

**STORMWATER MANAGEMENT REPORT
REED SCHOOL REDEVELOPMENT
PORTLAND, MAINE**

October 2, 2017

Project Description:

This project is the redevelopment of the Reed School located between Libby Street and Homestead Avenue in Portland. The school, most recently, was the central kitchen for the Portland Public Schools. The new use will convert most of the building back to a school

The building will be renovated on the inside and a 40x60 metal building addition will be removed. Additional paving will be added to accommodate 75 parking spaces.

Existing Conditions:

The site is located on well drained soils. The field area drains to a low spot in the back and infiltrates and the parking lot drains mostly to a catch basin in the middle of the access drive. The basin is connected to the sewer in Libby Street. On the Libby Street side, an area for an ice rink was created using a clay layer to hold water.

Developed Conditions:

The existing pavement in the rear is in poor condition. Much of it will be removed, regraded and repaved. Approximately 10,000 sq. ft. of new paving will be added on the Libby Street side to increase the number of parking spaces available. The playground area will be reshaped and fenced.

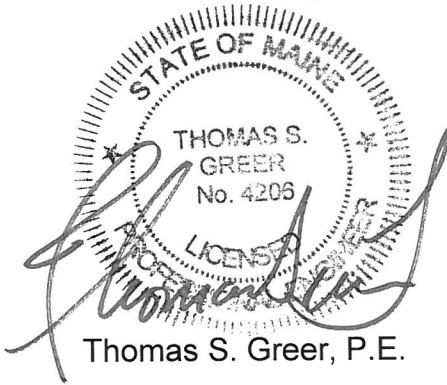
Stormwater Treatment:

The Libby Street end of the site will be graded to the low spot on the southwest corner of the site. An area of approximately 2,000 sq. ft. will be redone to create an infiltration soil filter.

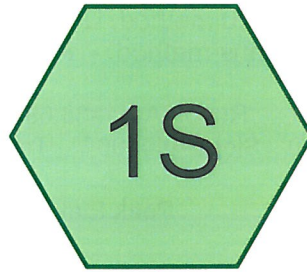
The filter will consist of 12" of soil media below 6" of topsoil. The top elevation will be recessed to allow storage of stormwater. This system matches the existing infiltration on site. There will be no discharge to the public sewer from this area of the site.

Conclusion:

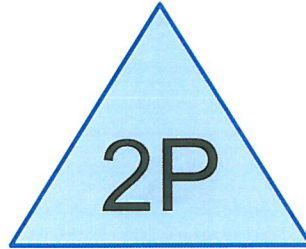
The capture and infiltration of stormwater from the new pavement area and the playground will minimize impacts of stormwater on the public sewer for this project. No change in peak flows leaving the site will occur. This project meets the standards of Chapter 500.



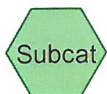
STATE OF MAINE
THOMAS S.
GREER
No. 4206
LICENSED PROFESSIONAL ENGINEER
Thomas S. Greer, P.E.



WEST END OF SITE
LIBBY



INFLITRATION FILTER



REED SCHOOL TSG 15154

Type III 24-hr 2 YEAR Rainfall=3.10"

Prepared by Hewlett-Packard Company

Printed 9/29/2017

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

Subcatchment 1S: WEST END OF SITE Runoff Area=38,698 sf 32.03% Impervious Runoff Depth>0.26"
Flow Length=100' Slope=0.0100 '/' Tc=19.1 min CN=58 Runoff=0.11 cfs 0.019 af

Pond 2P: INFILTRATION FILTER Peak Elev=12.52' Storage=36 cf Inflow=0.11 cfs 0.019 af
Outflow=0.10 cfs 0.019 af

Total Runoff Area = 0.888 ac Runoff Volume = 0.019 af Average Runoff Depth = 0.26"
67.97% Pervious = 0.604 ac 32.03% Impervious = 0.285 ac

REED SCHOOL TSG 15154

Type III 24-hr 2 YEAR Rainfall=3.10"

Prepared by Hewlett-Packard Company

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Summary for Subcatchment 1S: WEST END OF SITE LIBBY

Runoff = 0.11 cfs @ 12.48 hrs, Volume= 0.019 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

Area (sf)	CN	Description
* 12,394	98	PAVED
26,304	39	>75% Grass cover, Good, HSG A
38,698	58	Weighted Average
26,304		67.97% Pervious Area
12,394		32.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0100	0.09		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.10"

Summary for Pond 2P: INFILTRATION FILTER

Inflow Area = 0.888 ac, 32.03% Impervious, Inflow Depth > 0.26" for 2 YEAR event
 Inflow = 0.11 cfs @ 12.48 hrs, Volume= 0.019 af
 Outflow = 0.10 cfs @ 12.50 hrs, Volume= 0.019 af, Atten= 13%, Lag= 1.1 min
 Primary = 0.10 cfs @ 12.50 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 12.52' @ 12.62 hrs Surf.Area= 2,071 sf Storage= 36 cf

Plug-Flow detention time= 5.1 min calculated for 0.019 af (99% of inflow)
 Center-of-Mass det. time= 3.8 min (886.7 - 882.9)

Volume	Invert	Avail.Storage	Storage Description
#1	12.50'	7,250 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.50	2,000	0	0
13.00	4,000	1,500	1,500
14.00	7,500	5,750	7,250

Device	Routing	Invert	Outlet Devices
#1	Primary	12.50'	0.10 cfs Exfiltration at all elevations

Primary OutFlow Max=0.10 cfs @ 12.50 hrs HW=12.52' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.10 cfs)

REED SCHOOL TSG 15154

Type III 24-hr 10 YEAR Rainfall=4.60"

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

Subcatchment 1S: WEST END OF SITE Runoff Area=38,698 sf 32.03% Impervious Runoff Depth>0.85"
Flow Length=100' Slope=0.0100 '/' Tc=19.1 min CN=58 Runoff=0.56 cfs 0.063 af

Pond 2P: INFLTRATION FILTER Peak Elev=12.85' Storage=949 cf Inflow=0.56 cfs 0.063 af
Outflow=0.10 cfs 0.063 af

Total Runoff Area = 0.888 ac Runoff Volume = 0.063 af Average Runoff Depth = 0.85"
67.97% Pervious = 0.604 ac 32.03% Impervious = 0.285 ac

Summary for Subcatchment 1S: WEST END OF SITE LIBBY

Runoff = 0.56 cfs @ 12.32 hrs, Volume= 0.063 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YEAR Rainfall=4.60"

Area (sf)	CN	Description
* 12,394	98	PAVED
26,304	39	>75% Grass cover, Good, HSG A
38,698	58	Weighted Average
26,304		67.97% Pervious Area
12,394		32.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0100	0.09		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.10"

Summary for Pond 2P: INFILTRATION FILTER

Inflow Area = 0.888 ac, 32.03% Impervious, Inflow Depth > 0.85" for 10 YEAR event
 Inflow = 0.56 cfs @ 12.32 hrs, Volume= 0.063 af
 Outflow = 0.10 cfs @ 12.10 hrs, Volume= 0.063 af, Atten= 82%, Lag= 0.0 min
 Primary = 0.10 cfs @ 12.10 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 12.85' @ 13.86 hrs Surf.Area= 3,404 sf Storage= 949 cf

Plug-Flow detention time= 101.0 min calculated for 0.063 af (100% of inflow)
 Center-of-Mass det. time= 99.9 min (947.6 - 847.7)

Volume #1	Invert	Avail.Storage	Storage Description
	12.50'	7,250 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.50	2,000	0	0
13.00	4,000	1,500	1,500
14.00	7,500	5,750	7,250

Device #1	Routing	Invert	Outlet Devices
	Primary	12.50'	0.10 cfs Exfiltration at all elevations

Primary OutFlow Max=0.10 cfs @ 12.10 hrs HW=12.52' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

REED SCHOOL TSG 15154

Type III 24-hr 25 YEAR Rainfall=5.80"

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

Subcatchment 1S: WEST END OF SITE Runoff Area=38,698 sf 32.03% Impervious Runoff Depth>1.47"
Flow Length=100' Slope=0.0100 '/' Tc=19.1 min CN=58 Runoff=1.06 cfs 0.109 af

Pond 2P: INFILTRATION FILTER Peak Elev=13.21' Storage=2,413 cf Inflow=1.06 cfs 0.109 af
Outflow=0.10 cfs 0.068 af

Total Runoff Area = 0.888 ac Runoff Volume = 0.109 af Average Runoff Depth = 1.47"
67.97% Pervious = 0.604 ac 32.03% Impervious = 0.285 ac

Summary for Subcatchment 1S: WEST END OF SITE LIBBY

Runoff = 1.06 cfs @ 12.30 hrs, Volume= 0.109 af, Depth> 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YEAR Rainfall=5.80"

Area (sf)	CN	Description
* 12,394	98	PAVED
26,304	39	>75% Grass cover, Good, HSG A
38,698	58	Weighted Average
26,304		67.97% Pervious Area
12,394		32.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.1	100	0.0100	0.09		Sheet Flow, SHEET Grass: Dense n= 0.240 P2= 3.10"

Summary for Pond 2P: INFILTRATION FILTER

Inflow Area = 0.888 ac, 32.03% Impervious, Inflow Depth > 1.47" for 25 YEAR event
 Inflow = 1.06 cfs @ 12.30 hrs, Volume= 0.109 af
 Outflow = 0.10 cfs @ 11.95 hrs, Volume= 0.068 af, Atten= 91%, Lag= 0.0 min
 Primary = 0.10 cfs @ 11.95 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 13.21' @ 15.51 hrs Surf.Area= 4,732 sf Storage= 2,413 cf

Plug-Flow detention time= 198.5 min calculated for 0.068 af (63% of inflow)
 Center-of-Mass det. time= 118.6 min (953.1 - 834.5)

Volume #1	Invert	Avail.Storage	Storage Description
	12.50'	7,250 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
12.50	2,000	0	0
13.00	4,000	1,500	1,500
14.00	7,500	5,750	7,250

Device #1	Routing	Invert	Outlet Devices
	Primary	12.50'	0.10 cfs Exfiltration at all elevations

Primary OutFlow Max=0.10 cfs @ 11.95 hrs HW=12.52' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.10 cfs)

**REED SCHOOL REDEVELOPMENT
PORTLAND, MAINE**

**INSPECTION AND MAINTENANCE
OF STORMWATER MANAGEMENT FACILITIES**

Stormwater Management Facilities include swales, paved surfaces, drain pipe, riprapped aprons, level spreaders, buffers detention basins/treatment ponds. Periodic inspection and maintenance of these site features and devices is necessary to prevent erosion, protect roadways and other paved areas, and remove pollutants from stormwater runoff.

The operation and maintenance will be the responsibility of the developer.

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 (“DPW”) 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 DPW in a form provided by DPW, 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 DPW 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, DPW 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; Ord. 108-15/16, 11-16-2015)

SWALES, DITCHES, CURBS AND PAVED AREAS:

Swales, ditches, curbs and paved areas are easily inspected during a site walk or even a ride-by. Since visual inspection is easy, their condition should be assessed during and/or after significant rainfall events such as thunder showers and periods of heavy or extended rainfall and during periods of significant snowmelt. Any damage or unusual condition such as sedimentation of a ditch, erosion, damaged curb or dying vegetation should be recorded, dated and initialed by the inspector when observed. Even if there is no damage, the inspector should make record of these inspections at least twice annually.

Paved areas should be visually inspected monthly during the winter. The inspector should pay particular attention to the build up of sand around catch basin grates and remove accumulations that block the free flow of surface runoff to the catch basins. The date and initials of the inspector should be recorded on the forms provided as well as a notation of any cleanup effort that was made and the approximate volume of sand that was removed.

CATCH BASINS, FIELD INLETS AND DRAIN MANHOLES:

Catch Basins and field inlets are precast concrete structures with sumps and cast iron grates used to collect stormwater and trap heavy sediments. Drain Manholes are similar structures constructed with a channel instead of a sump and a solid cast iron cover instead of a grate. Drain Manholes exist at changes in direction and/or size of storm drain pipe. Catch Basins, field inlets and drain manholes provide access to the closed storm drain system for inspection and maintenance.

Throughout the winter / spring sanding period, inspect catch basins and field inlets monthly and after every significant rainfall event or period of heavy snowmelt. Clean catch basin and field inlet sumps when sediment level is within 3 inches of the outlet pipe invert. Record dates of inspections, observations and maintenance measures implemented (if any) on the forms provided and initial the entry.

Confined space entry safety procedures should be practiced when entering these structures.

DRAIN PIPES:

Drain pipes are road culverts and pipes connecting drain manholes. Inspect drain pipes when inspecting other stormwater maintenance facilities. At least annually make a visual inspection of the pipe. During the daylight you should be able to see light through most pipes as they have been laid to a straight line and grade. In some cases (e.g. pipe runs to a drain

manhole, or is blocked) you will need a light to inspect pipes.

Clean pipes as necessary. Record inspections on the forms provided noting condition of pipe and any maintenance procedures implemented.

SOIL FILTERS:

There is a soil filter located on the project site. A soil filter is a landscaped depression with a soil filter that exfiltrates the stormwater. The depression is designed to temporarily store runoff, which will drain through the soil filter into the soil.

Soil Filter Inspection: The soil 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.

Soil 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. The grass around the filter acts as pretreatment.

Mowing: Filters with grass cover should be mowed no more than 2 times per growing season to maintain grass heights less than 12 inches.

Fertilization: Fertilization of the filter area should be avoided unless absolutely necessary to establish vegetation.

Harvesting and Weeding: Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary. Add new mulch as necessary for bioretention cells.

Record all maintenance on forms provided.

**REED SCHOOL REDEVELOPMENT
PORTLAND, MAINE**

INSPECTION / MAINTENANCE LOG

DRAIN PIPES

I: INSPECTED - C: CLEANED - R: REPAIRED

DATE	INITIALS	ACTION	COMMENT
10-2-17	TSG	I, C	EXAMPLE: Called ACME to clean catch basins, cleaned debris from culvert inlets along access road.

**STORMWATER MANAGEMENT SYSTEM
MAINTENANCE PROGRAM
SUMMARY CHECKLIST**

Item	Commentary	Frequency			
		Month	Semi-Annual	Annual	Long-Term
Open Swale, Ditches & Inlet Structures	Inspect for debris accumulation, erosion and excessive vegetation. Mow monthly, remove debris, repair and revegetate any area of erosion	X Mow		X	
Pavement	Review for damage and buildup of debris and sand.	X	X Sweep		
Pipelines	Inspect for sediment build-up in pipe. Flush and remove as required.			X	
Soil Filter	The soil filter should be inspected after every major storm in the first few months to ensure proper function		X Mow, Check Drain Rate	X Sediment Removal	X Weed, Repl. Media

HOUSEKEEPNG REPORT

REED SCHOOL REDEVELOPMENT PORTLAND, MAINE

October 2, 2017

Housekeeping: The developer is responsible for notifying the contractor and owner of the housekeeping standards.

1. Spill Prevention: The contractor and owners need to take care with construction and waste materials such that contaminants do not enter the stormwater. The storage of materials such as paint, petroleum products, cleaning agents and the like are to be stored in watertight containers. The use of the products should be in accordance with manufacturer recommendations. When fueling equipment, including snowblowers and lawnmowers, have oil absorbent pads available below the fueling.

Staging areas are noted on the plans for the contractor's use. Refueling of small engines by the owner should occur in the garage or on a paved surface.

Any spill or release of toxic or hazardous substances must be reported to the Department. For oil spills, call 1-800-482-0777 which is available 24 hours a day. For spills of toxic or hazardous material, call 1-800-452-4664 which is available 24 hours a day. For more information, visit the Department's website at: <http://www.maine.gov/dep/spills/emergspillresp/>

2. Groundwater Protection: Protection of the groundwater is required by the contractor and owner. Petroleum products should be stored in manufactured cans designed for the purpose. Spill preventions procedures should be followed.
3. Fugitive Sediment and Dust: The contractor is required to minimize dust from the construction operation. The road should be swept regularly (weekly) and prior to any rain event. The gravel areas are to be watered regularly to minimize dust. Any mud that is tracked off site should be cleaned up prior to it drying and becoming a dust issue.

Do not use oil to control dust.

Dewatering a stream without a permit from the Department may violate state water quality standards and the Natural Resources Protection Act.

4. Debris and Other Materials: Construction materials and construction debris should be covered to prevent rainwater from washing contaminants off the site. Any fertilizers, cleaning products, herbicides should be protected from the weather and used in accordance with manufacturers recommendations.

Note any contaminants that are washed off the site by rainwater is a violation of the Clean Waters Act.

Storage Handling and Disposal of Solid Waste items must comply with Maine's Solid Waste Management Rules. Lack of appropriate pollutant control may result in violations of the Groundwater Quality Standards.

This project has a written Erosion Control Plan and Stormwater Maintenance Plan. Modifications to the plan must be approved by the Town.

Maintenance of stormwater treatment and control systems must occur regularly. The Stormwater Maintenance Report provides inspection details and time lines for doing the inspections and reporting to the Town and DEP