NORTHEAST ENGINEERS & CONSULTANTS, INC.

STORMWATER SYSTEM
OPERATIONS AND MAINTENANCE PLAN

Newport Beach Suites
Assessor's Map 116NW, Lot 13
Aquidneck Avenue and Wave Avenue
Middletown, RI

Prepared For
Wave Pond Hotel LLC
1140 Reservoir Avenue
Cranston, RI 02920-6320
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1.0 INTRODUCTION

1.1 SITE INFORMATION

City / Town:	Middletown, Rhode Island
Adjacent Roadways:	Aquidneck and Wave Avenue
Lot(s) identification:	A.P. 116NW Lot 13
Zoning District:	ABD
Site Area:	0.32 Acres
FEMA Zone and Map:	Zone "AE" (14) (Panel 44005C0181J)

1.2 SITE CONDITIONS

The site contains a single 8-unit motel. The lower level of the structure features a parking garage while the upper structure levels contain the motel units and services. A pervious paver parking area is present along Wave Avenue. A raised patio and pool are present facing Aquidneck Avenue. The structure utilizes municipal water and sewer services. The hotel is served by underground electrical and communication services. Pedestrian access from raised patio connects to the existing concrete sidewalk along Aquidneck Avenue via a wooden ramp. The proposed structure lies within a FEMA designated "A" zone with an associated elevation of 14 (NAVD).

The stormwater system is comprised of three main components. The first component is a pair of identical subsurface sand filters each consisting of two Cultec C100HD chambers over 12 inches of ASTM C-33 sand. These sand filters treat the rooftop runoff of the structure. The second component of the system is the pervious paver patio at the rear of the structure. The pervious pavers are situated over a system of R-Tank modular plastic chambers which provide detention for collected stormwater. Overflow water from the rooftop downspouts is also routed to this R-Tank system. Both the R-Tank system and the sand filter underdrains discharge to a secondary R-Tank system located in the front yard under the pervious paver driveway. The second R-Tank system collects runoff from yard drains and the paver driveway above. This second R-Tank system is lined to prevent interaction with the groundwater. Stormwater discharged from this secondary system is routed to a municipal storm drain in Wave Avenue.

1.3 PROTECTED FEATURES

There are no features protected by the state located on site. The site has no significant vegetation aside from the maintained grasses. The site is not within 200 feet of a coastal feature. The project lies within the Town of Middletown Watershed Protection District Zone 2.

2.0 ADMINISTRATION

2.1 RESPONSIBLE PARTIES

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

Wave Pond Hotel LLC
1140 Reservoir Avenue
Cranston, RI 02920-6320
Contact: Nicholas Giacobbi
T: 401-946-6320
ngiacobbi@tpgcompanies.com

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 drainage areas to the Town of Middletown will be provided upon request; however, the Owner is solely responsible for the operation and maintenance.

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 systems. A water truck and a vacuum truck will be required for more intensive 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.

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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) as indicated on the stormwater maintenance checklists.
2. Quarterly basis (four times per year) as indicated on the stormwater maintenance checklists.
3. 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

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 and guests 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 walkway surfaces and dispose of sweepings properly. Regular sweeping can prevent or delay more costly maintenance that requires the use of more specialized equipment, such as a vacuum truck. It is recommended that the exterior walkway surfaces be swept at least twice a year;
- 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. **These 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 municipality. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through qualified contractors and consultants. **These maintenance activities may be required as a result of the required inspections and will not need to be performed at regular 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 municipality immediately. In the case of extreme discharges, or at the direction of the municipality, the Owner shall also notify RIDEM or the RIDOT as appropriate. 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

The submittal of the required inspection forms and inspector qualifications shall be provided to the municipality upon request during the town permitting process. The Owner shall utilize the forms provided in Appendix A for this reporting. The Owner shall submit one form per inspection for each device shown on the stormwater device map provided in Appendix B.

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 desired level of maintenance.

4.2 MOWING AND MANAGEMENT

To prevent insects and weed problems, property owners 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 such as paved walkways, patios, driveways, etc., 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 STORMWATER BMPS

5.1 PERVIOUS PAVER (DRIVEWAY)

While the paver stones of the paver driveway are not themselves pervious, the open grout system allows stormwater to permeate the joints and enter the filter stone, base material, and finally into an R-Tank reservoir below. The R-Tank system meters water out to a municipal storm drain. The filter stone is not intended to have a permanent pool and should drain within 48 hours. The R-Tank system may take longer to discharge.

5.1.1 REQUIRED PERVIOUS PAVER (DRIVEWAY) 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. Permeable paver driveways require regular vacuum sweeping or hosing (minimum quarterly basis – 4 times per year) to prevent the surface from clogging.

2. The site should be inspected regularly to ensure that the paver surface drains properly after storms.

3. Remove any unwanted vegetative growth in the open grouts.

4. Replace any grout material which may have been transported away.

5. Replace any damaged or missing paver stones with similar stones.

General maintenance activities include the following:

1. Minimize use of sand and salt in winter months.

2. Attach rollers to the bottom of snowplows during winter plowing operations to prevent them from catching the edges of paver stones and damaging them, or more preferably, utilize hand clearing for snow removal.

3. Keep adjacent landscape areas well maintained and stabilized (erosion gullying quickly corrected).

4. Post sign identifying permeable pavers.

The owner is to ensure that the pervious pavers are never sealed or repaved with impervious materials. The function of the pervious pavers is critical to the drainage of the site. Should this surface ever be sealed or paved over, the driveway would no longer drain properly.

5.2 PERVIOUS PAVER (PATIO)

While the paver stones of the paver patio are not themselves pervious, the open grout system allows stormwater to permeate the joints and enter the filter stone, base material, and finally into an R-Tank reservoir below. The R-Tank system either infiltrates into the soil below or is metered out into the R-Tank system of the paver driveway. The filter stone is not intended to have a permanent pool and should drain within 48 hours. The R-Tank system may take longer to discharge.

5.2.1 REQUIRED PERVIOUS PAVER (PATIO) 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. Due to reduced sediment loading, permeable paver patios require a lesser frequency of regular vacuum sweeping or hosing (minimum once per year) to prevent the surface from clogging.

2. The site should be inspected regularly to ensure that the paver surface drains properly after storms.

3. Remove any unwanted vegetative growth in the open grouts.

4. Replace any grout material which may have been transported away.

5. Replace any damaged or missing paver stones with similar stones.

General maintenance activities include the following:

1. Minimize use of sand and salt in winter months.

2. Utilize hand clearing for snow removal.

3. Keep adjacent landscape areas well maintained and stabilized (erosion gullying quickly corrected).

4. Post sign identifying permeable pavers.

The owner is to ensure that the pervious pavers are never sealed or repaved with impervious materials. The function of the pervious pavers is critical to the drainage of the site. Should this surface ever be sealed or paved over, the patio would no longer drain properly.

5.3 R-TANK PERVIOUS PAVEMENT RESERVOIR

The R-Tank systems are a layer of prefabricated plastic cells set below the pervious paver stone layers. These cells provide substantially more storage than a standard crushed stone reservoir typically implemented in a pervious paver system. These cells of the paver driveway are underlaid by an impermeable liner to prevent interaction with the groundwater while the cells of the paver patio are free to drain into the soil below in the dry season. The R-Tanks meter stormwater out to either a municipal catch basin or to another R-Tank system.

5.3.1 REQUIRED R-TANK MAINTENANCE

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

1. Inspections should be performed every 6-months within the first year of operation and at least yearly thereafter.

2. Using the inspection ports, measure the accumulated sediments within the R-Tank system. Should the sediment depth be greater than 15% of the depth of the unit (approximately 4-inches for the system under the patio or approximately 2-inches for the system under the driveway), the r-tank system shall be back-flushed and jet-vac'ed from the ports in the paver surface.

3. Follow the following steps for the back-flushing procedure:
    a. Plug system outlet to prevent discharge of back-flush water via the drain basin outlet structures.
    b. Determine best location to pump out back-flush water. This will either be the outlet structure or a maintenance port.
    c. Remove cap of maintenance port and pump water as rapidly as possible into system through port to suspend sediments, pumping dirty water out of the system from an outlet or a maintenance port.
    d. Repeat at all maintenance ports until sediment levels are reduced to a satisfactory level.
    e. Sediment-laden water shall be disposed of per state and local regulations.
    f. Replace any remaining caps or covers and remove outlet plug.
    g. Record the back-flushing even in the maintenance logs.

5.4 ADS DRAIN BASIN

HDPE drain basins are used are used at various points in the system as either junction points for pipework or to provide metering points for outflow to downstream structures. These structures will include inflow and outflow pipes, as well as sumps for trapping incidental sediments. Inflow pipes may have metering caps with smaller diameter orifices to control stormwater flow.

5.4.1 REQUIRED ADS DRAIN 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 bottom of a drain basin 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.

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

4. Should the inflow pipes be fitted with a cap with a narrower diameter orifice, these caps shall be inspected to ensure that the orifice is flowing freely. This inspection will include the temporary removal and cleaning of the cap. Sediment buildup on the inside of the cap will indicate the intrusion of sediments upstream of the drain basin which could negatively impact the function of the system. A qualified contractor, potentially with the consultation of a professional engineer, should determine the steps to correct sediment intrusion.

5.5 SUBSURFACE 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 shallow water table, the media is lined with an impermeable membrane and the filtered runoff is collected by an underdrain. This treated runoff is then discharged to one of the R-Tank systems for detention. High flow runoff bypasses the devices entirely ADS drain basin diversion structures. The subsurface sand filter media layers are intended to drain within 24 hours.

5.5.1 REQUIRED SUBSURFACE 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 two (2) chamber inspection ports located in each of the two systems. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via these 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 or of the roof leader inlet piping. A qualified contractor shall be consulted to determine a corrective course of action.

2. Excessive sediments within a filter will indicate a failure of the inlet piping or in the impermeable liner of the system. 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 as all stormwater should be from the rooftop of the motel.

3. 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 a clogging of the underdrain orifice plate.

   After confirming that the underdrain orifice plate is not blocked and is functioning properly the following repairs shall be undertaken. 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. At the point where all sand had been removed, the plastic polyliner shall be inspected for failure and replaced if necessary. Any and all removed sand shall be disposed of in accordance with all applicable regulations.

4. The inspection ports shall also be visually inspected for damage. The 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 shall also be inspected for damage.

6.0 APPENDICES

APPENDIX A OPERATION AND MAINTENANCE CHECKLISTS

Newport Beach Suites
38 Purgatory Road, Middletown

Inspection Checklist for Pervious Paver Driveway

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

Device Description:	Pervious pavers
Device Location:	Driveway
Relevent O&M Section:	Section 5.1
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Quarterly □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
Permeable paver driveways require regular vacuum sweeping or hosing (minimum quarterly basis – 4 times per year) to prevent the surface from clogging.	□ Yes □ No	
Ensure that adjacent vegetated areas are stabiized and not contributing sediments to the paver surface.	□ Yes □ No	
Inspect inspection ports for presence of sediments. Refer to R- Tank maintenance for sediment removal.	□ Yes □ No	
Remove any unwanted vegetative growth in the open grouts.	□ Yes □ No	
Replace any damaged or missing paver stones with similar stones.	□ Yes □ No	

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Inspection Checklist for Pervious Paver Patio

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

Device Description:	Pervious pavers
Device Location:	Patio
Relevent O&M Section:	Section 5.2
Inspector's Name:	
Date of Inspection:	
Date of Last Inspection:	
Start Time:	
End time:	
Type of Inspection:	□ Annually □ Major Storm □ Pre-Storm □ Post Storm □ Other

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
Permeable paver patio requires regular vacuum sweeping or hosing (minimum once per year) to prevent the surface from clogging.	□ Yes □ No	
Ensure that adjacent vegetated areas are stabiized and not contributing sediments to the paver surface.	□ Yes □ No	
Inspect inspection ports for presence of sediments. Refer to R- Tank maintenance for sediment removal.	□ Yes □ No	
Remove any unwanted vegetative growth in the open grouts.	□ Yes □ No	
Replace any damaged or missing paver stones with similar stones.	□ Yes □ No	

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Inspection Checklist for ADS Drain Basin

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

Device Description:	HDPE plastic drain basins
Device Location:	Various
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 structure shall be inspected for the presence of debris or sediments. 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 basin 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 inlet and outlet pipes shall be inspected for damage or obstruction. Any damage shall be repaired by a qualified contractor.	□ Yes □ No	
Should the inflow pipes be fitted with a cap with a narrower diameter orifice, these caps shall be inspected to ensure that the orifice is flowing freely. This inspection will include the temporary removal and cleaning of the cap. Sediment buildup on the inside of the cap will indicate the intrusion of sediments upstream of the drain basin which could negatively impact the function of the system. A qualified contractor, potentially with the consultation of a professional engineer, should determine the steps to correct sediment intrusion.	□ Yes □ No	

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Inspection Checklist for R-Tank chambers (Cell 1)

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

Device Description:	R-Tank cells (470 UD Single Units)
Device Location:	Under paver driveway
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 □ Within 6 mo.

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
Using the inspection ports, measure the accumulated sediments within the R-Tank system. Should the sediment depth be greater than 15% of the depth of the unit (approximately 4-inches for the system under the patio or approximately 2-inches for the system under the driveway), the r-tank system shall be back-flushed and jet-vac'ed from the ports in the paver surface. Follow the following steps for the back-flushing procedure: a. Plug system outlet to prevent discharge of back-flush water via the drain basin outlet structures. b. Determine best location to pump out back-flush water. This will either be the outlet structure or a maintenance port. c. Remove cap of maintenance port and pump water as rapidly as possible into system through port to suspend sediments, pumping dirty water out of the system from an outlet or a maintenance port. d. Repeat at all maintenance ports until sediment levels are reduced to a satisfactory level. e. Sediment-laden water shall be disposed of per state and local regulations. f. Replace any remaining caps or covers and remove outlet plug. g. Record the back-flushing even in the maintenance logs	□ Yes □ No	

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Inspection Checklist for R-Tank chambers (Cell 2)

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

Device Description:	R-Tank cells (753 LD SINGLE + MINI UNITS)
Device Location:	Under paver patio
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 □ Within 6 mo.

Specific Inspection Requirements		
Maintenance Activity	**Is Status Satisfactory?**	**Corrective Action Needed**
Using the inspection ports, measure the accumulated sediments within the R-Tank system. Should the sediment depth be greater than 15% of the depth of the unit (approximately 4-inches for the system under the patio or approximately 2-inches for the system under the driveway), the r-tank system shall be back-flushed and jet-vac'ed from the ports in the paver surface. Follow the following steps for the back-flushing procedure: a. Plug system outlet to prevent discharge of back-flush water via the drain basin outlet structures. b. Determine best location to pump out back-flush water. This will either be the outlet structure or a maintenance port. c. Remove cap of maintenance port and pump water as rapidly as possible into system through port to suspend sediments, pumping dirty water out of the system from an outlet or a maintenance port. d. Repeat at all maintenance ports until sediment levels are reduced to a satisfactory level. e. Sediment-laden water shall be disposed of per state and local regulations. f. Replace any remaining caps or covers and remove outlet plug. g. Record the back-flushing even in the maintenance logs	□ Yes □ No	

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Inspection Checklist for Subsurface Sand Filter

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

Device Description:	(2) Cultec C100HD chambers over 12" of ASTM C-33 sand
Device Location:	under patio behind motel
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**
Subsurface chambers should be inspected for the presence of transported sediments. The inspector should utilize the two (2) chamber inspection ports located in each of the two systems. Should the average depth of sediments exceed one (1) inch, all sediments shall be removed using a vacuum truck via these 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 or of the roof leader inlet piping. A qualified contractor shall be consulted to determine a corrective course of action.	□ Yes □ No	
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 a clogging of the underdrain orifice plate. After confirming that the underdrain orifice plate is not blocked and is functioning properly the following repairs shall be undertaken. 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. At the point where all sand had been removed, the plastic polyliner shall be inspected for failure and replaced if necessary. Any and all removed sand shall be disposed of in accordance with all applicable regulations	□ Yes □ No	

The inspection ports shall also be visually inspected for damage. The 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 shall also be inspected for damage.	□ Yes □ No	

APPENDIX B DRAWINGS

NORTHEAST ENGINEERS
& CONSULTANTS, INC.

SITE/CIVIL
LAND PLANNING
WATERFRONT
SURVEYING
GEOTECHNICAL
ENVIRONMENTAL
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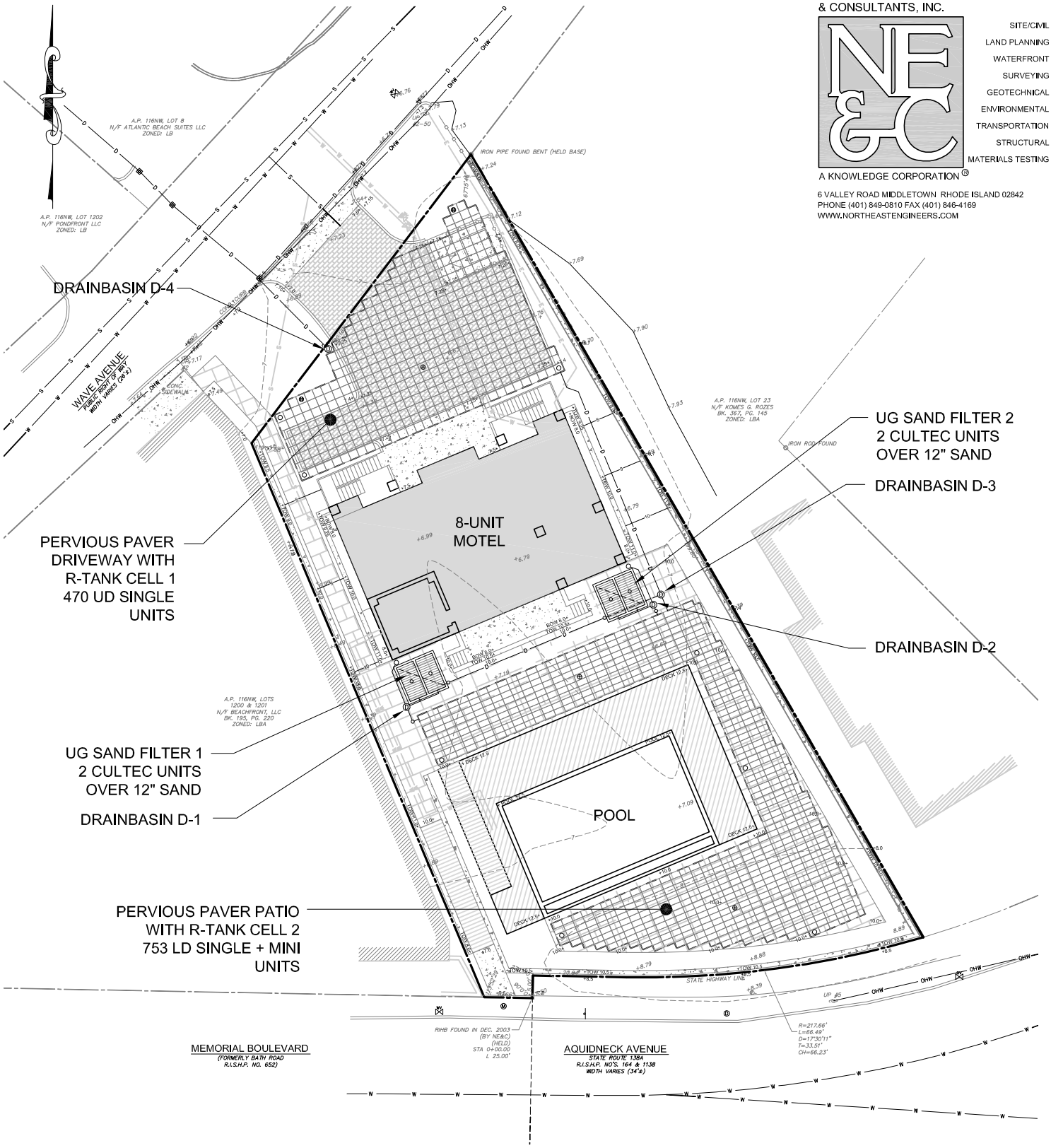

Scale:	1"=30'	Date:	REV. 28FEB24	Designed By:	JJR	Drawn By:	JJR	Checked By:	GES

Project Title:

NEWPORT BEACH SUITES
28 PURGATORY AVE. MIDDLETOWN RI

Drawing Title:

STORMWATER DEVICE MAP
FOR OPERATIONS AND MAINTENANCE

Issued for:

O&M DOCUMENT

Drawing Number:

M-1

Project Number:

15018.1