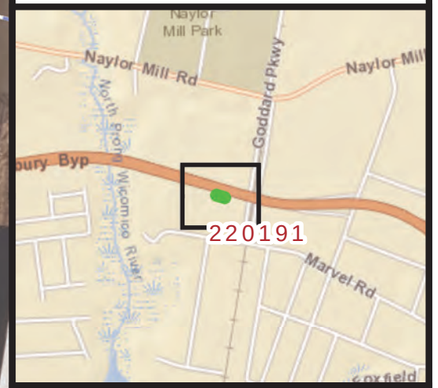
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220192

Infiltration trench

0 25 50
Feet

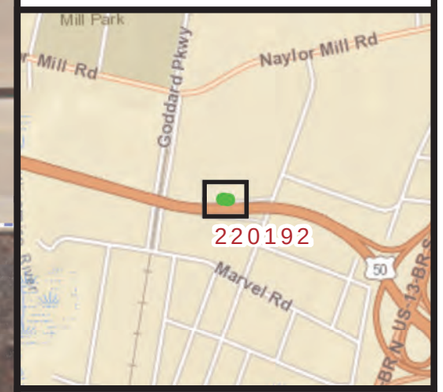
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

220192
RAMP 8 FR NORTHWOOD DR SB TO US 50 WB
0.1
0.15
0.2
18" RCP
15.4
50
15.35
SALISBURY BYPASS
2200158.002
15.3
SALISBURY BYPASS
15.35
42" RCP
50
24" RCP
220193

SHA SWM Facility 220193

Infiltration trench

0 25 50
Feet

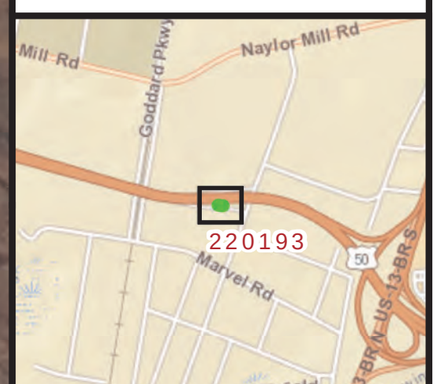
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220194

Infiltration basin

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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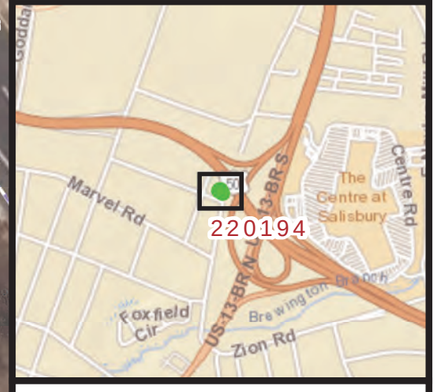
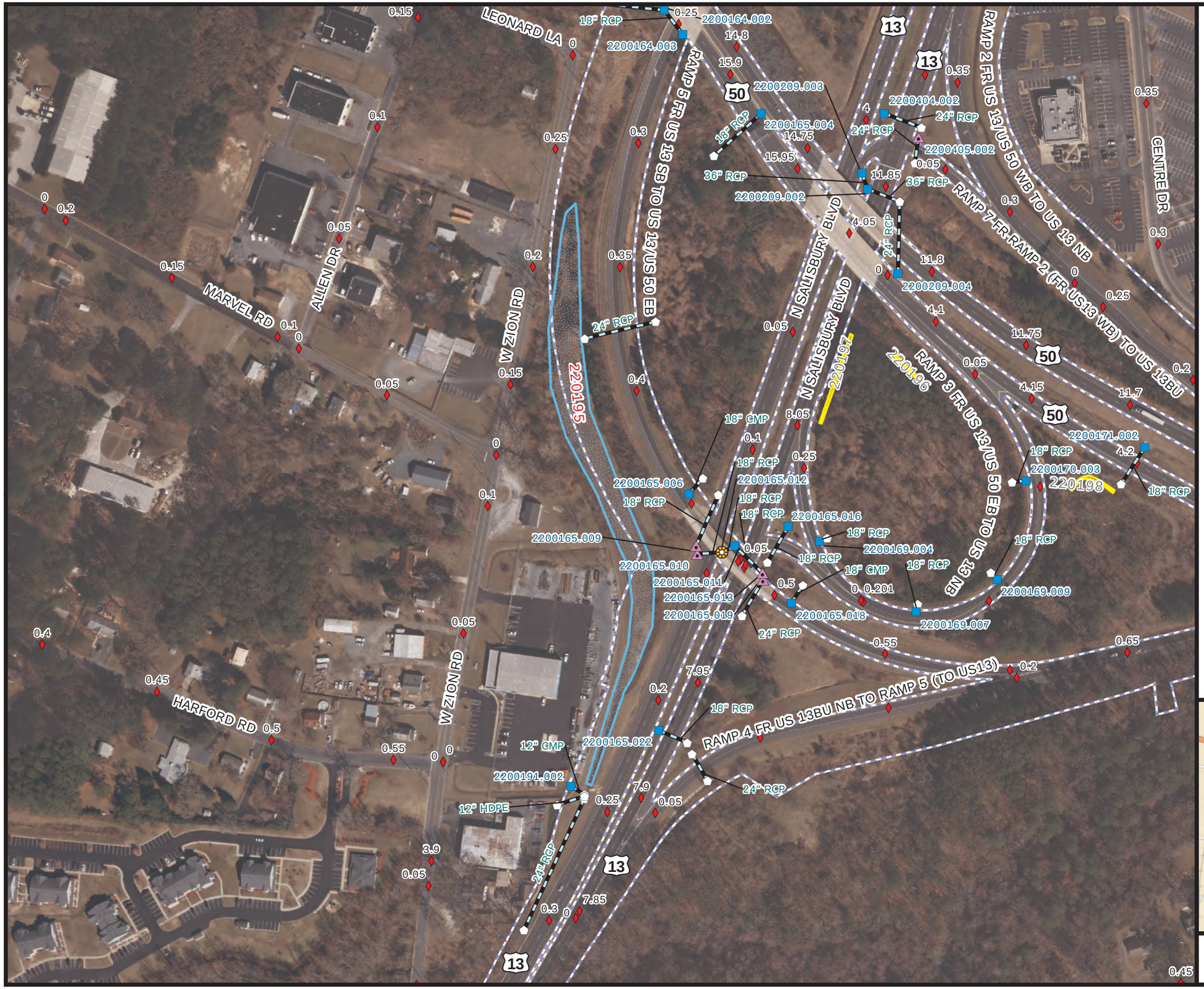
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017



SHA SWM Facility 220195

Dry pond

0 25 50 100
Feet

1 inch = 200 feet

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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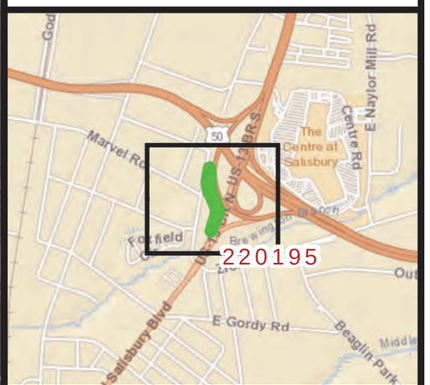
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220196

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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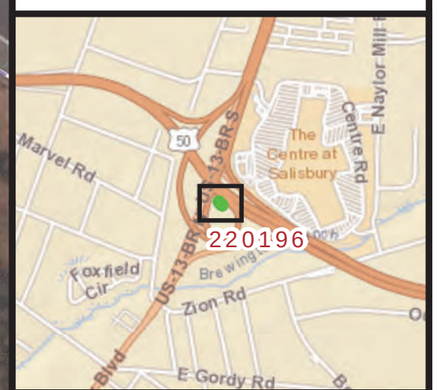
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220197

Infiltration trench

0 25 50
Feet

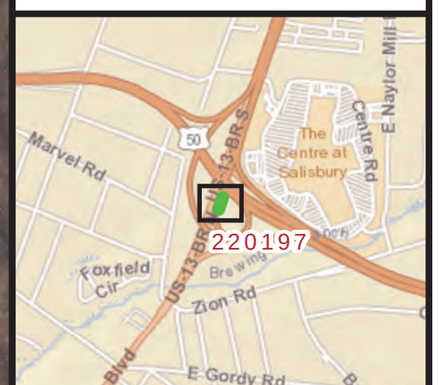
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220198

Infiltration trench

0 25 50
Feet

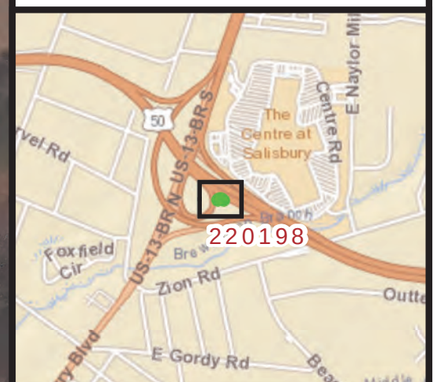
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220213

Infiltration trench

0 25 50
Feet

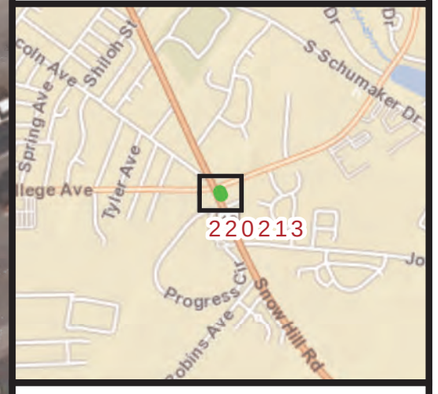
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220214

Infiltration trench

0 25 50
Feet

1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

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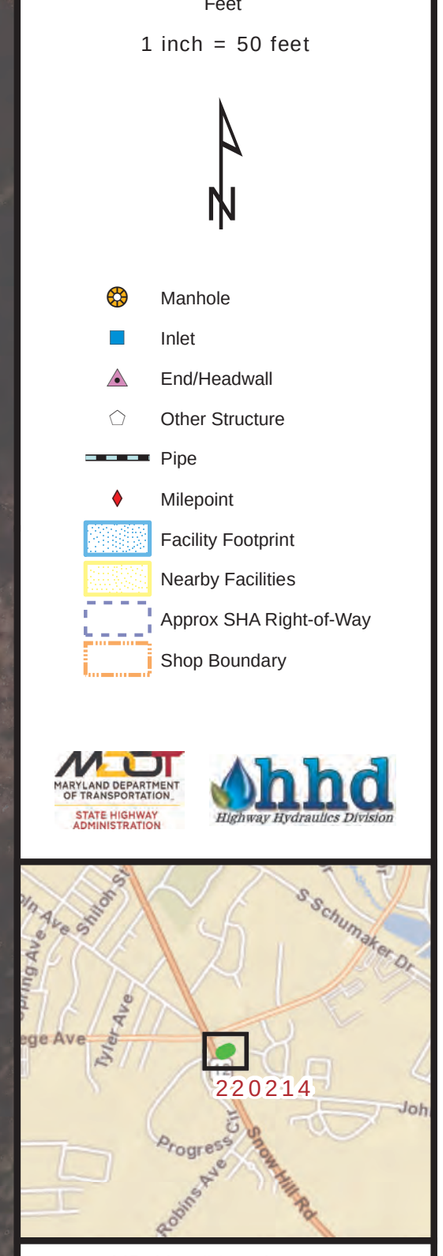
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220234

Grass Channel Credit

0 25 50
Feet

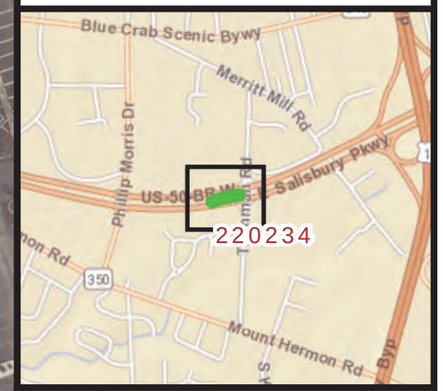
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220235

Grass Channel Credit

0 25 50

Feet

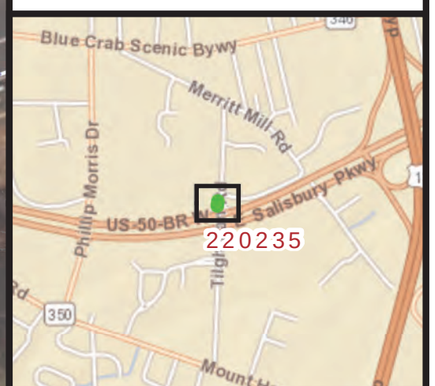
1 inch = 50 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220236

Wet extended detention pond

0 25 50
Feet

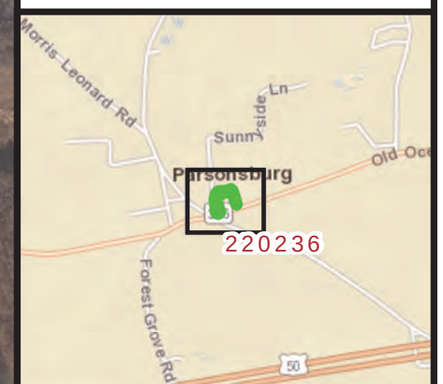
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220241

Wet pond

0 25 50
Feet

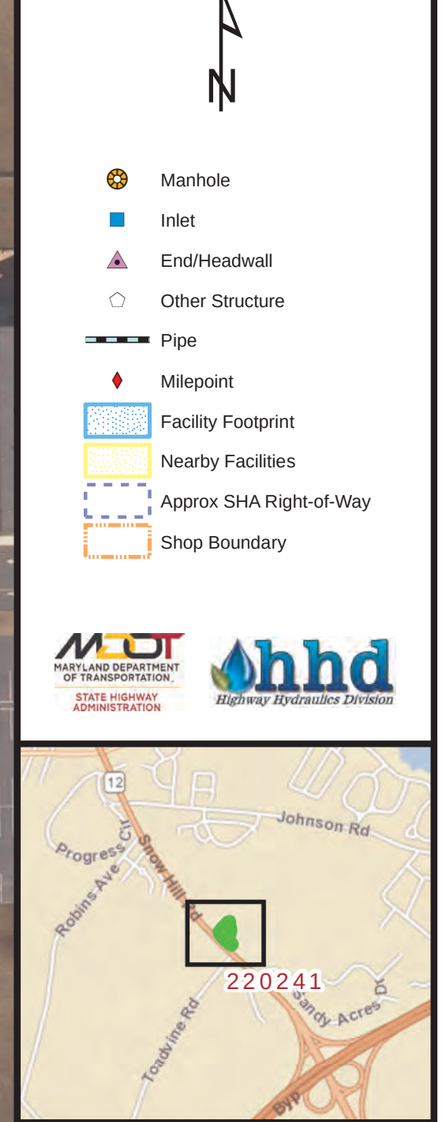
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

hhd
Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

SHA SWM Facility 220242

Wet pond

0 25 50
Feet

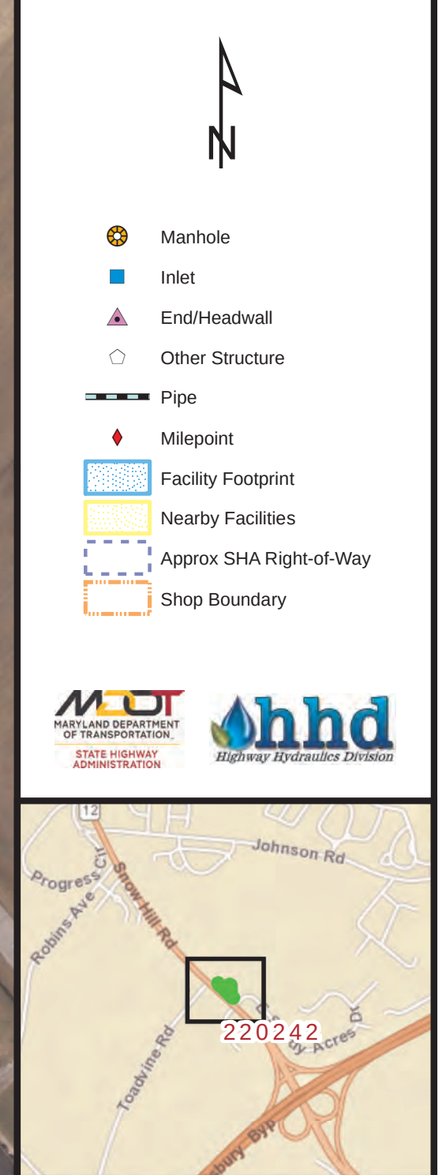
1 inch = 100 feet

N

- Manhole
- Inlet
- End/Headwall
- Other Structure
- Pipe
- Milepoint
- Facility Footprint
- Nearby Facilities
- Approx SHA Right-of-Way
- Shop Boundary

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

MDOT hhd Highway Hydraulics Division



MD iMap 6 Inch Imagery
Maps Prepared June, 2017

220241

220242

MARYLAND 12

SNOW HILL RD

TOADVINE RD

SANDY ACRES DR W

SANDY ACRES DR E

18" CMP

2.1
5.15
2.15
0
5.1
2.2
5.05
0.05
0.1
2.25
0
0
2.3
4.95
2.35
0.05
0.05
0.1

APPENDIX C

Index of Stormwater Management Facilities

Index of Stormwater Management Facilities - Salisbury Shop

(Sorted By SWM Facility No.)

SWM Facility No.	SWM Facility Type	Routine Maintenance Category	Tile Map
220001	Surface sand filter	Filtration Facility	D4
220002	Dry pond	Dry Pond	D4
220148	Wet pond	Wet Pond	D4
220149	Dry pond	Dry Pond	D5
220150	Wet pond	Wet Pond	D5
220151	Wet pond	Wet Pond	C4
220152	Dry pond	Dry Pond	C4
220153	Dry pond	Dry Pond	C4
220154	Infiltration basin	Infiltration Facility	C4
220155	Dry pond	Dry Pond	C4
220156	Wet extended detention pond	Wet Pond	C4
220157	Wet pond	Wet Pond	C4
220158	Wet pond	Wet Pond	C4
220159	Wet extended detention pond	Wet Pond	C4
220160	Wet pond	Wet Pond	C4
220161	Wet extended detention pond	Wet Pond	C4
220162	Infiltration trench	Infiltration Facility	C4
220163	Infiltration trench	Infiltration Facility	C4
220164	Infiltration trench	Infiltration Facility	C4
220165	Infiltration trench	Infiltration Facility	C4
220166	Infiltration trench	Infiltration Facility	C4
220167	Infiltration trench	Infiltration Facility	D4
220168	Infiltration trench	Infiltration Facility	D4
220169	Infiltration trench	Infiltration Facility	D4
220170	Infiltration trench	Infiltration Facility	D4
220171	Infiltration trench	Infiltration Facility	D4
220172	Infiltration trench	Infiltration Facility	C4
220173	Infiltration trench	Infiltration Facility	C4
220174	Infiltration trench	Infiltration Facility	C4
220175	Infiltration trench	Infiltration Facility	C4
220176	Infiltration trench	Infiltration Facility	C4
220177	Infiltration trench	Infiltration Facility	C4
220178	Infiltration trench	Infiltration Facility	C4
220179	Infiltration trench	Infiltration Facility	C4
220180	Wet extended detention pond	Wet Pond	C4
220181	Dry extended detention pond	Dry Pond	C4
220182	Infiltration trench	Infiltration Facility	C4
220183	Infiltration trench	Infiltration Facility	C4
220184	Infiltration trench	Infiltration Facility	C4
220187	Wet pond	Wet Pond	C4
220188	Infiltration trench	Infiltration Facility	C4
220190	Infiltration trench	Infiltration Facility	C4
220191	Infiltration trench	Infiltration Facility	C4
220192	Infiltration trench	Infiltration Facility	C4
220193	Infiltration trench	Infiltration Facility	C4
220194	Infiltration basin	Infiltration Facility	C4
220195	Dry pond	Dry Pond	D4
220196	Infiltration trench	Infiltration Facility	C4
220197	Infiltration trench	Infiltration Facility	C4
220198	Infiltration trench	Infiltration Facility	D4
220213	Infiltration trench	Infiltration Facility	D4
220214	Infiltration trench	Infiltration Facility	D4
220234	Grass Channel Credit	*Turfgrass Maintenance*	D5
220235	Grass Channel Credit	*Turfgrass Maintenance*	D5
220236	Wet extended detention pond	Wet Pond	D6
220241	Wet pond	Wet Pond	D4
220242	Wet pond	Wet Pond	E4

Index of Stormwater Management Facilities - Salisbury Shop

(Sorted By SWM Facility Type)

SWM Facility No.	SWM Facility Type	Routine Maintenance Category	Tile Map
220181	Dry extended detention pond	Dry Pond	C4
220002	Dry pond	Dry Pond	D4
220149	Dry pond	Dry Pond	D5
220152	Dry pond	Dry Pond	C4
220153	Dry pond	Dry Pond	C4
220155	Dry pond	Dry Pond	C4
220195	Dry pond	Dry Pond	D4
220156	Wet extended detention pond	Wet Pond	C4
220159	Wet extended detention pond	Wet Pond	C4
220161	Wet extended detention pond	Wet Pond	C4
220180	Wet extended detention pond	Wet Pond	C4
220236	Wet extended detention pond	Wet Pond	D6
220148	Wet pond	Wet Pond	D4
220150	Wet pond	Wet Pond	D5
220151	Wet pond	Wet Pond	C4
220157	Wet pond	Wet Pond	C4
220158	Wet pond	Wet Pond	C4
220160	Wet pond	Wet Pond	C4
220187	Wet pond	Wet Pond	C4
220241	Wet pond	Wet Pond	D4
220242	Wet pond	Wet Pond	E4
220154	Infiltration basin	Infiltration Facility	C4
220194	Infiltration basin	Infiltration Facility	C4
220162	Infiltration trench	Infiltration Facility	C4
220163	Infiltration trench	Infiltration Facility	C4
220164	Infiltration trench	Infiltration Facility	C4
220165	Infiltration trench	Infiltration Facility	C4
220166	Infiltration trench	Infiltration Facility	C4
220167	Infiltration trench	Infiltration Facility	D4
220168	Infiltration trench	Infiltration Facility	D4
220169	Infiltration trench	Infiltration Facility	D4
220170	Infiltration trench	Infiltration Facility	D4
220171	Infiltration trench	Infiltration Facility	D4
220172	Infiltration trench	Infiltration Facility	C4
220173	Infiltration trench	Infiltration Facility	C4
220174	Infiltration trench	Infiltration Facility	C4
220175	Infiltration trench	Infiltration Facility	C4
220176	Infiltration trench	Infiltration Facility	C4
220177	Infiltration trench	Infiltration Facility	C4
220178	Infiltration trench	Infiltration Facility	C4
220179	Infiltration trench	Infiltration Facility	C4
220182	Infiltration trench	Infiltration Facility	C4
220183	Infiltration trench	Infiltration Facility	C4
220184	Infiltration trench	Infiltration Facility	C4
220188	Infiltration trench	Infiltration Facility	C4
220190	Infiltration trench	Infiltration Facility	C4
220191	Infiltration trench	Infiltration Facility	C4
220192	Infiltration trench	Infiltration Facility	C4
220193	Infiltration trench	Infiltration Facility	C4
220196	Infiltration trench	Infiltration Facility	C4
220197	Infiltration trench	Infiltration Facility	C4
220198	Infiltration trench	Infiltration Facility	D4
220213	Infiltration trench	Infiltration Facility	D4
220214	Infiltration trench	Infiltration Facility	D4
220001	Surface sand filter	Filtration Facility	D4
220234	Grass Channel Credit	*Turfgrass Maintenance*	D5
220235	Grass Channel Credit	*Turfgrass Maintenance*	D5

Index of Stormwater Management Facilities - Salisbury Shop

(Sorted By Tile Map)

SWM Facility No.	SWM Facility Type	Routine Maintenance Category	Tile Map
220151	Wet pond	Wet Pond	C4
220152	Dry pond	Dry Pond	C4
220153	Dry pond	Dry Pond	C4
220154	Infiltration basin	Infiltration Facility	C4
220155	Dry pond	Dry Pond	C4
220156	Wet extended detention pond	Wet Pond	C4
220157	Wet pond	Wet Pond	C4
220158	Wet pond	Wet Pond	C4
220159	Wet extended detention pond	Wet Pond	C4
220160	Wet pond	Wet Pond	C4
220161	Wet extended detention pond	Wet Pond	C4
220162	Infiltration trench	Infiltration Facility	C4
220163	Infiltration trench	Infiltration Facility	C4
220164	Infiltration trench	Infiltration Facility	C4
220165	Infiltration trench	Infiltration Facility	C4
220166	Infiltration trench	Infiltration Facility	C4
220172	Infiltration trench	Infiltration Facility	C4
220173	Infiltration trench	Infiltration Facility	C4
220174	Infiltration trench	Infiltration Facility	C4
220175	Infiltration trench	Infiltration Facility	C4
220176	Infiltration trench	Infiltration Facility	C4
220177	Infiltration trench	Infiltration Facility	C4
220178	Infiltration trench	Infiltration Facility	C4
220179	Infiltration trench	Infiltration Facility	C4
220180	Wet extended detention pond	Wet Pond	C4
220181	Dry extended detention pond	Dry Pond	C4
220182	Infiltration trench	Infiltration Facility	C4
220183	Infiltration trench	Infiltration Facility	C4
220184	Infiltration trench	Infiltration Facility	C4
220187	Wet pond	Wet Pond	C4
220188	Infiltration trench	Infiltration Facility	C4
220190	Infiltration trench	Infiltration Facility	C4
220191	Infiltration trench	Infiltration Facility	C4
220192	Infiltration trench	Infiltration Facility	C4
220193	Infiltration trench	Infiltration Facility	C4
220194	Infiltration basin	Infiltration Facility	C4
220196	Infiltration trench	Infiltration Facility	C4
220197	Infiltration trench	Infiltration Facility	C4
220001	Surface sand filter	Filtration Facility	D4
220002	Dry pond	Dry Pond	D4
220148	Wet pond	Wet Pond	D4
220167	Infiltration trench	Infiltration Facility	D4
220168	Infiltration trench	Infiltration Facility	D4
220169	Infiltration trench	Infiltration Facility	D4
220170	Infiltration trench	Infiltration Facility	D4
220171	Infiltration trench	Infiltration Facility	D4
220195	Dry pond	Dry Pond	D4
220198	Infiltration trench	Infiltration Facility	D4
220213	Infiltration trench	Infiltration Facility	D4
220214	Infiltration trench	Infiltration Facility	D4
220241	Wet pond	Wet Pond	D4
220149	Dry pond	Dry Pond	D5
220150	Wet pond	Wet Pond	D5
220234	Grass Channel Credit	*Turfgrass Maintenance*	D5
220235	Grass Channel Credit	*Turfgrass Maintenance*	D5
220236	Wet extended detention pond	Wet Pond	D6
220242	Wet pond	Wet Pond	E4