
**STORMWATER SYSTEM
OPERATIONS AND MAINTENANCE PLAN**

“Coddington Cove Commons”

Assessor’s Map 103 Lot 103
300 Coddington Highway
Middletown, RI

Prepared For
Mello Realty Inc.
PO Box 4129
Middletown, RI 02842

May 20, 2024



TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
1.1	SITE INFORMATION FOR CODDINGTON COVE COMMONS.....	1
2.0	ADMINISTRATION.....	1
2.1	RESPONSIBLE PARTIES	1
2.2	O&M EXPENSES.....	1
3.0	GENERAL INSPECTION AND MAINTENANCE	2
3.1	MAINTENANCE INSPECTION SCHEDULE	2
3.2	TYPES OF MAINTENANCE	2
3.2.1	PREVENTATIVE MAINTENANCE	3
3.2.2	ROUTINE AND MINOR MAINTENANCE	3
3.2.3	MAJOR MAINTENANCE	3
3.2.4	ILLICIT DISCHARGES	4
3.2.5	SPILL PREVENTION AND CONTROL.....	5
3.2.6	MAINTENANCE REPORTING	6
4.0	LAWN, GARDEN, AND LANDSCAPE MANAGEMENT (PREVENTATIVE MAINTENANCE).....	7
4.1	GRASS.....	7
4.2	MOWING AND MANAGEMENT.....	7
4.3	FERTILIZATION	7
4.4	WEED MANAGEMENT.....	8
4.5	PEST MANAGEMENT.....	8
4.6	SENSIBLE IRRIGATION	9
5.0	ROUTINE MAINTENANCE OF STORMWATER DEVICES	10
5.1	UNDERGROUND SAND FILTER	10
5.1.1	REQUIRED SAND FILTER MAINTENANCE	10
5.2	HYDRODYNAMIC SEPARATOR	12
5.2.1	REQUIRED SEPARATOR MAINTENANCE.....	12
5.3	PRECAST CONCRETE CATCH BASIN	13



5.3.1	REQUIRED CATCH BASIN MAINTENANCE	13
5.4	PRECAST CONCRETE DRAIN MANHOLE	14
5.4.1	REQUIRED CONCRETE DRAIN MANHOLE MAINTENANCE.....	14
5.5	PRECAST CONCRETE OUTLET CONTROL MANHOLE.....	15
5.5.1	REQUIRED OUTLET CONTROL STRUCTURE MAINTENANCE.....	15
5.6	SUBSURFACE DETENTION CHAMBERS.....	16
5.6.1	REQUIRED SUBSURFACE STORMWATER DETENTION MAINTENANCE.....	16
6.0	APPENDICES	18
APPENDIX A OPERATION AND MAINTENANCE CHECKLISTS		
APPENDIX B STORMWATER DEVICE MAP AND DRAWINGS		
APPENDIX C STORMWATER MAINTENANCE AGREEMENT		

1.0 INTRODUCTION

1.1 SITE INFORMATION FOR CODDINGTON COVE COMMONS

City / Town:	Middletown, Rhode Island
Adjacent Roadways:	Coddington Highway (State Highway)
Lot(s) identification:	A.P. 103 Lot 103
Zoning District:	LI ²
Property Use:	Tradesman Center
Site Area:	3.84 Acres
FEMA Zone and Map:	Zone "X"

2.0 ADMINISTRATION

2.1 RESPONSIBLE PARTIES

The Owner and party responsible for the operation and maintenance of the Stormwater Management System shall be:

Mello Realty, Inc.
PO Box 4129
Middletown, RI 02842

The Owner intends that this Plan shall run with the land and be binding upon the Owner and the Owner's successors and assigns. A copy of this Plan shall be provided to any future property owners. This Section shall be amended as necessary.

Easements across the stormwater system to the Town of Middletown may be provided upon request. The Owner is solely responsible for all other operation and maintenance. Refer to any stormwater maintenance agreements in Appendix C which may be applicable for this site.

2.2 O&M EXPENSES

It is anticipated that the Operation and Maintenance budget will be incorporated into the operating budget of the property. The stormwater facilities will require continual maintenance to operate at peak efficiency. It is anticipated that small equipment and hand labor will typically be required to operate and maintain the system. A vacuum truck will be required for routine maintenance. Operation and Maintenance activities and equipment will be funded by the Owner.

3.0 GENERAL INSPECTION AND MAINTENANCE

This section contains a general overview of O&M guidelines and documentation procedures. Specific guidance is described in Section 5.0. Appendix A contains applicable Operation, Maintenance and Management Inspection Checklists. Appendix B contains a location map of stormwater features to be maintained and details of the devices which may be referenced during maintenance should any reconstructive measures be undertaken.

3.1 MAINTENANCE INSPECTION SCHEDULE

All stormwater management facilities shall be periodically inspected by a qualified individual. Inspections shall be conducted by a registered professional engineer where the structural or hydraulic integrity of the system is in question or as noted on the inspection checklists. Inspections shall follow the specific guidelines found in the checklists included in Appendix A. Regular inspections of the stormwater system shall be completed at the following intervals:

1. Monthly basis
2. After storm events greater to or equal to a 1-year, 24-hour Type III storm (2.8 inches of precipitation with 24-hours). The following website may be consulted to determine total rainfall for recent storm events in order to determine if an inspection is warranted:

<https://www.wunderground.com/weather/us/ri/middletown/02842>

Conditions may warrant additional inspections throughout the year in order to determine the cause of failure conditions exhibited by the stormwater system. It is the responsibility of the Owner and his qualified inspectors to determine if additional inspections are necessary. Timing of such inspections may be:

1. Pre-storm
2. During a storm event

3.2 TYPES OF MAINTENANCE

Maintenance activities are described in three basic categories based upon the magnitude and type of the maintenance activities performed. A description of each category follows.



3.2.1 PREVENTATIVE MAINTENANCE

The most effective way to maintain the stormwater system is to prevent the pollutants from entering them in the first place. Common pollutants include sediment, trash and debris, chemicals, runoff from stored materials, and illicit discharges. The Owner shall implement the following measures to address these potential contaminants. **These activities do not correspond to any maintenance checklists provided in the following sections and should be considered "Good Housekeeping" measures intended to reduce the potential for costly maintenance in the future.**

- Educate building tenants and maintenance staff of how their actions impact water quality, and how they can help reduce maintenance costs;
- Keep the property free of trash and debris;
- Ensure the proper disposal of hazardous wastes and chemicals;
- Plan landscaping care to minimize the use of fertilizers, herbicides, and pesticides. It is recommended that these materials not be kept on site when not in use;
- Sweep paved surfaces and dispose of sweepings properly. Regular sweeping can prevent or delay more costly maintenance. The Owner should be aware that lax sweeping will affect stormwater components that they are ultimately responsible for;
- Be aware of automobiles leaking fluids. Use absorbents to soak up drippings – dispose of properly (refer to section 3.2.5 of this manual);
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization under the direction of a qualified landscaper.

3.2.2 ROUTINE AND MINOR MAINTENANCE

Routine maintenance work to be undertaken by the Owner shall include activities normally performed throughout the year as described in the following sections. Such maintenance consists of isolated or small-scale maintenance and correcting minor operational problems. Most of this work can be completed by a small crew with hand tools, and small equipment. Routine maintenance will include parking lot vacuuming or sweeping. **Routine maintenance activities are included in the inspection and maintenance checklists and are required according to the intervals specified in Section 3.1 above.**

3.2.3 MAJOR MAINTENANCE

This work consists of more complex maintenance/operational problems and system failures. Some of this work may require consultation with a licensed engineer and/or the Town of Middletown. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through qualified contractors and consultants. **Major maintenance activities may be required as a result of the regular inspections and will not need to be performed at standard intervals.**



3.2.4 ILLICIT DISCHARGES

The following discharges are prohibited at the site, either into the stormwater system or otherwise:

- Contaminated groundwater, unless specifically authorized by the RIDEM and the municipality.
- Wastewater from washout of concrete, unless the discharge is contained and managed by appropriate control measures (applicable during any construction activities).
- Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds, and other construction materials (applicable during any construction activities).
- Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance. Proper storage and spill prevention practices must be utilized at all times.
- Soaps or solvents used in vehicle and equipment washing.
- Toxic or hazardous substances from a spill or other release.

Should any illicit discharges be detected at any time, the Owner will notify the Middletown Department of Public Works immediately. In the case of extreme discharges, or at the direction of the town, the Owner shall also notify RIDEM. Any and all cleanup activities shall be completed in coordination with these agencies. All recovered material following a spill of illicit materials shall be disposed of in accordance with the mandates of RIDEM.

3.2.5 SPILL PREVENTION AND CONTROL

Any chemicals and/or hazardous waste material must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for any such material delivery and storage. All areas where potential spills can occur and their accompanying drainage points must be identified in order for prevention to be possible. The owner and operator must establish spill prevention and control measures to reduce the chance of spills, stop the source of spills, contain and clean-up spills, and dispose of materials contaminated by spills. The site manager must establish and make highly visible location(s) for the storage of spill prevention and control equipment and provide training for personnel responsible for spill prevention and control on the construction site. The following table lists specific potential sources of spills, the associated risks, and the applicable preventative measures.

Potential Source of Pollution	Risk	Preventative Measures
Oil, gasoline, or hydraulic fluid leaks from vehicles	Oil or fluid leaks entering the drainage system or polluting downstream properties	<p>The potential for fuel or fluid leaks from vehicles on site will be minimized by regular inspection of the site for spills or evidence of contamination in paved areas.</p> <p>All vehicles on site will be monitored for leaks.</p> <p>Any petroleum products used on site will be stored in tightly sealed containers, all of which will be clearly labeled.</p> <p>Following any spill absorbent material will be placed over the area to collect excess fluid. The absorbent material will be replaced and disposed of properly when saturated.</p>
Temporary site toilet facilities (during construction)	Leaks and or overflows from temporary site toilets.	The General Contractor will ensure that temporary site toilets are maintained in good working order.
Stored construction materials	Leakage of stored materials entering the drainage system and hence downstream receiving waters.	<p>The owner will ensure that all materials stored on site are placed in suitable leak-proof containers.</p> <p>Materials such as cement and asphalt will be stored in covered, weatherproof facilities only. Diesel, or other fuel stored on site will be stored in approved containers, with containment areas where required.</p> <p>All site materials storage facilities will be clearly labeled and adequate measures will be taken to ensure that spills can be isolated within the storage area.</p>



3.2.6 MAINTENANCE REPORTING

At the request of the town, submittal of the required inspection forms and inspector qualifications may be necessary. **Requirements of annual reporting will be determined during the city permitting process.**

4.0 LAWN, GARDEN, AND LANDSCAPE MANAGEMENT (PREVENTATIVE MAINTENANCE)

Grasses require more water and attention than alternative groundcovers, flowers, shrubs, or trees. Alternatives to turf are especially recommended for problem areas such as lawn edges, frost pockets, shady spots, steep slopes, and soggy areas.

4.1 GRASS

Grass seed is available in a wide range of cultivated varieties. The Owner should consult a landscape expert to choose the grass type that matches the site conditions, and is consistent with the Owners desired level of maintenance.

4.2 MOWING AND MANAGEMENT

To prevent insects and weed problems, the Owner should mow high, mow frequently, and keep mower blades sharp. Lawns should not be cut shorter than 2 to 3 inches, because weeds can grow more easily in short grasses. Grass can be cut lower in the spring and fall to stimulate root growth, but not shorter than 1 ½ inches.

4.3 FERTILIZATION

If fertilizing is desired, consider the following points:

- Most lawns require little or no fertilizer to remain healthy. Fertilize no more than twice a year - once in May-June, and once in September-October;
- Fertilizers are rated on their labeling by three numbers (e.g., 10-10-10 or 12-4-8), which refer to their Nitrogen (N) – Phosphorus (P) – Potassium (K) concentrations. Fertilize at a rate of no more than ½ pound of nitrogen per 1000 square feet, which can be determined by dividing 50 by the percentage of nitrogen in the fertilizer;
- Apply fertilizer carefully to avoid spreading on impervious surfaces where the nutrient can be easily washed into storm drains or directly into surface waters;
- To encourage more complete uptake, use slow-release fertilizers that is those that contain 50 percent or more water-insoluble nitrogen (WIN);
- Grass blades retain 30-40 percent of nutrients applied in fertilizers. Reduce fertilizer applications by 30 percent, or eliminate the spring application of fertilizer and leave clippings on the lawn where they will degrade and release stored nutrients back to the soil; and
- Fertilizer should not be applied when rain is expected. Not only does the rain decrease fertilizer effectiveness, it also increases the risk of surface and ground water contamination.

4.4 WEED MANAGEMENT

The Owner must decide how many weeds can be tolerated before action is taken to eradicate them. To the extent practicable, weeds should be dug or pulled out. If patches of weeds are present, they can be covered for a few days with a black plastic sheet. This process kills the weeds while leaving the grass intact. If weeds blanket a large enough area, the patch can be covered with clear plastic for several weeks, effectively "cooking" the weeds and their seeds. The bare area left behind after weeding should be reseeded to prevent weeds from growing back. As a last resort, the Owner may use chemical herbicides to spot treat weeds.

4.5 PEST MANAGEMENT

Effective pest management begins with maintenance of a healthy, vigorous lawn that is naturally disease resistant. The Owner should monitor plants for obvious damage and check for the presence of pest organisms. Learn to distinguish beneficial insects and arachnids, such as green lacewings, ladybugs, and most spiders, from ones that will damage plants.

When damage is detected or when harmful organisms are present, the Owner should determine the level of damage the plant is able to tolerate. No action should be taken if the plant can maintain growth and fertility. If controls are needed, there are a variety of low-impact pest management controls and practices to choose from, including the following:

- Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off a plant with water, or in some cases vacuumed off of larger plants;
- Store-bought traps, such as species- specific, pheromone-based traps or colored sticky cards, can be used;
- Sprinkling the ground surface with abrasive diatomaceous earth can prevent infestations by soft-bodied insects and slugs. Slugs can also be trapped by falling or crawling into small cups set in the ground flush with the surface and filled with beer;
- In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of. (Pruning equipment should be disinfected with bleach to prevent spreading the disease organism);
- Small mammals and birds can be excluded using fences, netting, tree trunk guards, and, as a last resort, trapping. (In some areas trapping is illegal. Property owners should check local codes if this type of action is desired); and
- The Owner can encourage/attract beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seedhead weevils, and spiders that prey on detrimental pest species. These desirable organisms can be introduced directly or can be attracted to the area by providing food and/or habitat.

If chemical pesticides are used, the Owner should try to select the least toxic, water soluble and volatile pesticides possible. All selected pesticides should be screened for their potential to harm water resources. When possible, pesticides that pose the least risk to human health and the environment should be chosen. A list of popular pesticides, along with their uses, their toxicity to humans and wildlife, EPA's toxicity rating,



and alternatives to the listed chemicals, is available from *The Audubon Guide to Home Pesticides*, (<http://www.audubon.org/bird/pesticides/>).

4.6 SENSIBLE IRRIGATION

Established lawns need no more than one inch of water per week (including precipitation) to prevent dormancy in dry periods. Watering at this rate should wet soil to approximately 4-6 inches and will encourage analogous root growth. If possible, use timers to water before 9:00 a.m., preferably in the early morning to avoid evaporative loss. Use drought-resistant grasses (see "grass selection" above) and cut grass at 2-3 inches to encourage deeper rooting and heartier lawns.

5.0 ROUTINE MAINTENANCE OF STORMWATER DEVICES

5.1 UNDERGROUND SAND FILTER

The subsurface sand filters are designed to capture and temporarily store the water quality storm runoff volume in subsurface HDPE chambers and pass it through a sand media layer. Due to the water table, the media cells are lined with impermeable membranes and the filtered runoff is collected by underdrains. This treated runoff is then discharged downgradient to the municipal stormwater system. High flow runoff bypasses the device entirely to a precast concrete drain manhole which also discharges to the town system.

The sand filters for this development are identified as follows:

1. Sand Filter (UG1A)
Location: Northeast corner of the paved parking lot
Discharge location: municipal storm drain
Description: 66 Stormtech SC310 chambers above 18 inches of sand media
2. Sand Filter (UG1B)
Location: Northeast corner of the paved parking lot
Discharge location: municipal storm drain
Description: 32 Stormtech SC310 chambers above 18 inches of sand media
3. Sand Filter (UG2)
Location: Northwest corner of the paved parking lot
Discharge location: municipal storm drain
Description: 45 Stormtech SC310 chambers above 18 inches of sand media

5.1.1 REQUIRED SAND FILTER MAINTENANCE

Maintenance inspections shall include the following tasks. All inspections shall be carried out using the checklists provided in Appendix A of this document:

1. Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the chamber inspection ports located in the parking lot. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via the inspection port. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. The presence of excessive sediments may indicate a failure of the system installation or of the upstream piping. A RI licensed Professional Engineer shall be consulted to determine a corrective course of action. These modes of failure should be considered when completing the remaining inspections. If operating properly, there should be minimal or no sediments within the chambers.
2. Should standing water be observed more than 48-hours after a storm event, this will indicate a substantial failure in the filtering capability of the system. This is typically caused by long-term



failure to remove sediments and debris from the stormwater system, or by spills of oil or other illicit material.

Under the direction of a licensed RI civil engineer, the system shall be excavated and the HDPE plastic chambers removed. The top six (6) inches of sand shall be removed and replaced in kind. If discolored or contaminated material is found below this removed material, then that material shall also be removed and replaced in kind until all contaminated sand has been removed from the filter bed. The sand shall be disposed of in accordance with all applicable regulations.

Should any standing water be observed after the sand has been removed, this will indicate a further failure of the system. The inspector shall confirm that the outlet from the sand filter into the precast concrete manhole is not blocked. Should this outlet be free from obstruction, it must be assumed that either the impermeable liner has been compromised or that the underdrain itself has been crushed to the point where no flow is possible. The remainder of the system shall be removed. Any undamaged HDPE chambers may be reused. All other materials shall be disposed of and replaced in kind.

3. All inspection ports shall also be visually inspected. The heavy-duty cast iron frames shall be free of damage or excessive corrosion. Excessive corrosion shall be defined as any corrosion which prevents the use of the inspection port. The 6-inch PVC inspection port caps and the 24-inch ADS plastic header manhole covers shall also be inspected for damage.

5.2 HYDRODYNAMIC SEPARATOR

A hydrodynamic separator is a proprietary stormwater pre-treatment device which removes the remaining large diameter sediments before discharging runoff to the sand filter. Three (3) hydrodynamic separators are proposed for this development. The models of the devices specified for this development include two CS-4 Cascade Separators and one CS-5 Cascade Separator. The devices are precast concrete structures accessed via a 24-inch diameter manhole covers located in the paved surface. They consist of two chambers: an upper swirl chamber that causes particles to fall out of suspension and a lower sump chamber into which sediments are deposited.

5.2.1 REQUIRED SEPARATOR MAINTENANCE

Maintenance inspections for each structure shall include the following tasks. All inspections shall be carried out using the checklists provided in Appendix A of this document:

1. The structure sump chamber shall be inspected for the presence of debris or sediments and the sediment shall be removed via a vacuum truck in strict accordance with manufacturer requirements. The Owner should also consider more frequent sweeping of the parking lot. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations.

Should the sump chamber be found to be devoid of sediments, it should be considered that the device is not functioning as intended. A licensed engineer should be consulted for direction. Correction of a failed hydrodynamic separator could avoid costly repairs and reconstruction of a sand filter.

2. The frame and cover of a structure shall be inspected for damage. Damage may result in a compromise of the safety of the device or the intrusion of excessive surface stormwater through the cover. Structural faults shall be repaired by a qualified contractor.
3. The inlet and outlet pipes shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.



5.3 PRECAST CONCRETE CATCH BASIN

Precast concrete catch basins collect all runoff from the paved areas of the site. These structures feature cast iron grates. The structures can be accessed via the removal of the grates. The structures are intended to have a single outlet pipe below which is a three (3) foot deep sump intended to collect parking lot debris and any intercepted sand or gravel.

5.3.1 REQUIRED CATCH BASIN MAINTENANCE

Maintenance inspections for each structure shall include the following tasks. All inspections shall be carried out using the checklists provided in Appendix A of this document:

1. The sump of the catch basin shall be inspected for the presence of debris or sediments. Should the depth of material within the sump exceed 50% of the total sump depth (two feet), the sediment shall be removed via a vacuum truck. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. Any large debris which could potentially obstruct the outflow pipe shall be removed immediately. Should excess sediments and debris be encountered, the Owner should consider more frequent sweeping of the parking lot.
2. The frame and grate of the catch basin shall be inspected for damage. Damage may include blockage of the grate openings, or a compromise of the safety of the device. Structural faults shall be repaired by a qualified contractor.
3. The internal steps shall be inspected for damage. Dangerous or damaged rungs shall be repaired by a qualified contractor.
4. The outlet pipe(s) shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.



5.4 PRECAST CONCRETE DRAIN MANHOLE

Several precast concrete drain manholes are present in the stormwater collection system. Each structure features 24" cast iron frame and cover. The structures can be accessed via the removal of the cover by a qualified individual. The structures have one or more outlet pipes and have no sumps.

5.4.1 REQUIRED CONCRETE DRAIN MANHOLE MAINTENANCE

Maintenance inspections shall include the following tasks. All inspections shall be carried out using the checklists provided in Appendix A of this document:

1. The bottom of the drain manhole shall be inspected for the presence of debris or sediments. Should the any material be found, it shall be removed via a vacuum truck or by hand. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. Any large debris which could potentially obstruct the outflow pipe shall be removed immediately. Should excess sediments and debris be encountered, the Owner should consider more frequent sweeping and/or catch basin cleanings.
2. The frame and cover of the manholes shall be inspected for damage. Damage may include any defects that compromise of the safety of the device. Structural faults shall be repaired by a qualified contractor.
3. Any internal steps shall be inspected for damage. Dangerous or damaged rungs shall be repaired by a qualified contractor.
4. The outlet pipes shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.

5.5 PRECAST CONCRETE OUTLET CONTROL MANHOLE

The outlet control manholes are precast concrete structures with internal cast in place weirs. These structures are accessed by 24-inch diameter cast iron covers. Each structure has two inlets from systems headers, and may also have inlets from sand filter underdrains. The weirs are designed to meter the outflow from the devices to ensure required stormwater flowrate attenuation.

5.5.1 REQUIRED OUTLET CONTROL STRUCTURE MAINTENANCE

Maintenance inspections for each structure shall include the following tasks. All inspections shall be carried out using the checklists provided in Appendix A of this document:

1. A structure shall be inspected for the presence of debris or sediments. Any sediment shall be removed via a vacuum truck. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. The presence of sediments or sand within the manhole will indicate a failure of the upstream sand filter and/or of the subsurface stormwater detention system impermeable liner. A licensed engineer should be consulted to determine corrective actions.
2. The frame and cover of the structure shall be inspected for damage. Damage may result in a compromise of the safety of the device or the intrusion of excessive surface stormwater through the cover. Structural faults shall be repaired by a qualified contractor.
3. The inlet and outlet pipes shall be inspected for damage or obstruction. In particular, the weir should be free of obstructions or cracking. Any damage shall be repaired by a qualified contractor.
4. Should the inspection reveal a flow of water into the structure more than 72 hours after the end of a storm event, this may indicate that the impermeable liner of the upstream systems has failed and that there is an intrusion of groundwater into the system. A licensed engineer should be consulted to determine corrective actions.

5.6 SUBSURFACE DETENTION CHAMBERS

The subsurface stormwater detention areas are designed to store and slowly meter stormwater runoff in subsurface HDPE chambers to mitigate downstream effects. Outlet water is routed to the downstream municipal stormwater system. The bottom of the system is lined to prevent interaction with the groundwater. The system is not intended to have a permanent pool and is designed to drain within 72 hours.

The subsurface stormwater detention areas for this development are identified as follows:

1. Subsurface Infiltration Area (UG3)
Location: Under northwest corner of parking lot
Lined or Unlined: lined
Outlet Structure (Y/N): Y
Overflow weir type: N/A
Discharge location: municipal stormwater system
Chambers: 2 fields of 68 Stormtech SC740 units

5.6.1 REQUIRED SUBSURFACE STORMWATER DETENTION MAINTENANCE

Maintenance inspections for each area shall include the following tasks. All inspections shall be carried out using the checklists provided in Appendix A of this document:

1. Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the provided chamber inspection ports. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via the inspection ports. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. The presence of excessive sediments may indicate a failure of the system installation, the hydrodynamic separator, and /or the infiltration system (D-1). A RI licensed Professional Engineer shall be consulted to determine a corrective course of action.
2. Should standing water be observed more than 72-hours after a storm event, this may indicate a problem with the system and/or the outlet control manhole installation. The inspector shall confirm that the outlet control manhole flow control plate and pipe are not obstructed. Should this outlet be free from obstruction, it must be assumed that either the system has been compromised or that the system was improperly installed.
3. Should water be flowing from the system more that 72-hours after a storm event, this may indicate a problem with the impermeable liner of the system. The inspector shall consult with a registered professional engineer to determine if the problem requires reconstruction of the system.



4. All inspection ports shall also be visually inspected. The heavy-duty cast iron frames shall be free of damage or excessive corrosion. Excessive corrosion shall be defined as any corrosion which prevents the use of the inspection port. The 6-inch PVC inspection port caps under the lids shall also be inspected for damage.



6.0 APPENDICES



APPENDIX A OPERATION AND MAINTENANCE CHECKLISTS

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Precast Concrete Catch Basin

Minimum inspection schedule shall be bi-annual and after major storm events

Device Description:	Precast concrete structures with 24"x24" cast iron inlet grates
Device Location:	Parking lot, paved areas
Relevant O&M Section:	Section 5.3
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
The sump of the catch basin shall be inspected for the presence of debris or sediments. Should the depth of material within the sump exceed 50% of the total sump depth (two feet), the sediment shall be removed via a vacuum truck. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. Any large debris which could potentially obstruct the outflow pipe shall be removed immediately	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The frame and grates of the catch basin shall be inspected for damage. Damage may include blockage of the grate openings, or a compromise of the safety of the device. Structural faults shall be repaired by a qualified contractor	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The internal steps shall be inspected for damage. Dangerous or damaged rungs shall be repaired by a qualified contractor	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The outlet pipe shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Precast Concrete Hydrodynamic Separator

Minimum inspection schedule shall be bi-annual and after major storm events

Device Description:	Cascade Separator CS-4 / Cascade Separator CS-5
Device Location:	In paved areas at the north end of the site
Relevant O&M Section:	Section 5.2
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
The structure sump chamber shall be inspected for the presence of debris or sediments. Should the depth of material within the sump exceed eighteen (15) inches, the sediment shall be removed via a vacuum truck. Should sediment depth exceed thirty (30) inches or more, the interval of sump inspection and cleanout should be increased. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The frame and cover of the structure shall be inspected for damage. Damage may result in a compromise of the safety of the device or the intrusion of excessive surface stormwater through the cover. Structural faults shall be repaired by a qualified contractor.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The inlet and outlet pipes shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Precast Concrete Outlet Control Manhole

Minimum inspection schedule shall be bi-annual and after major storm events

Device Description:	precast concrete structure with 24" dia. frame and cover
Device Location:	In paved areas at the north end of the site
Relevant O&M Section:	Section 5.5
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
The structure shall be inspected for the presence of debris or sediments. Any sediment shall be removed via a vacuum truck. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. The presence of sediments or sand within the manhole will indicate a failure of the upstream sand filter and/or of the subsurface stormwater detention system impermeable liner. A licensed engineer should be consulted to determine corrective actions.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The frame and cover of the structure shall be inspected for damage. Damage may result in a compromise of the safety of the device or the intrusion of excessive surface stormwater through the cover. Structural faults shall be repaired by a qualified contractor.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The inlet and outlet pipes shall be inspected for damage or obstruction. In particular, the weir should be free of obstructions. Any damage shall be repaired by a qualified contractor.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Should the inspection reveal a flow of water into the structure more than 72 hours after the end of a storm event, this may indicate that the impermeable liner of the detention area has failed and that there is an intrusion of groundwater into the system. A licensed engineer should be consulted to determine corrective actions.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Subsurface Stormwater Detention (UG3)

Minimum inspection schedule shall be bi-annual and after major storm events

Device Description:	2 fields with 68 Stormtech SC740 chambers each
Device Location:	Under paved area at the northwest corner of the site
Relevant O&M Section:	Section 5.6
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the provided chamber inspection ports. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via the inspection ports. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations. The presence of excessive sediments may indicate a failure of the system installation, the hydrodynamic separator, and /or the upstream sand filter. A RI licensed Professional Engineer shall be consulted to determine a corrective course of action.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Should standing water be observed more than 24-hours after a storm event, this may indicate a problem with the system and/or the outlet control manhole installation. The inspector shall confirm that the outlet control manhole flow control plate and pipe are not obstructed. Should this outlet be free from obstruction, it must be assumed that either the system has been compromised or that the system was improperly installed.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Should water be flowing from the system more that 72-hours after a storm event, this may indicate a problem with the impermeable liner of the system. The inspector shall consult with a registered professional engineer to determine if the problem requires reconstruction of the system.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
All inspection ports shall also be visually inspected. The heavy-duty cast iron frames shall be free of damage or excessive corrosion. Excessive corrosion shall be defined as any corrosion which prevents the use of the inspection port. The 6-inch PVC inspection port caps under the lids shall also be inspected for damage.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Subsurface Sand Filter UG1A

Minimum inspection schedule shall be bi-annual and after major storm events

Device Description:	60 Stomtech SC310 chambers over 18" of sand media
Device Location:	Under paved areas at the northeast corner of the site
Relevant O&M Section:	Section 5.1
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the inspection ports. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via the inspection ports	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Subsurface chambers should be inspected for the presence of standing water. Consult section 5.1.1 of the O&M if condition is found.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The inspection ports shall also be visually inspected. The heavy-duty cast iron frames shall be free of damage or excessive corrosion. Excessive corrosion shall be defined as any corrosion which prevents the use of the inspection port. The 6-inch PVC inspection port caps and the 8-inch PVC header cleanout under the lids shall also be inspected for damage.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Subsurface Sand Filter UG1B

Minimum inspection schedule shall be bi-annual and after major storm events

Device Description:	32 Stomtech SC310 chambers over 18" of sand media
Device Location:	Under paved areas at the northeast corner of the site
Relevant O&M Section:	Section 5.1
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the inspection ports. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via the inspection ports	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Subsurface chambers should be inspected for the presence of standing water. Consult section 5.1.1 of the O&M if condition is found.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The inspection ports shall also be visually inspected. The heavy-duty cast iron frames shall be free of damage or excessive corrosion. Excessive corrosion shall be defined as any corrosion which prevents the use of the inspection port. The 6-inch PVC inspection port caps and the 8-inch PVC header cleanout under the lids shall also be inspected for damage.	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Coddington Cove Commons
300 Coddington Highway, Middletown, RI

Inspection Checklist for Subsurface Sand Filter UG2

Minimum inspection schedule shall be bi-annual and after major storm events

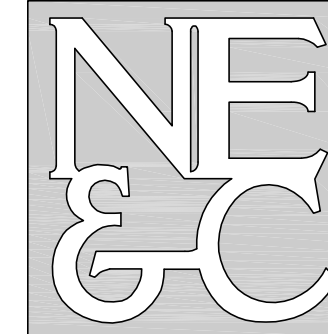
Device Description:	45 Stomtech SC310 chambers over 18" of sand media
Device Location:	Under paved areas at the northwest corner of the site
Relevant O&M Section:	Section 5.1
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	<input type="checkbox"/> Biannual <input type="checkbox"/> Major Storm <input type="checkbox"/> Pre-Storm <input type="checkbox"/> Post Storm <input type="checkbox"/> Other

Specific Inspection Requirements		
Maintenance Activity	Is Status Satisfactory?	Corrective Action Needed
Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the inspection ports. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via the inspection ports	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Subsurface chambers should be inspected for the presence of standing water. Consult section 5.1.1 of the O&M if condition is found.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
The inspection ports shall also be visually inspected. The heavy-duty cast iron frames shall be free of damage or excessive corrosion. Excessive corrosion shall be defined as any corrosion which prevents the use of the inspection port. The 6-inch PVC inspection port caps and the 8-inch PVC header cleanout under the lids shall also be inspected for damage.	<input type="checkbox"/> Yes <input type="checkbox"/> No	



APPENDIX B STORMWATER DEVICE MAP AND DRAWINGS

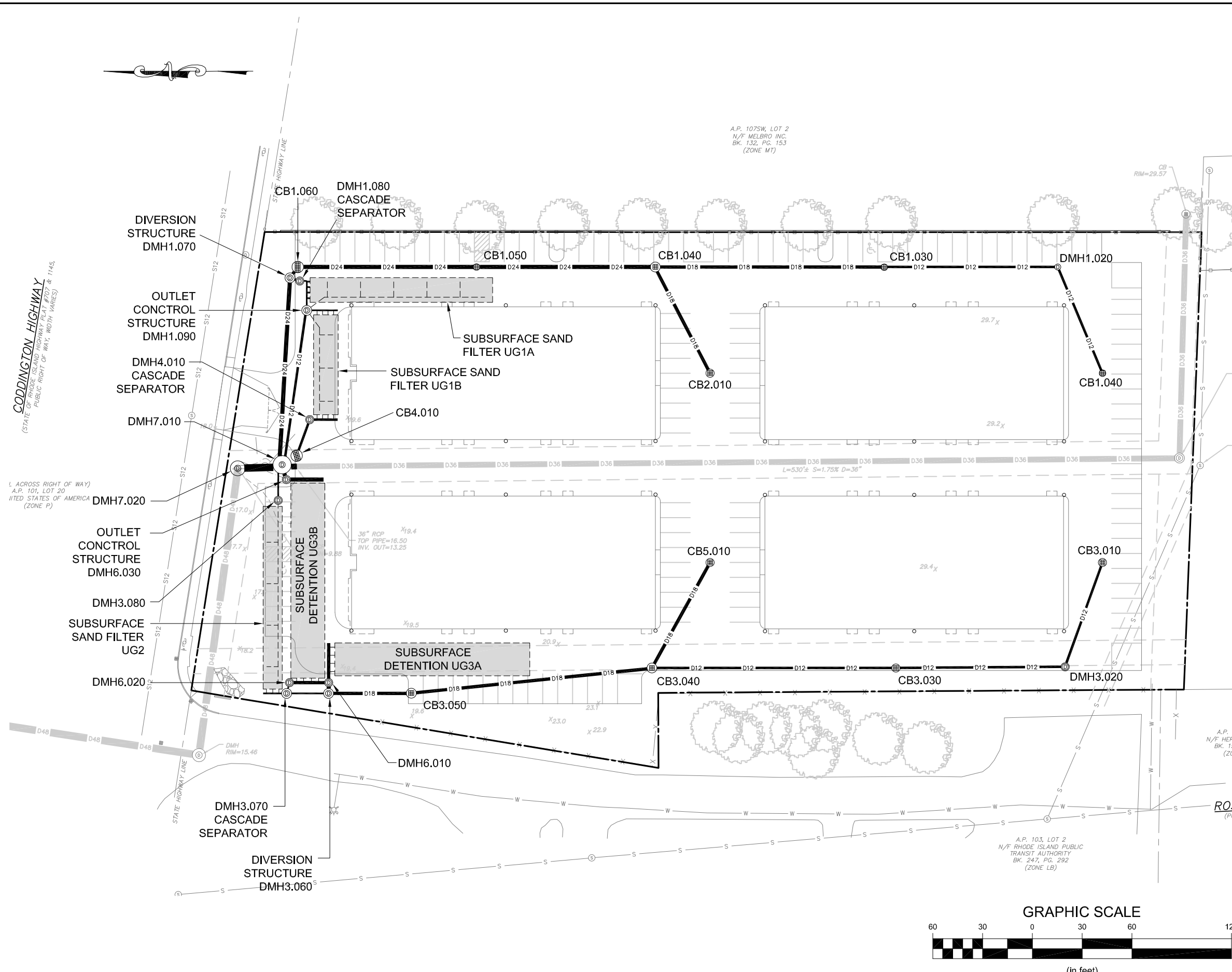
NORTHEAST ENGINEERS & CONSULTANTS, INC.



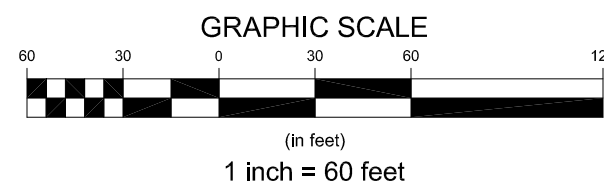
A KNOWLEDGE CORPORATION®

6 VALLEY ROAD MIDDLETOWN RHODE ISLAND 02842
 PHONE (401) 849-0810 FAX (401) 846-4169
 WWW.NORTHEASTENGINEERS.COM

- SITE/CIVIL
- LAND PLANNING
- WATERFRONT
- SURVEYING
- GEOTECHNICAL
- ENVIRONMENTAL
- TRANSPORTATION
- STRUCTURAL



Drawn by:	JJR	Checked by:	GES
Scale:	1"=60'	Date:	21MAY24
CODDINGTON COVE COMMONS			
A.P. 103 LOT 103 300 CODDINGTON HWY			
Issued for:			
PERMITTING			
Drawing Title:			
STORMWATER DEVICE LOCATION MAP			
Drawing Number:			
M-1			
Project Number:			
23099.1			





APPENDIX C STORMWATER MAINTENANCE AGREEMENT

(If required by the municipality, the agreement will be attached here.)