NORTHEAST ENGINEERS & CONSULTANTS, INC.

STORMWATER SYSTEM
OPERATIONS AND MAINTENANCE PLAN

"Valley Crossing"

Assessor's Map 107NE, Lot 402B
0 Valley Road
Middletown, RI

Prepared For
James H. Clausen Revocable Trust
7067 Villa Estelle Drive
Orlando, FL 32819

Rev. May 2023

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Civil ● Site ● Land Development ● Waterfront ● Coastal Engineering ● Environmental ● Geotechnical ● Structural ● Transportation ● Surveying

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1.0 INTRODUCTION

1.1 SITE INFORMATION FOR VALLEY CROSSING

City / Town:	Middletown, Rhode Island
Adjacent Roadways:	Valley Road (RI State Roadway)
Lot(s) identification:	A.P. 107NE Lot 402B
Zoning District:	LBA (Limited Business – Traffic Sensitive)
Site Use:	Medical Office (commercial)
Site Area:	2.25 Acres
FEMA Zone and Map:	Zone "X (Panel 44005C0093J)

2.0 ADMINISTRATION

2.1 RESPONSIBLE PARTIES

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

James H. Clausen Revocable Trust
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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. Biannual basis (twice per year)
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 employees 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 Town.
- 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 and RIDOT. 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	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. All vehicles on site will be monitored for leaks. Any petroleum products used on site will be stored in tightly sealed containers, all of which will be clearly labeled. 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.
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.	The owner will ensure that all materials stored on site are placed in suitable leak-proof containers. 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. 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.

3.2.6 MAINTENANCE REPORTING

At the request of the Town, submittal of the required inspection forms and inspector qualifications may be provided. Requirements of annual reporting will be determined during the town 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 SEDIMENT FOREBAY

A sediment forebay is a pre-treatment device which intercepts runoff from upstream piped and surface inlet and collects bulk sediments before overflowing into the primary water quality device. Inlets and outlets of a sediment forebay should be protected by rip-rap. A sediment forebay is grass lined and is not intended to have a pool.

The sediment forebay for this development is identified as follows:

1. Location: Northwest of paved parking lot
   Discharge location: Infiltration Basin
   Description: Two-foot-deep grassed depression
   Inlet: Stone spill off from parking lot
   Outlet: Stone Weir

5.1.1 REQUIRED SEDIMENT FOREBAY 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 slopes of a forebay shall be inspected for erosion and gullying. Reinforce inlet and outlet riprap if riprap is found to be deficient, erosion is present at the outfalls, or the existing riprap has been compromised. Replace underlying filter fabric if underlying erosion is detected, and restore riprap stone.

2. All structural components, which include, but are not limited to, trash racks, access gates, valves, pipes, weir walls, orifice structures, concrete headwalls, and spillway structures shall be inspected and any deficiencies should be resolved.

3. Sediment shall be removed from a forebay when the depth has been reduced by 50%. All material shall be disposed of in accordance with all federal and local regulations.

5.2 INFILTRATION / DETENTION BASIN

An infiltration /detention basin collects and temporarily detains high volume stormwater runoff in order to mitigate the downstream effects. Low flow water infiltrates into the underlying soils. High flow stormwater is released via a staged concrete weir, down a stone spillway, and over a concrete level spreader. The bottom and side slopes of the basin are planted with water tolerant grasses. These basins are not intended to have a permanent pool and are intended to drain within 72 hours following a storm event.

The infiltration / detention basins for this development are identified as follows:

1. Location: Northwest of paved parking lot
   System ID: D-3
   Discharge location: northwest abutter
   Inlet: From Sediment forebay
   Outlet: Concrete weir; outlet structure

2. Location: Southeast of paved parking lot
   System ID: D-2
   Discharge location: Swale along front of property (R-1)
   Inlet: From Stormcepter STC450i
   Outlet: (3) concrete box culverts

5.2.1 REQUIRED INFILTRATION /DETENTION BASIN 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 slopes of a basin shall be inspected for erosion and gullying. Any eroded areas shall be repaired and reinforced with a seeding of grass. Slope protection material should be placed in areas prone to erosion.

2. Reinforce inlet areas with erosion control blankets or stone over a bed of filter fabric if erosion is found.

3. All material, including any trash, debris, and sediments within the extents of a basin shall be disposed of in accordance with all applicable regulations. Should excessive sediments be found within the basin, the owner should consider more frequent sweeping of the parking lot or more intensive maintenance of the parking lot stormcepter (STC450i).

4. The stone surrounding the outlet weir from the basin shall be inspected. Any missing stone shall be replaced.

5. The concrete overflow weir shall be inspected for structural faults. In particular, it should be determined that settling of the structure has not occurred. In addition, it should be determined if

any stormwater is escaping the basin around the sides of the concrete weir. Any faults shall be corrected immediately. All work shall be carried out by a qualified contractor.

6. Embankments of a basin shall be inspected for seepage and burrowing animals. Pest control will be required should evidence of burrowing animals be required. Any evidence of groundwater seepage shall be brought to the attention of a licensed engineer immediately.

7. If dead or dying grass on the bottom is observed or if standing water is observed more than 72 hours after a storm event, than the basin shall be tilled to a depth of eighteen (18) inches and reseeded. All work shall be carried out by a qualified contractor.

8. The inspector shall ensure that the grass around the perimeter of and within a basin has been mowed at least three times per growing season. Following each mowing, bare areas should be seeded. The intention is to maintain a maximum grass height of less than twelve inches.

9. During inspection, remove any invasive vegetation within the extents of a basin. Any invasive vegetation encroaching upon the perimeter of a basin shall be pruned or removed.

10. Inspect stone spillway from outlet weir. Missing stone shall be replaced in kind. Should evidence of stone transport be found, the replacement stone shall be of a larger diameter.

5.3 PRECAST CONCRETE DRAIN MANHOLE

A precast concrete drain manhole in the paved access drive. This structure is used as a diversion device to control flow to infiltration area D-2. This structure features one a 24" cast iron frame and cover and has an internal diameter of four (4) feet. The structure can be accessed via the removal of the cover by a qualified individual. The structure has two outlet pipes and has no sump.

5.3.1 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.

5.4 DRY SWALE

The dry swale provides conveyance of stormwater while also proving stormwater treatment for the conveyed water. The dry swale is constructed above the seasonal high-water table, and provides water quality via a bed of bioretention soil, mulch, and grassed plantings. A perforated pipe underdrain system conveys treated water downstream.

The dry swales for this development are identified as follows:

1. Location: Along Valley Road
   System ID: R-1
   Discharge location: northwest abutter
   Inlet: From Infiltration/detention D-2

2. Location: East of development in meadow
   System ID: R-2
   Discharge location: northwest abutter
   Inlet: from southern abutter

5.4.1 REQUIRED DRY SWALE 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. Sediment build-up within the bottom of the channel shall be removed with 25% of the swale capacity has been exceeded. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations.

2. Eroded side slopes and channel bottom shall be stabilized as necessary.

3. Vegetation in the swale shall be mowed as required to maintain gras heights in the 4-to-6-inch range with mandatory mowing once grass heights exceed 10 inches.

4. If the surface of the dry swale becomes clogged to the point that standing water is observed on the surface 48 hours after precipitation events, the bottom shall be roto-tilled or cultivated to break up any hard packed sediment, and then reseeded.

1. Should any channeling be evident from the upstream grassed area, these areas shall be reinforced with riprap stone over filter fabric to prevent any further damage

5.5 TRENCH DRAIN

An eight-inch-wide trench drain is located at the bottom of the paved access drive. This structure has a cast iron grate and discharges to the swale along the front of the property via a 6-inch PVC pipe.

5.5.1 REQUIRED TRENCH DRAIN 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 trench drain shall be inspected for the presence of debris or sediments. All material removed shall be removed with a shovel 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.

2. The frame and grates of the trench drain 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 outlet pipe shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.

5.6 INLINE DRAIN

A four-inch diameter (4") inline drain is located in the front yard adjacent the entry walk. This structure has a cast iron grate and discharges to the infiltration area along the front of the property via a four-inch diameter (4") PVC pipe.

5.6.1 REQUIRED INLINE DRAIN 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 shall be inspected for the presence of debris or sediments. All material removed shall be removed by hand 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 better stabilization of the surrounding grasses.

2. The frame and grate of the drain 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 outlet pipe shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.

5.7 HYDRODYNAMIC SEPARATOR

A hydrodynamic separator is a proprietary stormwater pre-treatment device which removes the remaining large diameter sediments before discharging runoff to an infiltration area. The model of device specified for this development is a Stormcepter STC450i. This device is a precast concrete structure accessed via a 24x24-inch grate located in the parking lot. It consists 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.

5.7.1 REQUIRED SEPARATOR 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 structure sump chamber shall be inspected for the presence of debris or sediments. Should the depth of material within the sump exceed eighteen (18) 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. 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 the overall stormwater system.

2. The frame and grate of the structure shall be inspected for damage. Damage may result in a compromise of the safety of the device. Structural faults shall be repaired by a qualified contractor.

3. The outlet pipe shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.

6.0 APPENDICES

APPENDIX A OPERATION AND MAINTENANCE CHECKLISTS

Valley Crossing
Valley Road, Middletown

Inspection Checklist for Dry Swale

Minimum inspection schedule shall be annual and after major storm events

Device Description:	Dry infiltration swale (vegetated)
Device Location:	
Relevant O&M Section:	Section 5.4
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
Sediment build-up within the bottom of the channel shall be removed with 25% of the swale capacity has been exceeded. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations.	□ Yes □ No	
Eroded side slopes and channel bottom shall be stabilized as necessary.	□ Yes □ No	
If the surface of the dry swale becomes clogged to the point that standing water is observed on the surface 48 hours after precipitation events, the bottom shall be roto-tilled or cultivated to break up any hard packed sediment, and then reseeded.	□ Yes □ No	
Should any channeling be evident from the upstream grassed area, these areas shall be reinforced with riprap stone over filter fabric to prevent any further damage.	□ Yes □ No	

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Inspection Checklist for Precast Concrete Drain Manhole

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

Device Description:	4' ID precast concrete structure with 24" dia. frame and cover
Device Location:	within parking lot
Relevant O&M Section:	Section 5.3
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
The structure shall be inspected for the presence of debris or sediments. As there is no sump in this structure, all material encountered shall be removed immediately. All material removed shall be removed by the operator and disposed of in accordance with all applicable RIDEM regulations.	□ Yes □ No	
The frame and cover of the drain manhole 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	□ Yes □ No	
The internal steps shall be inspected for damage. Dangerous or damaged rungs shall be repaired by a qualified contractor.	□ Yes □ No	
The inlet and outlet pipes shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.	□ Yes □ No	

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Inspection Checklist for Infiltrating Detention Basin

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

Device Description:	3 foot deep infiltration basin with a grassed surface
Device Location:	
Relevant O&M Section:	Section 5.2
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
The slopes of the basin shall be inspected for erosion and gullying. Any eroded areas shall be repaired and reinforced with a seeding of grass. Slope protection material should be placed in areas prone to erosion.	□ Yes □ No	
Reinforce inlet areas with erosion control blankets or stone over a bed of filter fabric if erosion is found.	□ Yes □ No	
All material, including any trash, debris, and sediments within the extents of a basin shall be disposed of in accordance with all applicable regulations.	□ Yes □ No	

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Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
The concrete overflow weir or box culverts shall be inspected for structural faults. In particular, it should be determined that settling of the structure has not occurred. In addition, it should be determined if any stormwater is escaping the basin around the sides of the concrete weir. Any faults shall be corrected immediately. All work shall be carried out by a qualified contractor.	□ Yes □ No	
Embankments of the basin shall be inspected for seepage and burrowing animals. Pest control will be required should evidence of burrowing animals be required. Any evidence of groundwater seepage shall be brought to the attention of a licensed engineer immediately.	□ Yes □ No	
If dead or dying grass on the bottom is observed or if standing water is observed more than 48 hours after a storm event, the basin shall be tilled to a depth of eighteen (18) inches and reseeded. All work shall be carried out by a qualified contractor.	□ Yes □ No	
The inspector shall ensure that the grass around the perimeter of and within a basin has been mowed at least three times per growing season. Following each mowing, bare areas should be seeded. The intention is to maintain a maximum grass height of less than twelve inches.	□ Yes □ No	
During inspection, remove any invasive vegetation within the extents of the basin. Any invasive vegetation encroaching upon the perimeter of the basin shall be pruned or removed.	□ Yes □ No	
Inspect stone spillway from outlet weir. Missing stone shall be replaced in kind. Should evidence of stone transport be found, the replacement stone shall be of a larger diameter.	□ Yes □ No	

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Inspection Checklist for Sediment Forebay

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

Device Description:	24 inch deep grassed depression
Device Location:	Northwest of parking lot
Relevant O&M Section:	Section 5.1
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
The slopes of a forebay shall be inspected for erosion and gullying. Reinforce inlet and outlet riprap if riprap is found to be deficient, erosion is present at the outfalls, or the existing riprap has been compromised. Replace underlying filter fabric if underlying erosion is detected, and restore riprap stone.	□ Yes □ No	
All structural components, which include, but are not limited to, trash racks, access gates, valves, pipes, weir walls, orifice structures, concrete headwalls, and spillway structures shall be inspected and any deficiencies should be resolved.	□ Yes □ No	
Sediment shall be removed from a forebay when the depth has been reduced by 50%. All material shall be disposed of in accordance with all federal and local regulations.	□ Yes □ No	

Valley Crossing
Valley Road, Middletown

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
Reinforce inlet areas with erosion control blankets or stone over a bed of filter fabric if erosion is found.	□ Yes □ No	

Valley Crossing
Valley Road, Middletown

Inspection Checklist for Trench Drain

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

Device Description:	8-inch wide trench drain with cast iron grate
Device Location:	Bottom of access drive near Valley Road
Relevant O&M Section:	Section 5.5
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
The bottom of the trench drain shall be inspected for the presence of debris or sediments. All material removed shall be removed with a shovel 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.	□ Yes □ No	
The frame and grates of the trench drain 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.	□ Yes □ No	
The outlet pipe shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.	□ Yes □ No	

Valley Crossing
Valley Road, Middletown

Inspection Checklist for Precast Concrete Hydrodynamic Separator

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

Device Description:	Stormcepter STC450i Precast concrete structure with 24" inlet grate
Device Location:	Southeast corner of parking lot
Relevent O&M Section:	Section 5.7
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ 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 (18) 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.	□ Yes □ No	
The frame and grate of the structure shall be inspected for damage. Structural faults shall be repaired by a qualified contractor.	□ Yes □ No	
The inlet and outlet pipes shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor	□ Yes □ No	

Valley Crossing
Valley Road, Middletown

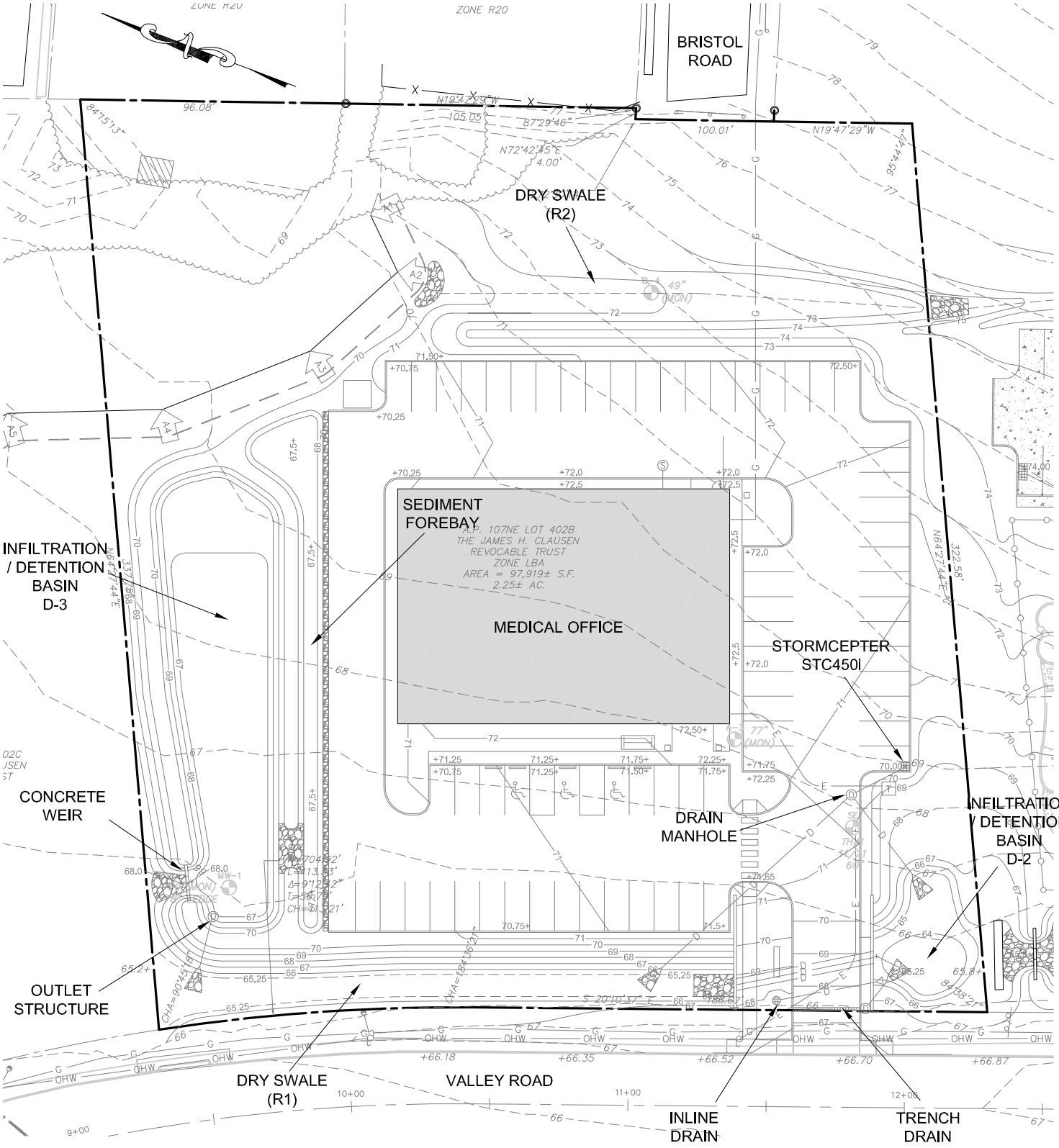
Inspection Checklist for Inline Drain

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

Device Description:	4" diameter inline drain with cast iron grate
Device Location:	Bottom of lawn near Valley Road and adjacent to entry walkway
Relevant O&M Section:	Section 5.6
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Biannual □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
The bottom of the drain shall be inspected for the presence of debris or sediments. All material removed shall be removed by hand and disposed of in accordance with all applicable RIDEM regulations. Any large debris which could potentially obstruct the outflow pipe shall be removed immediately.	□ Yes □ No	
The frame and grate of the drain 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.	□ Yes □ No	
The outlet pipe shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.	□ Yes □ No	

APPENDIX B STORMWATER DEVICE MAP AND DRAWINGS



Scale: 1"=50'	Date: REV 24MAR23	Designed By: JJR	Drawn By: JJR	Checked By: GES

Project Title:	Drawing Title:	
VALLEY CROSSING VALLEY ROAD, MIDDLETOWN, RI	STORMWATER DEVICE MAP	
Issued for: O&M DOCUMENT	Drawing Number: M-1	Project Number: 18225.5

APPENDIX C STORMWATER MAINTENANCE AGREEMENT

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