STORMWATER MANAGEMENT REPORT
828 RIVERSIDE STREET
PORTLAND, MAINE
November 19, 2014
(Revised December 4, 2014)

PINKHAM & GREER
CIVIL ENGINEERS
28 VANNAH AVE. PORTLAND, ME. 04103
Tel: 207.781.5242 Fax: 207.781.4245

Project Description:

This project is the construction of a 4,534 sq. ft. building and associated parking on a 15,000 sq. ft. lot. The building will be used as a contractor's shop. The existing home on the site will remain.

Existing Conditions:

This existing area is fully developed with a business located to the east, a residential property to the north, and a recreational ball field to the west. The drainage from off site comes from the east. It encompasses the adjacent building and lawn area.

The drainage on site, sheet flows around the existing home to a culvert just off site to the west.

Developed Conditions:

The site will have additional parking and a building added to the land cover. The grading from the parking area is at 1% around the east side of the building to a drip strip filtration system on the north side of the building. The discharge from the site remains in the same location on the west side.

Peak Flow:

The drip strip filter system provides peak flow control. Below are the peak flows leaving the site:

Peak Flow (CFS)

Storm Event	2 Yr	10 Yr	25 Yr
Existing	0.73	1.65	2.05
Developed	0.57	1.14	1.47

Stormwater Treatment:

The drip strip filter system treats the runoff from the parking area and the roof of the building. It stores water in the stone layer and the 0.7' area above the stone. This meets the Chapter 500 Standards for stormwater treatment.

Conclusion:

The use of the drip strip filter system provides stormwater treatment and flow control for the site. This project should have no unreasonable adverse impacts from stormwater on downstream properties.

STATE OF MAINE
THOMAS S. GREER
No. 4206
LICENSED PROFESSIONAL ENGINEER

Thomas S. Greer, P.E.
12/4/14

PINKHAM & GREER
CIVIL ENGINEERS
28 VANNAH AVE. PORTLAND, ME. 04103
Tel: 207.781.5242 Fax: 207.781.4245

JOB 828 RIVERSIDE ST PORTLAND
SHEET NO. _____ OF _____
CALCULATED BY TSG DATE 12/3/14
CHECKED BY _____ DATE _____
SCALE _____

REVISED THE SIZE OF THE DRIP STRIP FILTER.

IMPERVIOUS AREA FROM (115) - 6348

VOLUME REQUIRED 1" OF RUNOFF

$$6{,}348 \times \frac{1''}{12} = 529 \text{ CF}$$

VOLUME AVAILABLE

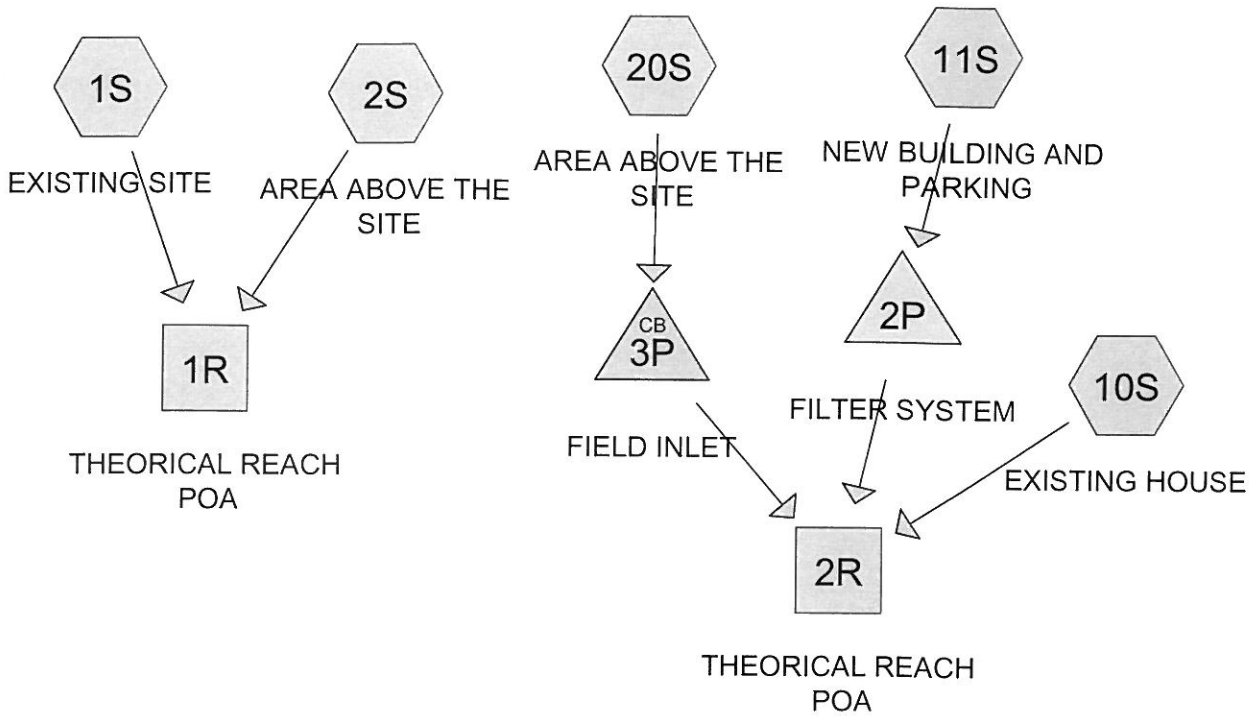
STONE: 700 SQFT x .5' x 0.30 VOIDS = 70 CF

994 TO 1001 =

$$\frac{(703 + 819)}{2} \times 0.7 = 532$$

TOTAL VOLUME 602 CF

602 > 529 ok



Subcat Reach Pond Link

Drainage Diagram for RIVERSIDE 828 TSG
Prepared by Pinkham and Greer, Printed 12/4/2014

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.222	Other	1S, 2S, 10S, 11S, 20S

Summary for Subcatchment 1S: EXISTING SITE

Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.030 af, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YEAR Rainfall=3.00"

	Area (sf)	CN	Description
*	2,692	98	IMPERVIOUS
*	12,420	74	LANDSCAPED
	15,112	78	Weighted Average
	12,420		82.19% Pervious Area
	2,692		17.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, DIRECT**

Summary for Subcatchment 2S: AREA ABOVE THE SITE

Runoff = 0.29 cfs @ 12.12 hrs, Volume= 0.022 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YEAR Rainfall=3.00"

	Area (sf)	CN	Description
*	1,500	98	EXISTING BUILDINGS
*	10,000	74	LANDSCAPED
	11,500	77	Weighted Average
	10,000		86.96% Pervious Area
	1,500		13.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0					**Direct Entry, DIRECT**

Summary for Subcatchment 10S: EXISTING HOUSE

Runoff = 0.24 cfs @ 12.05 hrs, Volume= 0.015 af, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YEAR Rainfall=3.00"

	Area (sf)	CN	Description
*	2,282	98	IMPERVIOUS
*	3,114	74	LANDSCAPED
	5,396	84	Weighted Average
	3,114		57.71% Pervious Area
	2,282		42.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, DIERECT**

Summary for Subcatchment 11S: NEW BUILDING AND PARKING

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.035 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YEAR Rainfall=3.00"

	Area (sf)	CN	Description
*	6,348	98	PAVED AND BUILDING
*	3,368	74	LANDSCAPED
	9,716	90	Weighted Average
	3,368		34.66% Pervious Area
	6,348		65.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, DIRECT**

Summary for Subcatchment 20S: AREA ABOVE THE SITE

Runoff = 0.29 cfs @ 12.12 hrs, Volume= 0.022 af, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YEAR Rainfall=3.00"

	Area (sf)	CN	Description
*	1,500	98	EXISTING BUILDINGS
*	10,000	74	LANDSCAPED
	11,500	77	Weighted Average
	10,000		86.96% Pervious Area
	1,500		13.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0					**Direct Entry, DIRECT**

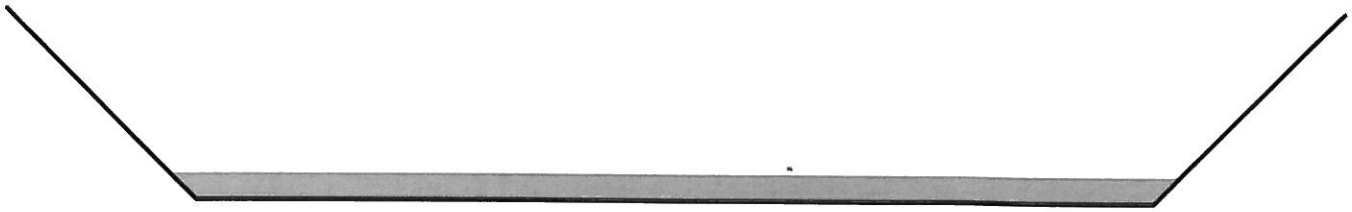
Summary for Reach 1R: THEORICAL REACH POA

Inflow Area = 0.611 ac, 15.75% Impervious, Inflow Depth > 1.01" for 2 YEAR event
Inflow = 0.73 cfs @ 12.10 hrs, Volume= 0.052 af
Outflow = 0.71 cfs @ 12.12 hrs, Volume= 0.051 af, Atten= 3%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.25 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 2.0 min

Peak Storage= 29 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 19.16 cfs

10.00' x 2.00' deep channel, n= 0.350
Side Slope Z-value= 1.0 '/' Top Width= 14.00'
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -0.20'



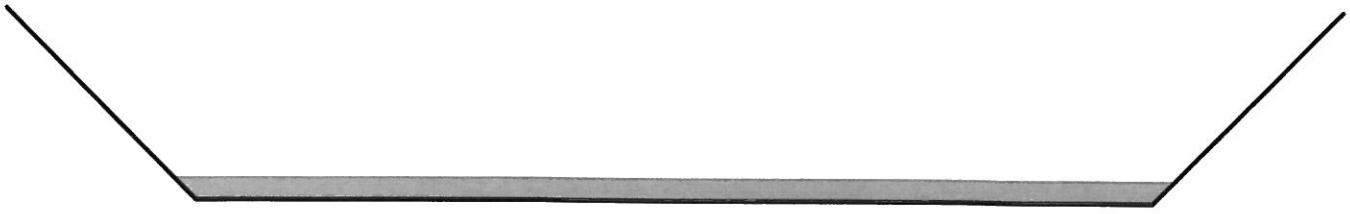
Summary for Reach 2R: THEORICAL REACH POA

Inflow Area = 0.611 ac, 38.07% Impervious, Inflow Depth > 1.39" for 2 YEAR event
Inflow = 0.58 cfs @ 12.09 hrs, Volume= 0.071 af
Outflow = 0.57 cfs @ 12.11 hrs, Volume= 0.071 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 2.0 min

Peak Storage= 25 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 19.16 cfs

10.00' x 2.00' deep channel, n= 0.350
Side Slope Z-value= 1.0 '/' Top Width= 14.00'
Length= 10.0' Slope= 0.0200 '/'
Inlet Invert= 0.00', Outlet Invert= -0.20'



Summary for Pond 2P: FILTER SYSTEM

Inflow Area = 0.223 ac, 65.34% Impervious, Inflow Depth > 1.86" for 2 YEAR event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.035 af
Outflow = 0.10 cfs @ 11.75 hrs, Volume= 0.035 af, Atten= 81%, Lag= 0.0 min
Primary = 0.10 cfs @ 11.75 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 99.69' @ 12.52 hrs Surf.Area= 751 sf Storage= 409 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 24.7 min (800.6 - 775.9)

Volume	Invert	Avail.Storage	Storage Description
#1	98.90'	1,552 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.90	90	0	0
99.40	703	198	198
100.10	819	533	731
100.50	904	345	1,076
101.00	1,000	476	1,552

Device	Routing	Invert	Outlet Devices
#1	Primary	100.10'	**5.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Primary	98.90'	**0.10 cfs Exfiltration at all elevations**

Primary OutFlow Max=0.10 cfs @ 11.75 hrs HW=98.94' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Summary for Pond 3P: FIELD INLET

Inflow Area = 0.264 ac, 13.04% Impervious, Inflow Depth > 0.98" for 2 YEAR event
Inflow = 0.29 cfs @ 12.12 hrs, Volume= 0.022 af
Outflow = 0.29 cfs @ 12.12 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
Primary = 0.29 cfs @ 12.12 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 97.45' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	97.10'	**6.0" Round Culvert** L= 86.0' Ke= 0.500 Inlet / Outlet Invert= 97.10' / 96.50' S= 0.0070 '/' Cc= 0.900 n= 0.010

Primary OutFlow Max=0.28 cfs @ 12.12 hrs HW=97.44' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.28 cfs @ 1.99 fps)

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EXISTING SITE Runoff Area=15,112 sf 17.81% Impervious Runoff Depth>2.29"
Tc=5.0 min CN=78 Runoff=1.00 cfs 0.066 af

Subcatchment 2S: AREA ABOVE THE SITE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.20"
Tc=8.0 min CN=77 Runoff=0.68 cfs 0.048 af

Subcatchment 10S: EXISTING HOUSE Runoff Area=5,396 sf 42.29% Impervious Runoff Depth>2.81"
Tc=3.0 min CN=84 Runoff=0.47 cfs 0.029 af

Subcatchment 11S: NEW BUILDING AND Runoff Area=9,716 sf 65.34% Impervious Runoff Depth>3.39"
Tc=5.0 min CN=90 Runoff=0.91 cfs 0.063 af

Subcatchment 20S: AREA ABOVE THE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.20"
Tc=8.0 min CN=77 Runoff=0.68 cfs 0.048 af

Reach 1R: THEORICAL REACH POA Avg. Flow Depth=0.46' Max Vel=0.34 fps Inflow=1.65 cfs 0.115 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=1.62 cfs 0.115 af

Reach 2R: THEORICAL REACH POA Avg. Flow Depth=0.37' Max Vel=0.30 fps Inflow=1.14 cfs 0.141 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=1.13 cfs 0.140 af

Pond 2P: FILTER SYSTEM Peak Elev=100.17' Storage=789 cf Inflow=0.91 cfs 0.063 af
Outflow=0.35 cfs 0.063 af

Pond 3P: FIELD INLET Peak Elev=98.01' Inflow=0.68 cfs 0.048 af
6.0" Round Culvert n=0.010 L=86.0' S=0.0070 '/' Outflow=0.68 cfs 0.048 af

Total Runoff Area = 1.222 ac Runoff Volume = 0.255 af Average Runoff Depth = 2.51"
73.09% Pervious = 0.893 ac 26.91% Impervious = 0.329 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: EXISTING SITE Runoff Area=15,112 sf 17.81% Impervious Runoff Depth>2.85"
Tc=5.0 min CN=78 Runoff=1.24 cfs 0.082 af

Subcatchment 2S: AREA ABOVE THE SITE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.76"
Tc=8.0 min CN=77 Runoff=0.84 cfs 0.061 af

Subcatchment 10S: EXISTING HOUSE Runoff Area=5,396 sf 42.29% Impervious Runoff Depth>3.42"
Tc=3.0 min CN=84 Runoff=0.57 cfs 0.035 af

Subcatchment 11S: NEW BUILDING AND Runoff Area=9,716 sf 65.34% Impervious Runoff Depth>4.03"
Tc=5.0 min CN=90 Runoff=1.08 cfs 0.075 af

Subcatchment 20S: AREA ABOVE THE Runoff Area=11,500 sf 13.04% Impervious Runoff Depth>2.76"
Tc=8.0 min CN=77 Runoff=0.84 cfs 0.061 af

Reach 1R: THEORICAL REACH POA Avg. Flow Depth=0.53' Max Vel=0.37 fps Inflow=2.05 cfs 0.143 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=2.02 cfs 0.143 af

Reach 2R: THEORICAL REACH POA Avg. Flow Depth=0.43' Max Vel=0.33 fps Inflow=1.49 cfs 0.171 af
n=0.350 L=10.0' S=0.0200 '/' Capacity=19.16 cfs Outflow=1.47 cfs 0.171 af

Pond 2P: FILTER SYSTEM Peak Elev=100.21' Storage=824 cf Inflow=1.08 cfs 0.075 af
Outflow=0.60 cfs 0.075 af

Pond 3P: FIELD INLET Peak Elev=98.58' Inflow=0.84 cfs 0.061 af
6.0" Round Culvert n=0.010 L=86.0' S=0.0070 '/' Outflow=0.84 cfs 0.061 af

Total Runoff Area = 1.222 ac Runoff Volume = 0.314 af Average Runoff Depth = 3.08"
73.09% Pervious = 0.893 ac 26.91% Impervious = 0.329 ac

828 Riverside Street
PORTLAND, MAINE
November 19, 2014
(Revised December 4, 2014)

INSPECTION AND MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES

The owner is Clementina Properties LLC, 1731 Washington Avenue, Portland, Maine 04103. The owner will be responsible for the inspection and maintenance of all stormwater management facilities, the establishment of any contract services required to implement the program, and the keeping of records and maintenance log book as described herein. At a minimum, the appropriate and relevant activities for each of the stormwater management facilities should be performed on the prescribed schedule. Periodic inspection and maintenance of these site features and devices is necessary to prevent erosion and remove pollutants from stormwater runoff.

POST CONSTRUCTION MONITORING:

32-38. Post-construction stormwater management plan compliance.

Any person owning, operating, or otherwise having control over a BMP required by a post Construction stormwater management plan shall maintain the BMPs in accordance with the approved plan and shall demonstrate compliance with that plan as follows:

(a) Inspections. The owner or operator of a BMP shall hire a qualified post-construction stormwater inspector to at least annually, inspect the BMPs, including but not limited to any parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.

(b) Maintenance and repair. If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the department of public services ("DPS") in the annual report.

(c) Annual report. The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, on or by June 30 of each year, provide a completed and signed certification to DPS in a form provided by DPS, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they require maintenance or repair, including the record of the deficiency and corrective action(s) taken.

(d) Filing fee. Any persons required to file and annual certification under this section shall include with the annual certification a filing fee established by DPS to pay the administrative and technical costs of review of the annual certification.

(e) Right of entry. In order to determine compliance with this article and with the post-construction stormwater management plan, DPS may enter upon property at reasonable hours with the consent of the owner, occupant or agent to inspect the BMPs.

(Ord. No. 35-09/10, 8-17-09)

DRIP STRIP FILTER SYSTEM:

There is a Drip Strip Filter System located on the project site. A Drip Strip Filter is a depression with an underdrained soil bed or soil filter that exfiltrates the stormwater. The depression is designed to temporarily store runoff, which will drain through the soil filter into the underdrains; excess runoff will flow over the downhill lip.

Drip Strip Filter Inspection: The drip strip filter should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours; and that, after storms that fill the system to overflow, it drains in no less than 24 hours. If the system drains too fast, the orifice on the underdrain outlet may need to be modified.

Drip Strip Filter Replacement: The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. The removed sediments should be disposed in an acceptable manner.

Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.

Record all maintenance on forms provided.

828 RIVERSIDE STREET
PORTLAND, MAINE

INSPECTION / MAINTENANCE LOG

DRIP STRIP FILTER SYSTEM

I: INSPECTED - C: CLEANED - R: REPAIRED

DATE	INITIALS	ACTION	COMMENT
11/19/14	GHI	I, C	EXAMPLE: Units cleaned by ACME.