Proposed Redevelopment

1400 West Main Road
Middletown, Rhode Island

PREPARED FOR

Carpionato Group, LLC
1414 Atwood Avenue
Johnston, Rhode Island 02919

PREPARED BY

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May 2019

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Long Term Stormwater Operation and Maintenance Measures

Owner/Operator Responsible for Operation and Maintenance

Carpionato Group, LLC

1414 Atwood Avenue

Johnston, Rhode Island 02919

Maintenance of Stormwater Systems

The following maintenance program shall ensure the continued effectiveness of the structural water quantity and quality controls shown on the project Site Plans prepared by VHB. Refer to the attached Operation and Maintenance Location Plan.

Pavement Systems

Regular Asphalt Pavement

› Sealants for asphalt pavement are a major source of polycyclic aromatic hydrocarbons (PAHs) in our environment. Asphalt based sealants are allowed. Coal-tar based sealants are not allowed.

- Sweep or vacuum standard asphalt pavement areas at least once per year with a commercial cleaning unit and properly dispose of removed material.
- More frequent sweeping of paved surfaces will result in less accumulation in catchment areas, less cleaning of subsurface structures, and less disposal costs.

Structural Stormwater Management Devices

Deep Sump Hooded Catch Basins and Landscape Drain

- Inspect the unit post construction, prior to being placed into service and ensure unit is clean and free of any structural damage.
- Inspect quarterly for the first year to determine the oil and sediment accumulation rate.
- Cleaning is required annually and whenever the depth of sediment is greater than or equal to half the sump depth.
- Inspect the units immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove oil and sediment and dispose per state and local regulations.

Roof Drain Leaders

- Perform routine roof inspections twice per year.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets twice per year as necessary.

Vegetated Stormwater Management Devices

Surface Detention Basin

- Initial Post-Construction Inspection.
- Detention basins should be inspected after every major storm for the first few months to ensure proper stabilization and function. After that, inspections shall be done on an annual basis and after storm events greater than or equal to the 1-year storm or 2.7 inches of rainfall.

Long-Term Maintenance

- The grass on the side slopes and in the buffer areas should be mowed at least 4 times annually, and grass clippings, organic matter, and accumulated trash and debris removed, at least twice during the growing season.
- Eroded or barren spots should be reseeded immediately after inspection to prevent additional erosion and accumulation of sediment.

- Deep tilling can be used to break up a clogged surface area.
- Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry.

Inspections and Cleaning

- Infiltration basins should be inspected at least twice a year to ensure proper stabilization and function.
- Visual inspection for erosion and gullying, damage to structural components, embankment stability, and accumulation of sediment.

  Light equipment, which will not compact the underlying soil, should be used to remove the top layer.

Water Quality Swales - Dry

Water quality swales require routine maintenance (similar to conventional landscaping maintenance) to ensure that the system functions well as a stormwater management practice while also maintaining an aesthetic quality compatible with the surrounding land uses.

Initial Post-Construction Inspection

- During the initial period of vegetation establishment, pruning and weeding are required twice in first year by contractor.
- Any dead vegetation found after the first year must be replaced.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.

Long-Term Maintenance

- Weeds and invasive plant species shall be removed by hand.
- Leaf litter and other detritus shall be removed twice per year.
- The grass vegetation should be cut to a height between three and four inches; Remove grass clippings to encourage healthy growth, and filtering and infiltration of stormwater.
- The channel bottom shall be scraped every 5 years to remove sediment and restore the channel to its original cross section and infiltration rate. Reseed to restore the grass cover.
- Fertilizers should not be used as excessive nutrients in the topsoil may migrate to the subsoil and be discharged to adjacent surface waters.

Inspections and Cleaning

- Water quality swales shall be inspected twice during the first year and annually thereafter and after storm events greater than or equal to the 1-year, 2.7 inch rainfall event for sediment buildup, erosion, vegetative conditions, etc. If sediment build-up is found, core aeration or cultivating of un-vegetated areas may be required to ensure adequate filtration.

- The inflow location should be inspected annually for clogging. Sediment build up is a common problem where runoff leaves an impervious surface and enters a vegetative or earthen surface. Any built-up sediment should be removed to prevent runoff from bypassing the facility.
- The overflow structure should be inspected annually to ensure that it is properly functioning.
- Water that remains ponded on the surface of the swale after 48 hours of dry weather could indicate a problem with the infiltrative capacity of the strip or clogging of the outlet and maintenance should be scheduled. If sediment build-up is found, core aeration or cultivating of un-vegetated areas may be required to ensure adequate filtration.

Qualifying Pervious Area

- Qualified pervious ares (QPAs) are natural or restored upland vegetated areas that meet specific requirements. QPAs are relatively flat with well-drained soils, and receive small volumes of runoff as sheet flow.
- Inspect the qualifying pervious area yearly and remove any deposited sediment (sand from winter sanding operations). Correct any ponding, erosion, and replant any vegetation that has died.

Stone Diaphragm, Energy Dissipaters and Rip-rap Maintenance

- The stone areas shall be inspected annually for missing or dislodged stones. Replace stone as necessary.
- Deposited sediments shall be removed manually at least once per year.
- Trash and debris shall be removed as necessary.

General Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.

- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.

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Pollution Prevention and Source Control

A comprehensive source control program will be implemented at the Site, which includes the following components:

- Regular pavement sweeping and vacuuming as defined previously in this manual.
- Asphalt pavement sealants are a major source of polycyclic aromatic hydrocarbons (PAHs) in our environment. Asphalt based sealants are allowed. Coal-tar based sealants are not allowed.
- Catch basin cleaning.
- Clearing litter from the parking area, islands, and perimeter landscape areas.
- Trash and recycling receptacles must be provided with regular collection.
- Enclosure and regular maintenance of all dumpsters.
- Spill Prevention training. Maintenance personnel will be instructed in the proper clean-up procedures for spilled materials and the location of clean-up materials. Any washing water used on machinery will be discharge to the sanitary sewerage system after filtering of sediment.
- Sand and deicing chemicals shall be stored under cover so as to prevent exposure to stormwater. Use calcium chloride and calcium magnesium acetate (CMA) in sensitive ecosystem areas.
- Snow storage areas will be managed to prevent blockage of storm drain catch basins and stormwater drainage swales. Snow combined with sand and debris may block a storm drainage system, diminishing the infiltration capacity of the system and causing localized flooding.

- Snow shall not be dumped into any swale or detention basin.
- Grounds Management:
  - Conduct soil evaluation every 1-3 years to determine suitability for supporting lawn, and to determine how to optimize growing conditions.
  - Mowing and thatch management.
  - Weed management.
  - Pest management.
  - Sensible irrigation.

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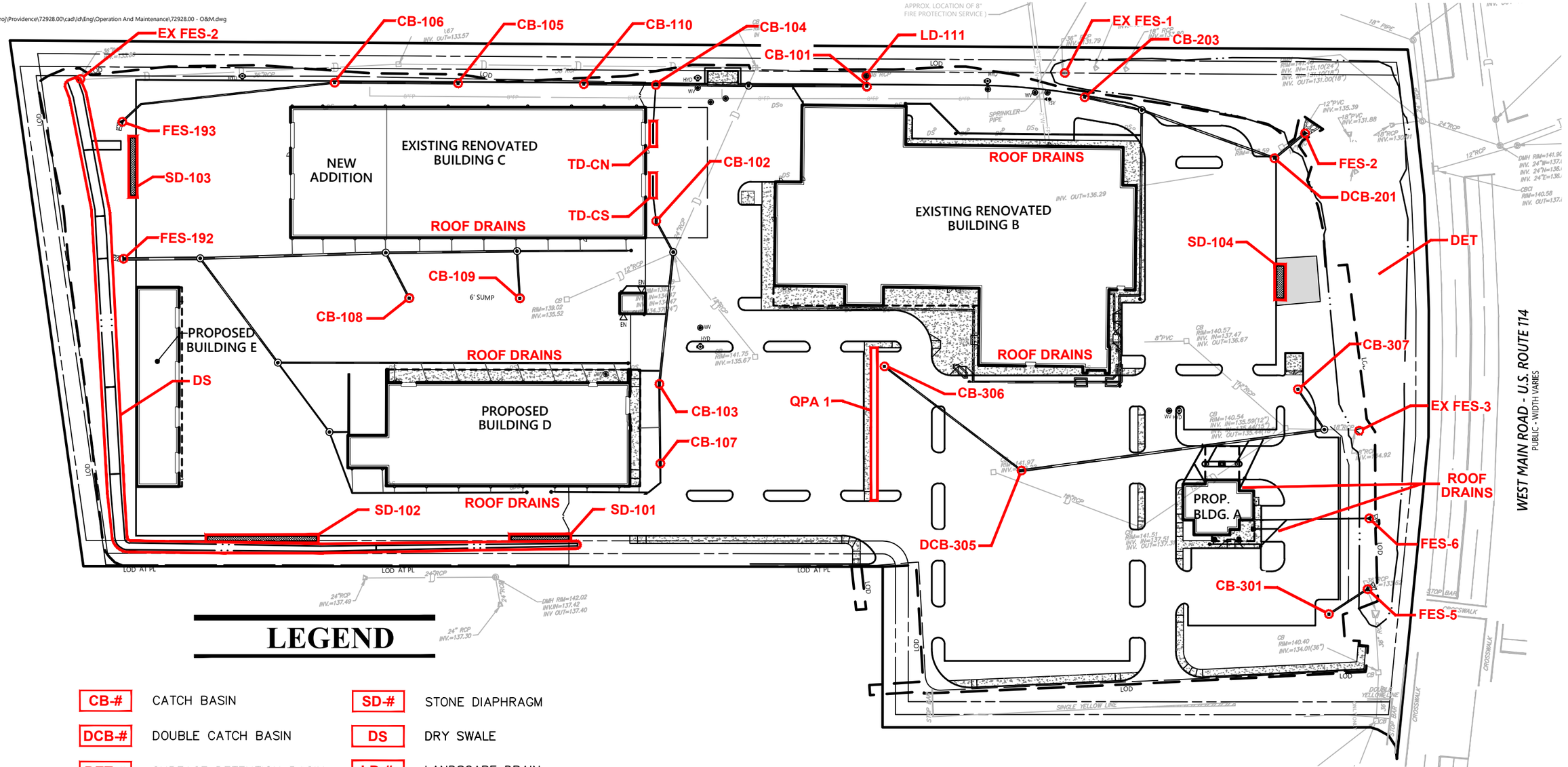

LEGEND

CB-#	CATCH BASIN	SD-#	STONE DIAPHRAGM
DCB-#	DOUBLE CATCH BASIN	DS	DRY SWALE
DET-#	SURFACE DETENTION BASIN	LD-#	LANDSCAPE DRAIN
FES-#	FLARED END SECTION	QPA	QUALIFIED PERVIOUS AREA
TD-#	TRENCH DRAIN		

Operation and Maintenance Location Plan

Proposed Redevelopment

1400 West Main Road, Middletown, RI

Source: **VHB**
Prepared for: **Operation and Maintenance**
Date: **May 2019, Revised April 2022**

0 40 80 Feet

Inspection Date: ____/____/____ Inspection Performed By: _____

Regular Asphalt Pavement Areas **– Sweep or vacuum pavement at least once per year with a commercial cleaning unit and properly dispose of removed material. More frequent sweeping will result in less accumulation in other stormwater features.**

Street Name	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
Parking and Driveways				/ /	

Catch Basins and Landscape Drains **– Inspect quarterly for first year to determine oil and/or sediment accumulation rate. Clean annually and when sediment depth is greater than half the sump depth.**

Catch Basin	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damaged)
CB 101				/ /	
DCB 102				/ /	
DCB 103				/ /	
DCB 104				/ /	
CB 105				/ /	
CB 106				/ /	
DCB 107				/ /	
CB 108				/ /	
CB 109				/ /	
CB 110				/ /	
CB 201				/ /	
CB 203				/ /	
CB 301				/ /	
CB 303				/ /	
DCB 305				/ /	
CB 306				/ /	
CB 307				/ /	

Inspection Date: ____/____/____ Inspection Performed By: _____

Surface Detention Basin **– Upon construction completion for 12 months, inspect after every rainfall event of 2 inches or more for proper function and stabilization. Inspect once per year and after rainfall events of 2.7 inches or more. Revegetate eroded and bare side slopes and bottom as needed. Keep grass mowed to 4-inches. Remove sediment annually. Use light equipment to avoid compaction of soils. If water remains in the basin for longer than 48 hours after rain event, the top few inches of material should be removed and replaced with clean material and revegetated.**

Basin	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Sediment, Damage)
DET				/ /	

Roof Runoff Downspouts **– Inspect downspouts and roofs twice per year. Keep roofs clean of debris. Clean inlets twice per year.**

Bldg #	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
Bldg A				/ /	
Bldg B				/ /	
Bldg C				/ /	
Bldg D				/ /	

Stone Diaphragms, Energy Dissipaters and Rip-rap Outfalls **– Inspect annually, replace any dislodged rip-rap, remove sediment and excess vegetation, and remove any debris.**

Outfall	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
SD-101				/ /	
SD-102				/ /	
SD-103				/ /	
SD-104				/ /	
RipRap @ FES-192				/ /	
RipRap @ FES-193				/ /	
RipRap @ FES-2				/ /	
RipRap @ FES-5				/ /	

Inspection Date: ____/____/____ Inspection Performed By: _____

RipRap @ FES-6				/ /	
RipRap @ EX FES-1				/ /	
RipRap @ EX FES-2				/ /	
RipRap @ EX FES-3				/ /	

Landscape Areas **- Inspect twice per year. Remove any deposited sediment, leaf litter and debris. Reseed or replace any vegetation that has died. Keep mowed to about 4-inches. Fertilizer usage should be avoided. If needed, a slow release fertilizer should be used.**

Areas	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
Perimeter and interior island landscaping				/ /	

Dry Swale **– Inspect twice during for the first year and annually thereafter for sediment buildup, erosion, vegetative conditions, etc. Replace dead vegetation. If sediment build-up is found, core aeration or cultivating of unvegetated areas may be required to ensure adequate filtration. Remove weeds, invasive plants, leaf litter, sediment and debris annually. The overflow structure should be inspected annually to ensure that it is functioning. Keep grass mowed to 4-inches. If water remains on the surface for more than 48 hours, the filter media shall be replaced. Remove the top 6 inches, core aerate and revegetate.**

Water Quality Swale	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
DS				/ /	

Qualifying Pervious Areas **– Inspect annually and remove any deposited sediment. Correct any ponding and erosion, and replant vegetation, as needed.**

Qualifying Pervious Area	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
QPA-1				/ /	